

Assessment of productive longevity in cows of modern black-and-white cattle

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Abstract. The Ural type of the domestic black-and-white breed is distinguished by high productivity indicators, good suitability for use in the conditions of industrial milk technology. High productivity is accompanied by a decrease in productive longevity, which raises new questions for livestock workers. The assessment of the productive longevity of cows, depending on belonging to the line, is relevant and has practical significance. As a result of the research, it was found that the highest lifetime milk yield had animals of the Siling Trijun Rokita line, which in this indicator exceeded the rest by 23015 - 30647 kg or by more than 54.0 - 72.0%. In each group there are animals that have low productivity and cows with a high lifetime milk yield of over 65-77 tons of milk. Cows of the Siling Trajun Rokita line have high rates of productive longevity – 5.9 lactation, and the other lines have low from 1.4 to 2.4 lactation. The genetic potential of productive longevity of cows of all lines (with the exception of the Pabs Governer line) is high 9 - 10 lactation. An increase in the duration of lactation does not significantly affect the overall milk productivity of cows.

1 Introduction

Ensuring the food security of any country poses great challenges to farmers to increase production and improve the quality of agricultural products, including of animal origin [1-3]. Great importance is attached to the development of dairy cattle breeding as a branch of animal husbandry, from which such a valuable food product and raw material for the food industry – milk, is received [4-5]. For its production, highly productive dairy cattle is used, the main livestock of which belongs to related breeds of Dutch origin – Holstein, black-and-white, etc. [6-7].

The gene pool of the Holstein breed, which is considered the best dairy breed in the world, has been used everywhere for a long time, more than four decades, and continues to be used to improve domestic livestock, including black-and-white breeds to increase the abundance of milk and improve technological features in industrial production [8-9]. A large array of Holsteinized black-and-white cattle with a high proportion of blood relationship by the Holstein breed has been created, which differs in economically useful

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and phenotypic characteristics depending on the breeding region and the breed resources used for crossing [9]. The Ural type of black-and-white cattle was created and officially registered in the Sverdlovsk region [9-10]. High productivity is accompanied by a decrease in productive longevity, which raises new questions for livestock workers. The assessment of the productive longevity of cows, depending on belonging to the line, is relevant and has practical significance.

2 Materials and Methods

The objects of research were cows of Holsteinized black-and-white cattle. The research was carried out in breeding plants for the breeding of Holsteinized black-and-white cattle of the Ural type of the Sverdlovsk region on the livestock of animals obtained by closely related breeding. The treatment included all cows that have completed lactation, obtained as a result of closely related mating – distant and moderate inbreeding, used in breeding plants. We used the data of zootechnical and veterinary records of the IAS "SELEX-Dairy cattle" database. Milk yield for 305 days of lactation, FDM, and PDM in milk were considered. Correlation coefficients between indicators of milk productivity depending on lactation were calculated. Milk yield per lactation was evaluated by conducting control milking once a month, milk quality indicators were determined in an average milk sample from each cow once a month in the Uralplemcenter dairy laboratory. The animals were divided into groups depending on their line origin: group 1 – the Vis Back Ideal line; group 2 – the Monvik Chieftain line; group 3 – the Pabs Governor line; group 4 – the Reflection Sovering line; group 5 – Siling Trajun Rokita.

3 Results and Discussion

The percentage of cows of individual lines is shown in the diagram (Fig. 1).

