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IMPLEMENTATION OF THE GENETIC POTENTIAL OF PRODUCTIVITY OF COWS OF HOLSTEIN BREED IN THE SOUTH OF R. MOLDOVA

Aleksandra KONSTANDOGLO[1], V. FOKSHA[1], A. KENDIGELYAN[2], I. AKBASH[2]

[1]Scientific and Practical Institute of Biotechnologies in Zootechny and Veterinary Medicine, Republic of Moldova
[2]Society of limited liability „DokSanCom" v. Tomay, Administrative and Territorial Unit Gagauzia, Republic of Moldova
Corresponding author email: aconstandoglo@yahoo.com

Abstract

In the article are shown the materials of estimation of cows of Holstein breed on milk productivity for I-III finished lactations. It was found that the cows for the first lactation had a milk productivity at the level of 85% from the full-aged cows (at a rate of 70-75%), which amounted to an average of 8980.2 kg of milk with a fat content of 3.83%. Milk productivity of cows of III lactation averaged 10530.1 kg of milk.
The parental index was at the level of 9720 kg by milk yield and 4.27% by fat content. Realization of genetic potential for milking of first-calves was 8980.2 kg, and cows for II-III lactation - 10081.8 and 10530 kg of milk, respectively. It was marked the cow nr. 5736, from which for 7 completed lactations (2135 days) was received 65274 kg of milk, the average daily milk yield for the whole period was 30.5 kg of milk.

Key words*: Holstein breed, lactation, lactation curve, realization of the genetic potential of productivity.*

INTRODUCTION

In the XX century the Holstein breed became the dominant one in the world dairy cattle breeding. The world population of Holstein cows is 25 million heads, or 72% of the eight world's most common dairy breeds (Jansen, 2009). Canadian cattle breeders believe that for the Holstein cows, a yield of 45 kg per day is good, but not sufficient. In the future, they plan to bring a yield for lactation to 12,000 kg, and daily - to increase to 80 kg and more (Wilson, 1985).

Using the high genetic potential of Holstein in purebred breeding and crossing with other breeds allowed in many countries to create highly productive herds and increase milk production while reducing the number of dairy cows. Over the past 40 years, milk yields in many European countries increased more than twice as a result of achievements in breeding, feeding and management of the herd. Currently, the average growth in milk productivity is 1.5% per year, the main role is given to the effective use of artificial insemination, which predetermines the high genetic potential of the herd (Sartori, 2006).

A dairy cattle breeding is the leading branch of livestock production in the Republic of Moldova and many countries of the world. The main task of dairy cattle breeding is to increase the productivity of animals and improve the quality of products. In increasing the production of milk, an important role is assigned to selection and breeding work, as it determines the genetic progress of breeds and herds. All other factors, including elements of technology, provide only the implementation of this process.

Currently, in the Republic of Moldova, as in other Eastern European countries, new herds of Holstein breeds with high productivity are created by importing livestock. In the Republic of Moldova, dairy cattle are imported from different countries, including Holland and Germany. These animals combine high milk production, are able to give high milk yields (Foksha et al., 2017). It should be noted that at the beginning of 2016 there were 1,421 heads of Holstein cattle in the republic, including 932 cows, whose milk productivity averaged 7612 kg of milk with a fat content of 3.81% (Foksha et al., 2016).

One of the most important factors of determining the value of imported livestock is the genetic potential of acquired animals, which is determined by the productivity of the mother's ancestors. Each regular import of

animals needs to study the realization of their genetic potential for economic-useful signs under new conditions. Therefore, the purpose of the research was to assess the dairy productivity of Holstein cows in the south of the Republic of Moldova on an example of a herd of Society of limited liability "Doksancom".

MATERIALS AND METHODS

Research on the study of the productivity of Holstein cows of Dutch breeding were conducted in the herd of Society of limited liability (SLL) „Doksancom" v. Tomay, Administrative and Territorial Unit Gagauzia, Republic of Moldova.

For studying the productivity of cows, the data of primary zootechnical and pedigree records were analyzed: journals on the accounting of dairy productivity, pedigree cards of cows, pedigree certificates on animals and other documents of primary zootechnical accounting. The yield for lactation, for 305 days, was calculated on the basis of control milking, which was performed 3 times a month, taking into account the fat content in milk. During the research, lactation curves of some cows were studied. The conditions for feeding and keeping the imported animals from Holland were the same. Feeding rations, depending on the level of milk productivity, the physiological state of the animals and the quality of the feed were periodically adjusted.

