Comparative assessment of cows by daughters from different breeding bulls in terms of milk production

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Abstract. The increase in the productivity of cows is inseparably linked with the intensification of selection work with dairy cattle. All over the world, dairy cattle are used to obtain milk, including such related ones as black-and-white, Holstein, Dutch, which differ in economically useful qualities depending on the climatic and ecological-forage conditions of the breeding zone, and the gene pool of breed resources. Animal perfection is achieved by selecting the best males and females for reproduction and individual selection. The transmission of genes from generation to generation is carried out from father to son, from mother to son, from father to daughter, from mother to daughter. The rate of genetic improvement in dairy cattle populations depends on the efficiency of the assessment, selection and use of these groups of animals. Currently, the farm uses the daughters of sire bulls belonging to 3 Holstein lines. Several breeding bulls are used in each line. So, at present, the farm uses 17 bulls-sires of the Vis Back Aydial 1013415 line, 10 bulls of the Reflection Sovering 198998 line and 3 bulls of the Montvik Chief 95679 line, but the daughters of not all breeding bulls are already used in the herd. The belonging of cows to a certain line reliably at a high level of reliability influences the indicators of milk productivity. The decrease in milk yield in cows of the Montvik Chieftain 95679 line is accompanied by an improvement in the quality indicators of milk, namely, MJ in milk. Daughters of bulls-producers of a certain line differ in their productive qualities. The best indicators were found in the groups of daughters of sire bulls: Emen 105018721 and Pilot 63811814 (Reflection Sovering line 198998); Reverse 2708 (Montvik Chieftain line 95679); Tek 69052876 and Fennek 4241542328 (Vis Back Aydial line 1013415).

1. Introduction

Ensuring an uninterrupted and sustainable supply of the population with quality food, including milk, is the main problem of maintaining the health of the nation and food security of any country [1-5].

Increasing the production of high-quality products is one of the most important tasks in the development of animal husbandry, including dairy farming, which is becoming increasingly important due to the growth of the population of our planet and the satisfaction of humanity's needs for nutritious food. In this regard, the development of dairy cattle breeding is given great national economic importance [6-12]. The increase in the productivity of cows is inseparably associated with the...
intensification of selection work with dairy cattle [13-23]. All over the world, dairy cattle are used to obtain milk, including such related ones as black-and-white, Holstein, Dutch, which differ in economically useful qualities depending on the climatic and ecological-forage conditions of the breeding zone, and the gene pool of breed resources [24-26]. Animal perfection is achieved by selecting the best males and females for reproduction and individual selection. The transmission of genes from generation to generation is carried out from father to son, from mother to son, from father to daughter, from mother to daughter.

The rate of genetic improvement in dairy cattle populations depends on the efficiency of the assessment, selection and use of these groups of animals. Breeding work with dairy cattle without a reliable assessment of the ability of bulls and cows to transmit their productive hereditary qualities to their offspring is ineffective [27-29]. The main task of pedigree cattle breeding is to ensure that commercial cattle produce more milk and at a minimum cost, for this it is necessary to use the best pedigree bulls in breeding [24-29]. Comparative assessment of cows-daughters of different breeding bulls in terms of milk production is relevant, has practical value and requires extensive study.

The aim of the work was to compare daughters of different Holstein bulls in terms of milk production.

2. Materials and method
The studies were carried out on Holsteinized black-and-white cows, daughters of various Holstein bulls. The studies were carried out at the dairy complex from 2018 to 2020. During the research period, milk productivity was taken into account for the completed lactation according to control milking. In the milk of each cow, once a month, the fat content was determined using the Clover-1M device, and the protein content was determined using the Milkotester device. The research was carried out by the regional dairy laboratory.

Milk studies were carried out once a month, in duplicate. For the analysis, we used data from zootechnical and pedigree registration, the Selex program database.

3. Results
The agricultural enterprise is engaged in breeding highly productive, Holsteinized black-and-white cattle of the Ural type. The milk production of cows is influenced by many different factors. It is known that the milk yield of a cow is 60% dependent on feeding and not less than 25% on the origin, including linearity [19-21]. Currently, the farm uses the daughters of sire bulls belonging to 3 Holstein lines.

Several breeding bulls are used in each line. So, at present, the farm uses 17 bulls-sires of the Vis Back Aydial 1013415 line, 10 bulls of the Reflection Sovering 198998 line and 3 bulls of the Montvik Chief 95679 line, but the daughters of not all breeding bulls are already used in the herd.

Figure 1 shows the milk yield for 305 days of lactation and the yield of nutrients with milk of cows-daughters of 5 bulls from the Reflection Sovering line 198998 (Emen 105018721, Pilot 63811814, Dent 2244592261, Dancer 71088577 and Marcellus 136057831).