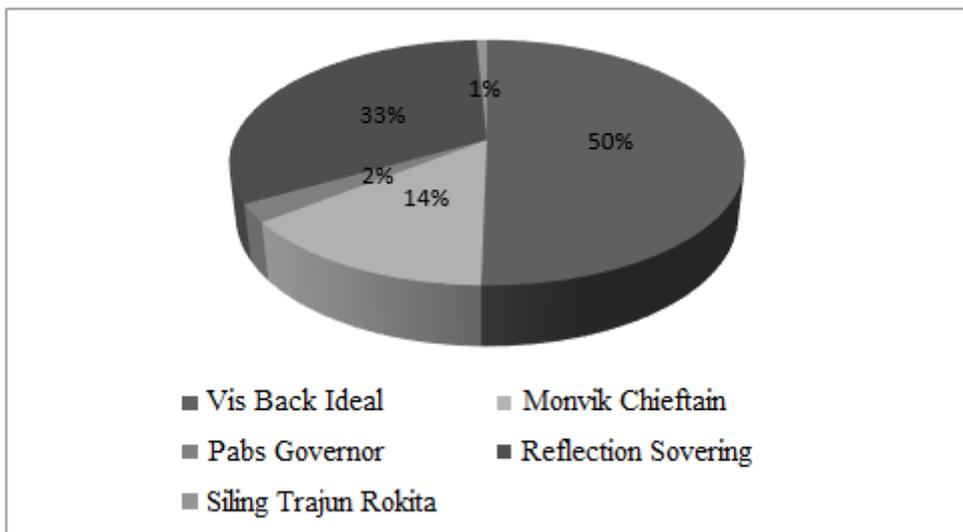


Fig. 1. The percentage of cows for lines.

The figure clearly shows that the main livestock of inbred cows belongs to two lines of Vis Back Ideal and Reflection Sovering 82.7% and only 17.3% falls on the other three. The third place is occupied by the animals of the Monvick Chieftain line.

When evaluating the productivity of cows, different periods of production are taken. For comparison of data on groups of animals, the best indicator is milk yield for 305 days of lactation (Fig. 2).

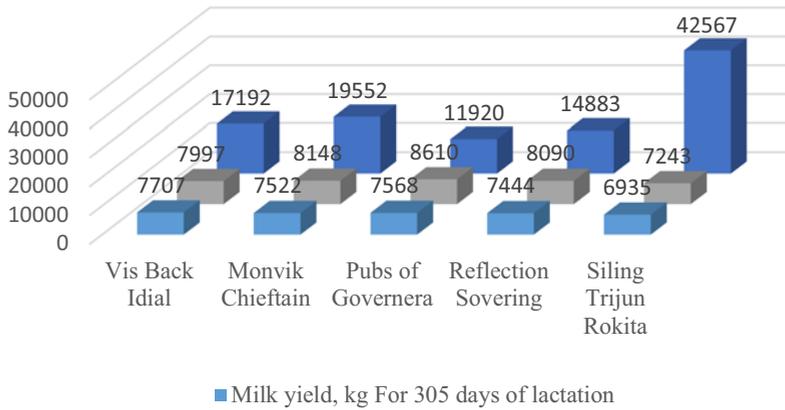


Fig. 2. Milk yield in cows for different periods of production, kg.

The figure shows that the highest milk yield for 305 days of lactation was in cows of the Vis Back Ideal line, animals of the Pabs Governor line were in second place, and the lowest milk yield was observed in cows of the Siling Trajun Rokita line. The difference in milk yield for 305 days of lactation between groups of cows ranged from 139 to 772 kg or 1.8-10.0% and was significant only between the lines of Vis Back Ideal and Siling Trajun Rokita in favor of the first one at $P \leq 0.05$.

An important indicator in determining the selection features is the lifetime milk yield. The figure shows that the animals of the Siling Trajun Rokita line had the highest lifetime milk yield, which in this indicator exceeded the rest by 23015-30647 kg or by more than 54.0-72.0%.

Figure 3 shows data on fluctuations in lifetime milk yield, which show that in any studied group of animals by line affiliation there are cows that show high productivity over a long period of use.