The coefficient of milk yield of cows was determined by the formula: MR = M/LW, where: MR – milk ratio, kg; M – milk for 305 days or a shortened lactation, kg; LM – live weight, kg.

To study the influence of the genotype on the part of the father, the parent bull index (PBI) was calculated. The parent bull index (PBI) was calculated according to the method proposed by Kravchenko: PBI= 2M + MM + FM/4, where: M – the highest productivity of the mother; MM – the highest productivity of mother's mother; FM – the highest productivity of the father's mother.

The calculation of selection and genetic parameters of productivity and static processing of research materials were carried out according to the methods of Plohinsky (1970), Merkuryev (1983). The digital data obtained during the studies were processed biometrically on a personal computer using Microsoft Excel programs.

RESULTS AND DISCUSSIONS

Indicators of milk production, fat content in milk of breeding cows of farm SLL "Docsancom" in three lactations are presented in Table 1.

Table 1. Dairy productivity of cows of SLL "Docsancom" for three complete lactations

Lactation by account	The number of cows, heads	Live weight, kg	Milk yield, kg	Fat content		Coefficient of milk, kg
				%	kg	
the first	168	648.9±6.7	8980.2±122.8	3.83±0.01	343.2±4.3	1383.7
the second	108	658.2±5.1	10081.8±159.3	3.77±0.01	379.7±5.7	1520.6
the third	36	702.9±8.2	10530.1±351.8***	3.74±0.02	390.9±11.7***	1497.9

Note: *** - P<0,001

Analysis of the milk yield of cows of different ages showed that less milk was obtained from the cows of the first lactation.

It was established that the cows for the first lactation had milk production at the level of 85% of the full-aged cows (at a rate of 70-75%), which averaged 8980.2 kg of milk with a fat content of 3.83%.

It should be noted that with an increase in the number of lactations, there was an increase in milk yield for lactation. Thus, the increase in milk yield for the second lactation was 1101.6 kg of milk and amounted to an average of 10081.8 kg of milk per lactation, to the third – to 1549.9 kg of milk, the difference is highly reliable, at P<0.001.

The amount of milk fat also increased with the increase of the number of lactations. The amount of milk fat at cows in the second lactation was by 36.5 kg, and at cows of third lactation was by 47.7 kg more than at cows of

the first lactation, the difference is highly reliable at P<0.001.

For a more complete assessment of cows for milk production, we calculated the output of dairy products per 100 kg of live weight. The ratio of milk yield for lactation to the live weight of a cow, or the milk ratio, characterizes the economics of milk production. The coefficient of milk of Holstein cows, both for the first and second lactation, was at the level of 1383 - 1497 kg. When the analysis was performed, depending on the age in lactations, was observed an increase in the live weight of cows of the second lactation by 9.3, on the third, 54 kg or 1.4-8.3%.

For a more complete assessment of cows for milk production, we calculated the output of dairy products per 100 kg of live weight. The ratio of milk yield for lactation to the live weight of a cow, or the milk ratio, characterizes the economics of milk production. Normal value is considered to be close to 1000. From the data of Table 1 it is seen that for the whole population of the analyzed cows this coefficient exceeds the norm, the cows of the second lactation have the highest coefficient of milk – 1520.6 kg. As it is known, high-yielding cows within each breed are characterized by a large increase in productivity during the II-III month of lactation and a slow decrease in subsequent. Studies by American scientists and All-Russian institute of livestock production (Aldrich, 1987; Nekrasov et al., 2011) in experiments on highly productive Holstein cows with milk yield of 8500 to 10,000 kg and more confirmed the opinion of most scientists and practitioners about the typical lactation curve.

In figures 1 and 2 are shown lactation curves of cows' at numbers 1016 and 0685.

