

Changes in the live weight of cows with age and its impact on their productive qualities

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Abstract. In the Sverdlovsk region, holsteinized black-and-white cattle of the Ural type is bred, which is represented by large, highly productive animals with a high genetic potential for productivity. The purpose of the work is to study the dynamics of live weight of cows with age and its relationship with milk productivity. In animals, there is an increase in live weight with age by 22.6 kg (from 3 to 4 lactation) – 46.2 kg (from the first to the 2 lactation) or by 3.4 – 7.9%. With an increase in live weight, there was an increase in milk yields up to 3 lactation, and then their decrease. The greatest decrease was observed in the fifth lactation. The coefficient of milk production decreases with the age of cows and is accompanied by an increase in live weight. Despite an increase in live weight and a decrease in milk yield for every 100 kg of live weight of cows, all of them turned out to be of dairy-oriented productivity. However, it should be noted that achieving a live weight of 710 kg or more leads to a decrease in the efficiency of cow use. There is a low negative relationship between live weight and milk yield of cows.

1 Introduction

Sustainable supply of high-quality food products, including milk, is the main necessity in ensuring the health of the nation and food security of any country [1-7]. At the same time, special attention is paid to the development of dairy cattle breeding, since the main amount, more than 99% of the total production, is obtained from cattle, a valuable food product and raw material for the dairy industry – milk. The increase in cow productivity is inseparably linked to the improvement of milk quality [8-18]. The main population of dairy cattle belongs to the domestic black-and-white breed, in which the offspring are distinguished, differing in economic and biological characteristics. In recent years, a related Holstein breed has been used to improve dairy cattle. The widespread, long-term use of the valuable gene pool of the Holstein breed of foreign breeding bulls has led to the creation of a large array of Holstein cattle in various natural-climatic and ecological-forage zones of the country, which also differs by economic and biological features, which is due to the

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breed resources of cattle in the breeding zone and the country of origin of the breeding bulls involved in crossing [19-21]. Thus, in the Sverdlovsk region, the breeding stock of the black-and-white breed of the Ural offspring was inseminated with the seed of bulls-producers of Canadian, Danish and German breeding. As a result, large, highly productive animals having high genetic potential for productivity and well adapted to industrial milk production were obtained. They are able to show good average daily milk yields throughout lactation, produce for a long time without a sharp decrease in milk yield, but a decrease in reproductive ability was noted [22-27]. The study of the dynamics of live weight of cows with age and its relationship with milk productivity is relevant and has practical significance.

The *purpose of the work* is to study the dynamics of live weight of cows with age and its relationship with milk productivity.

2 Materials and method

The research was carried out in the conditions of one of the stud farms for breeding of holsteinized black-and-white cattle of the Ural type. The study included all the cows that completed 5 lactation on 01.10.2020. The data of zootechnical and breeding records of the Selex database were used for the analysis. Milk productivity was taken into account by conducting control milkings once a month, milk quality indicators: fat mass fraction and protein mass fraction in milk, which were checked monthly from each cow in the conditions of the dairy laboratory of the OJSC "Uralplemcenter" of the Sverdlovsk region. The live weight of the cows was estimated by individual weighing after calving. The coefficient of milk production and the correlation coefficients between the indicators of milk productivity and the live weight of cows by lactation were calculated.

3 Results and discussion

The farm is engaged in breeding of highly productive holsteinized cattle of the black-and-white breed of the Ural type with a high proportion of blood for the Holstein breed (more than 91%). In 2018, 9299 kg of milk was received from 1,391 cows, FMF and PMF in milk - 3.93 and 3.24%, respectively. The live weight of full-aged cows is 660-670 kg.

Figure 1 shows changes in the live weight of cows depending on their age.

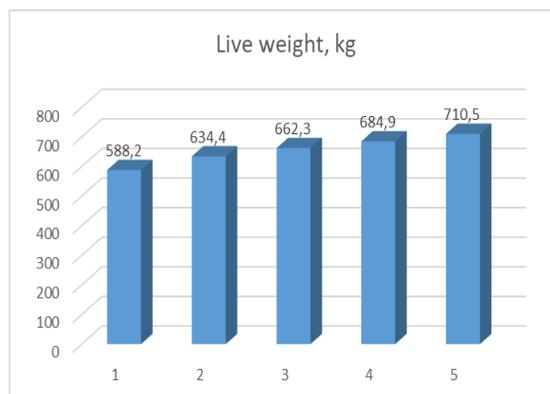


Fig. 1. Dynamics of live weight of cows by lactation, kg.

The figure clearly shows that the live weight increases with the age of cows. It is known that it increases significantly before reaching the physiological maturity of cows. Highly

productive cows are characterized by live weight loss during milking period after calving, which is associated with physiological changes in the body and if such losses are more than 10%, they do not recover. From the above data, it can be concluded that the farm has created conditions for normal life and productive longevity of cows. In animals, there is an increase in live weight with age by 22.6 kg (from 3 to 4 lactation) – 46.2 kg (from the first to the 2 lactation) or by 3.4 – 7.9%.