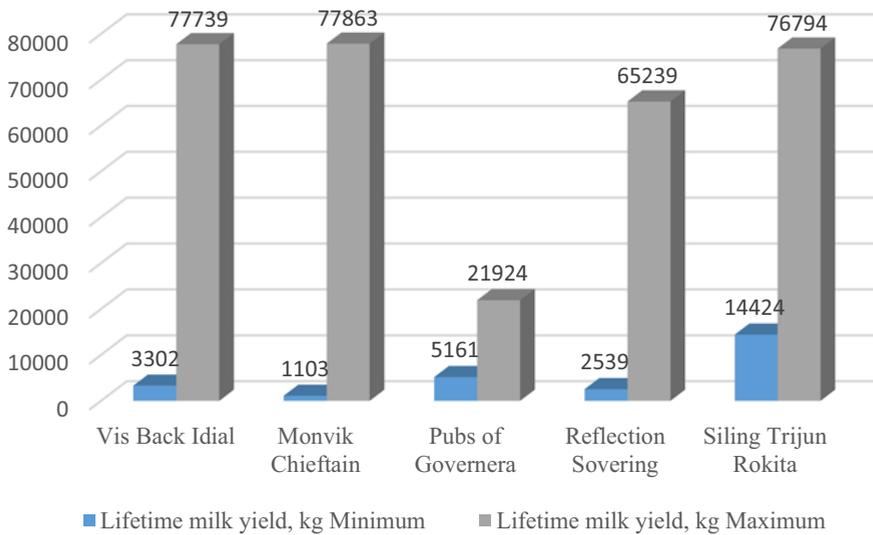


Fig. 3. Fluctuations in lifetime milk yield along the lines, kg.

The figure shows that in each group there are animals that have low productivity, most likely withdrawn during the first lactation, with the exception of cows from the Siling Trajun Rokita line and cows with a high lifetime milk yield of over 65-77 tons of milk.

Lifetime milk yield allows to estimate the duration of productive use of animals by the average indicators of lifetime milk yield and the possible duration, considering the maximum lifetime milk yield (Fig. 4).

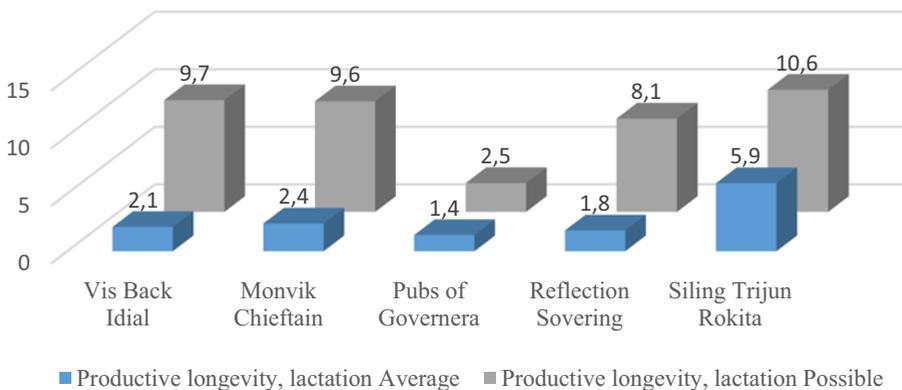


Fig. 4. Productive longevity of cows, depending on the line, lactation.

In the breeding farms of the region, the average indicators of productive longevity are 2.4-2.6 lactation, which is confirmed by the average indicators of productive use of cows of different lines. Cows of the Siling Trajun Rokita line have high rates of productive longevity – 5.9 lactations, and the other lines have low rates from 1.4 to 2.4 lactations. In the herd, the cows of the Pabs Governor line have been used recently and therefore at the

moment it is impossible to talk about their productive longevity. The genetic potential of productive longevity of cows of all lines (with the exception of the Pabs Governor line) is high, that is, work aimed at its increasing is effective.

High productivity of cows is often associated with an increase in the lactation duration. In our case, there is an increase in milk yield for the entire lactation, compared with milk yield for 305 days of lactation, which ranges from 291 (Vis Back Ideal line) to 1042 kg (Pabs Governor) with an increase in duration from 26 days (Siling Trajun Rokita line) to 94 days (Pabs Governor line). A positive relationship was noted between the extension of lactation duration and an increase in milk yield for the entire lactation, nevertheless, this increase is insignificant and amounts to 3.8; 9.3; 13.8; 8.7, and 4.5%. The difference was significant in 2-4 groups of cows (Monvik Chieftain lines; Pabs Governor; Reflection Sovering) at $P \leq 0.05$ - $P \leq 0.01$. In addition, it was found that with an increase in the lactation duration, the difference between milk yields for 305 days of lactation and for the entire lactation increased (Fig. 5).