Despite the high performance indicators of daughters of all breeding bulls, significant differences are observed between them in milk yield per lactation, the yield of nutrients with milk (the amount of milk fat and milk protein). The daughters of the bull-producer Pilot 63811814 turned out to have the best indicators, which surpassed the daughters of other bulls-producers in milk yield by 437-1360 kg, the amount of milk fat by 21-68 kg, milk protein by 15-50 kg.
Figure 1. Milk yield for lactation and nutrient yield with milk of cows-daughters from the line Reflection Sovering 198998, kg.

Milk of cows-daughters of bulls-producers Pilot 63811814, Dent 2244592261, Dancer 71088577 was distinguished by an increased amount of MJ in milk, and Emena 105018721, Pilot 63811814, Denta 2244592261 had a higher protein content in milk (figure 2).

Figure 3 shows milk yield for 305 days of lactation and nutrient yield with milk of daughters of bulls-producers Fennek 4241542328, Lariat 62398865, Tek 69052876, Distances 140565227 from Vis Back ID 1013415 line.
Figure 3. Milk yield for lactation and nutrient yield with milk of cows-daughters from the line Vis Back ID 1013415, kg.

All daughters of all evaluated bulls of the Vis Bek Aydial 1013415 line have high performance indicators. The difference between the daughters of bulls-producers of the Vis Back Aydial 1013415 line in terms of productive qualities is 82 - 470 kg or 0.8 - 4.3%. A higher MDB was noted in the milk of daughters from the bull-producer DISTANTS 140565227, according to compared with the milk of daughters of other breeding bulls (figure 4).

Figure 4. Quality indicators of the line's cow milk line Vis Back ID 1013415, %.

Similar studies were carried out on the group of daughters of sire bulls belonging to the Montvik Chieftain 95679 line. Of this line, the daughters of only three sire bulls are used in the farm: Reverse 2708, Myrtle 50783876 and Tuareg 1785. These data are presented in figure 5 - 6.

This is a fairly young line in the farm and the daughters of the estimated bulls Myrtle 50783876 and Tuareg 1785 are used for the production of milk for 1 lactation. The daughters of the bull-producer Reverse 2708 are used for a longer time. They also had higher productivity indicators (figure 5). Perhaps
the daughters of other breeding bulls have not shown their genetic potential for productivity, or they will still show it when they reach their age and sex physiological development.

![Figure 5. Milk yield for lactation and nutrient yield with milk of cows-daughters from the line Mantic Chieftain 95679, kg.]

The daughters of the bull Reverse 2708 surpassed the daughters of other bulls by 1361-1378 kg in milk yield. In the milk of daughters of bulls-producers Myrtle 50783876 and Tuareg 1785, there was an increased content of MJ in milk, compared to the daughters of bull Reverse 2708, by 0.20 - 0.26%, respectively, along the lines (figure 6).

![Figure 6. Quality indicators of the line's cow milk line Mantic Chieftain 95679, %.]

To determine the efficiency of breeding the daughters of certain sire bulls, we calculated the milk production coefficient, by which one can judge the constitutional orientation of animals towards one or another productivity, which are presented in table 1.
### Table 1. Coefficient of milk production of cows-daughters of bulls-producers of Holstein lines.

| Line            | Bull-producer | Emen     | Pilot    | Dent     | Dancer   | Marcellus |
|-----------------|---------------|----------|----------|----------|----------|-----------|
| Vis Back ID 1013415 | Fennek         | 198998   | 1937±31.2| 2050±17.3| 1925±15.2| 1836±13.1|
|                 | Lariat         | 1888±23.8| 1891±20.6| 1899±13.3| 1792±6.8 |
| Mantic Chieftain | Reverse        | 95679    | 1523±27.8| 1322±31.3| 1387±23.5| 1801±9.9  |
|                 | Myrtle         |          |          |          |          |

From the data in the table it can be seen that all cows have a dairy productivity direction and high milk production rates. They were the highest in the daughters of bulls-producers of the Reflection Sovering 198998 line, in second place in this indicator were the Vis Back ID 1013415 cows.

### 4. Discussion

As a result of the research, it was found that at present the daughters of sire bulls belonging to 3 Holstein lines are used in the farm. Several breeding bulls are used in each line. All daughters of the studied Holstein bulls-producers were of the dairy direction of productivity and had a milk yield per lactation of over 7500 kg with sufficiently high quality parameters of milk. Similar data were obtained in the results of studies by Myrmir V and Loretts O [21], Gridina S, Gridin V and Leshonok O [22], Tkachenko I, Gridin V and Gridina S [24].

### 5. Conclusion

Based on the foregoing, the belonging of cows to a certain line reliably, with a high level of reliability, affects the indicators of milk productivity. The decrease in milk yield in cows of the Montvik Chieftain 95679 line is accompanied by an improvement in the quality indicators of milk, namely, MJ in milk. Daughters of bulls-producers of a certain line differ in their productive qualities. The best indicators were found in the groups of daughters of sire bulls: Emen 105018721 and Pilot 63811814 (Reflection Sovering line 198998); Reverse 2708 (Montvik Chieftain line 95679); Tek 69052876 and Fennek 4241542328 (Vis Back Aydial line 1013415).

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