With an increase in live weight, there was an increase in milk yields up to 3 lactation, and then their decrease (figure 2.).

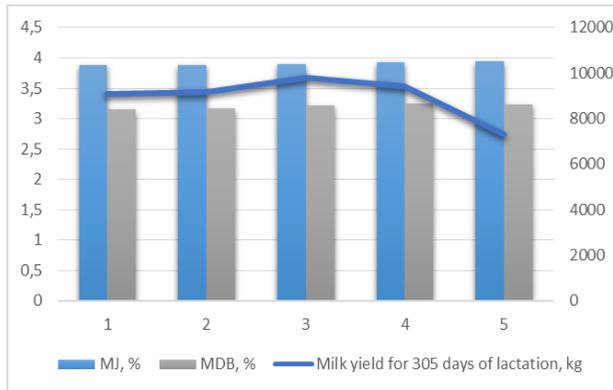


Fig. 2. Indicators of productivity of cows by lactation.

One of the most important indicators of productivity is the yield of milk fat with milk for lactation, according to which cows are assigned to a particular class according to breeding value. The results of the evaluation of cows on the yield of nutrients and the coefficient of milk content are presented in figure 3.

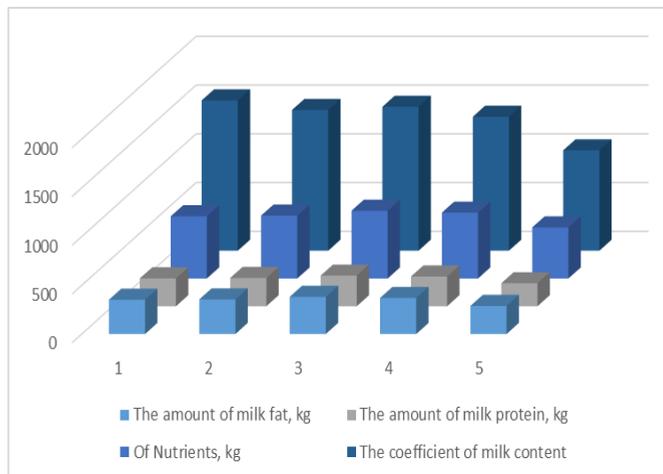


Fig. 3. Indicators of cow productivity.

As a result of the evaluation of cows on the yield of nutrients with milk, it was found that it increases with age, reaching maximum values in the third lactation, and then decreases. The greatest decrease was observed in the fifth lactation. This is explained by the change in milk yield for lactation, since no significant changes in FMF and PMF in milk for lactation were detected, despite the fluctuations in these indicators for lactations. According to the coefficient of milkiness, it is possible to judge the constitutional orientation of the

animal in a particular productivity. Despite an increase in live weight and a decrease in milk yield for every 100 kg of live weight of cows, all of them turned out to be of dairy-oriented productivity. However, it should be noted that achieving a live weight of 710 kg or more leads to a decrease in the efficiency of cow use.

The calculation of the correlation coefficient between live weight and milk yield per lactation confirms the latter assumption (figure 4.).

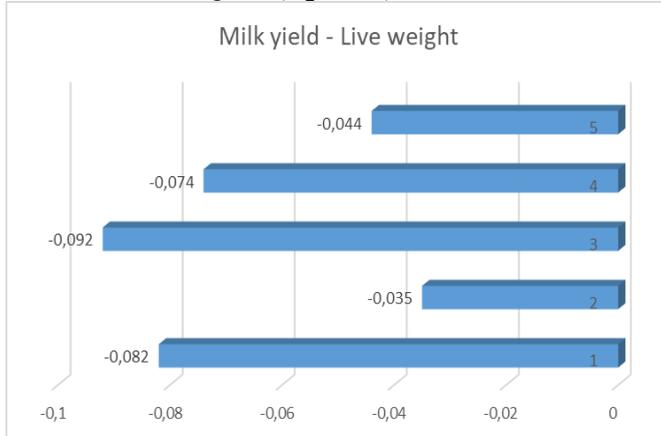


Fig. 4. Correlation coefficients between milk yield and live weight of cows by lactation.

Despite the fact that, according to many authors, N.V. Bogolyubova, V.P. Korotky, A.S. Zenkin, V.A. Ryzhov, N.P. Buryakov [23,24], V. Mymrin and O. Loretts [21], O.V. Gorelik, O.E. Lihodeevskaya, N.N. Zezin, M.Ya. Sevostyanov and O.I. Leshonok [25-27] it is considered that with an increase in live weight there is an increase in milk yield, in our case, there is a low negative relationship between these traits. Thus, an increase in live weight does not indicate an increase in productivity, although in absolute numbers this increase is noted up to and including 3 lactation. We believe that this is due to the physiology of milk formation.

4 Conclusion

Based on the above, it can be concluded that the farm uses large, highly productive holsteinized black-and-white cattle of the Ural type. Low negative relationship is noted between live weight and milk yield of cows, which increases with age up to 3 lactation.

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