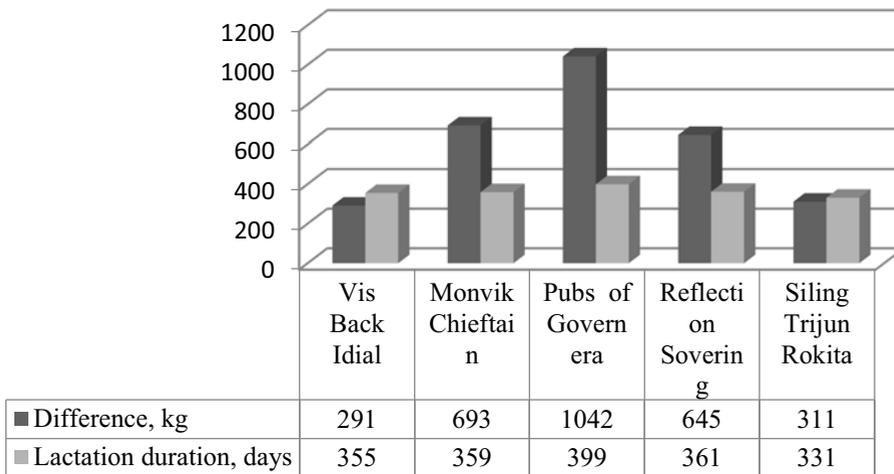


Fig. 5. The lactation duration and its effect on the increase in milk yields.

The figure clearly shows that an increase in the lactation duration leads to an increase in milk yield.

The calculations of average daily milk yields for 305 days of lactation and in the last days of lactation over 305 days showed that in the last days of lactation cows do not show high average daily milk yields, which cannot explain the need to extend the lactation duration and indicates certain problems with reproductive functions in cows (Fig.6).

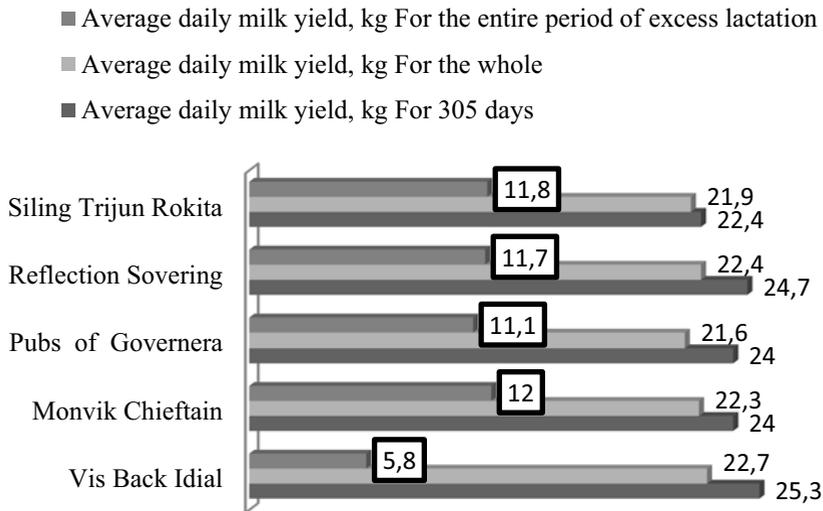


Fig. 6. Average daily milk yields by lactation periods in cows, kg.

The figure clearly shows that in the last lactation period over 305 days, the average daily milk yields ranged from 5.8 kg (Vis Back Ideal line) to 12.0 kg (Monvik Chieftain line), which is lower than the average for lactation by 77.1-47.2%. Thus, an increase in the lactation duration, although it leads to an increase in milk yield, but in general does not significantly affect the efficiency of milk production.

4 Conclusion

Thus, it can be concluded that the Ural type of Holsteinized black-and-white cattle has high breeding qualities, which is confirmed by their productive qualities. Productive longevity averages 2.4-2.6 lactations, while animals have certain problems related to reproductive abilities. An increase in the lactation duration does not significantly affect the total milk productivity of cows.

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