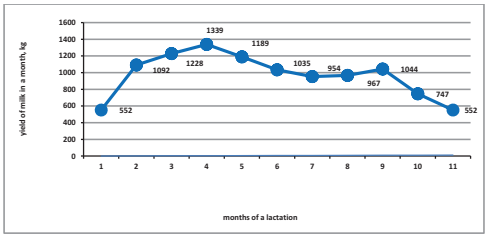

Figure 1. Lactation curve of a cow 1016, first lactation

The analysis of the lactation curve of the cow's number 1016 clearly showed that with a monthly milk yield at the peak of the first lactation, 1339 kg of milk it can be attributed to highly productive. At the same time, the productivity of the heifer by the end of lactation was almost equal to the full-aged cows of similar lactation terms. In the future, its lactation on the second lactation was 12054 kg of milk.

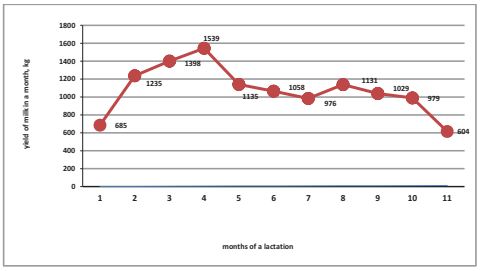

Figure 2. Lactation curve of a cow 0685, sixth lactation

Main peak of cow milk yield nr. 0685 for 4 months VI lactation was 1539 kg of milk, and then it is observed a gradual decrease until the end of lactation. In general, the yield for VI lactation amounted to 11769 kg of milk.

In the herd, were detected 16 cows with four and more lactations, the milk productivity of which remained at a high level in the dynamics of lactations. So, the most quantity of lactations was at the cow 5736. For seven finished lactations (2135 days), 65274 kg of milk was received from it, on average; the daily milk yield for the entire period was 30.5 kg of milk. For six lactations from the cow under the number 2918, was milked 63361 kg of milk. The highest milk yield for lactation from this cow was obtained by the last lactation, that is, for the sixth – 14,396 kg of milk. By 7514 kg of milk, less than six lactation was obtained from the cow 8545 - 55847 kg of milk.

It should be noted that both heifers and fully-aged cows in terms of milk productivity for 305 days of lactation exceeded the minimum standard requirements for Holstein breed.

For a more complete assessment of the potential capabilities of animals for all indicators of female ancestors, we calculated the parent index of cows (PIC) (Table 2).

Table 2. Realization of the genetic potential of cows 1-3 lactations

Account lactation	Indicators					
	Parent index of cows (PIC)		Own productivity		Realization of genetic potential (RGP),%	
	milk yield, kgM±m	fat, % M±m	milk yield, kg M±m	fat, % M±m	milk yield	fat
the first	9720±189.7	4.27±0.05	8980.2±122.8	3.83±0.01	92.4	89.7
the second			10081.8±159.3	3.77±0.01	103.7	88.3
the third			10530.1±3515.8	3.74±0.02	108.3	87.6

As a result of the analysis of the obtained data, it was established that the indicator of the parental index (PIC) was at the level of 9720 kg by milk yield and 4.27% by fat content.

The implementation of genetic potential (IGP) by milk yield was higher at cows of the third lactation and amounted to 108.3%, an average of 7.1% more than that of the cows of the first two lactations. On the content of fat in milk (%), the realization of genetic potential was higher at cows of the first lactation (89.7%). With an increase in the number of lactations, this indicator tends to decrease (87.6%), which is probably due to the existing direct correlation between the level of milk production and fat content in milk – with an increase in the milk production of cows, the fat content in milk decreases and vice versa.

Consequently, in the new conditions of keeping Holstein cows of Dutch breeding realize their genetic potential at a high level, which is facilitated by the appropriate conditions for keeping and feeding animals. The animals acquired in Holland combine high milk production, are able to give high milk yields, have good health, and have also successfully acclimatized and adapted to the conditions of the south of the Republic of Moldova, in particular in the SLL "Docsancom" herd.

CONCLUSIONS

A high level of milk productivity of cows was revealed for the first complete lactation, which amounted to 85% of full-aged cows. On average from cows by first lactation was milked 8980.2 kg of milk with a fat content of 3.83%.

The coefficient of milk yield of cows for the first two lactations was at the level of 1383-1497 kg, the cows of the second lactation had the highest coefficient of milking – 1520.6 kg.

The implementation of genetic potential by milk yield was higher at cows of the third lactation and amounted to 108.3%, an average of 7.1% more than at the cows of the first two lactations. On the content of fat in milk (%), the realization of genetic potential was higher at cows of the first lactation (89.7%).

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