

## BASIC PRINCIPLES OF SELECTION OF BULLS-PRODUCERS

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### *Abstract*

*Improving the methods of their evaluation is one of the most important links in breeding programs to increase productivity and fertility of livestock. The genetic improvement of the next generation and the population as a whole depends on the objectivity and accuracy of determining the tribal value of producers. We analyzed the basic principles of selection of bulls-producers, namely the use of producers of higher quality compared to the uterus; maximum use of the best manufacturers; replacement of the previous manufacturer by a manufacturer of even higher quality; regulation of kinship between the producer and the uterus with which he mates. As a result, it was found that when selecting producers for the herd, it is not rational to justify the choice with a high index of lifetime productivity.*

**Key words:** bulls-producers, dairy productivity, selection.

### INTRODUCTION

Widespread introduction of artificial insemination of cows imposes special requirements on breeding qualities of bulls-producers. Improving the methods of their evaluation is one of the most important links in breeding programs to increase productivity and fertility of livestock (Shishkina, 2020). The genetic improvement of the next generation and the population as a whole depends on the objectivity and accuracy of determining the tribal value of producers (Zdorovinin et al., 2021).

In this regard, we set a goal to study the peculiarities of the selection of bulls-producers according to international breeding bases and to develop a science-based system of selection of bulls-breeders (Shishkina, 2021). The basic principles of selection include the following: the use of producers of higher quality compared to the uterus; maximum use of the best manufacturers; replacement of the previous manufacturer by an manufacturer of even higher quality; regulation of kinship between the producer and the uterus with which he mates (Krykov, 2014; Nekrasov, 2014; Guseva, 2020).

### MATERIALS AND METHODS

The research was conducted on the basis of LLC "Pachelmskoe khozyaystvo", part of the group of companies LLC "UK" Rusmolko", which is one of the largest producers of whole milk in the Penza region. The herd of LLC "Pachelmskoe khozyaystvo" is staffed with cattle from the Holstein breed. Data from primary zootechnical and breeding documentation were used for analysis.

### RESULTS AND DISCUSSIONS

In order to carry out a competent selection of bulls-producers, it is necessary to determine the quality of the heifer to which the producer is selected (productivity and body type) and to establish the genealogical affiliation of the herd cows.

The average milk yield per herd is 10,471 kg, and the average fat content and protein milk yield are 3.73 and 3.14%, respectively. The average yield of fat per cow is 390.6 kg, and the average yield of protein is 328.8 kg (Figures 1, 2), which significantly exceeds the standards set for Holstein breed in the Russian Federation (Table 1).



Figure 1. Cattle of LLC "Pachelmskoe khozyaystvo" (Penza region, Russia)



Figure 2. Cattle of LLC "Pachelmskoe khozyaystvo" (Penza region, Russia)

Table 1. Indicators of milk productivity of cows for 305 days of the last completed lactation

Groups of animals	Heads	Milk, kg	Milk fat		Milk protein	
			%	kg	%	kg
All livestock	3333	10471	3.73	390.6	3.14	328.8
And lactation	1684	9962	3.71	369.6	3.15	313.8
II lactation	1649	10991	3.75	412.2	3.14	345.1

The correct physique of animals testifies to their ability to show a high level of productivity and productive longevity. The result of the evaluation of herd cows is slightly above average; deep enough torso and long sacrum; udder tightly attached with long anterior and highly attached broad posterior lobes, and a

deep furrow. Dairy forms are developed satisfactorily, muscularity is average. The position of the hind limbs and the angle of the hoof are normal. Disadvantages of the physique include insufficient strength of the physique, raised sacrum, narrow pelvis, closeness and some shortening of the front nipples.

Therefore, the cows of the herd of LLC "Pachelmskoe khozyaystvo" (Penza region, Russia) should be selected bulls-producers that

enhance the positive expression of external features and are able to correct the shortcomings of the offspring (Figure 3).



Figure 3. Calves of LLC "Pachelmskoe khozyaystvo" (Penza region, Russia)

To do this, a comparison of the exterior profile of the cows of the herd and the daughters of the fixed bull is carried out. The cows of the herd are characterized on average by a rather tall stature and deep body, strong physique and pelvic width slightly above the middle, tightly attached and high-lying udder with the length of the forelegs and the width of the hindquarters to the middle to the rear. It should be noted that the position of the sacrum in

animals of both countries of breeding is elevated, the position of the hind limbs deviates from the normal elephant side, the furrow of the udder is small,

In order to avoid undesirable related copulation, the method of line rotation is used in the selection of bulls. Which is that the cows of a certain lineage are selected bulls of other lines. The linear affiliation of the parent stock is given in Table 2.

Table 2. Genealogical structure of the parent stock by lineage

The line	Total uterine population, goal	Including, goal		
		Cows		heifers of all ages
		of all ages	of them first-timers	
R. Sovering	1526	1395	897	131
M. Cheftain	508	508	78	-
B. Ajdial	1789	1647	926	142
Total	3823	3550	1901	273

A study of the genealogical structure of the herd showed that the animals imported from the Netherlands and the United States come from 35 bulls from different breeding countries. Most of the cows come from bulls from the United States (52.3%) and Canada (26.1%), in addition, the share of animals from Dutch,

French, German and Italian producers is 10.5; 6.3; 3.1 and 1.6%, respectively. It is obvious that the bulls of other countries were used in Canada and America for the purpose of "refreshing the blood." All bulls of the same lines, regardless of the country of origin, belonged to the same branches.

For example, let's base the selection of the manufacturer of one planned Vis Ajdiala line. Recently, since the introduction of the complex index of lifelong productivity, Russian milk producers have begun to focus on it when selecting bulls. The higher the index, the index of lifetime productivity, the greater the interest of the manufacturer.

However, it should be understood that the data of the international assessment could not be fully consistent with Russian conditions. And since the Russian Federation is not a member of Interbull and does not participate in the MASE rating system, it is not possible to make an adjustment in the assessment for local conditions.

In this regard, it is important to assess the priority areas in the improvement of the herd and to select bulls-producers according to individual indicators of the projected transmission capacity that meet the established priorities.

Improving the productivity and quality of cow's milk is, of course, a priority for the herd. But the question of the importance of choosing a bull according to the forecast of the transfer capacity of dairy productivity can be answered only by comparing the level of basic productivity of Holstein cows in the United States and LLC "Pachelmskoe khozyaystvo" (Table 3).

Table 3. Average dairy productivity of the Holstein population in the United States and LLC "Pachelmskoe khozyaystvo" (Penza region, Russia)

Indicator	USA	LLC "Pachelmskoe khozyaystvo"	Difference, %
Milk, kg	11813	10471	11.4
Yield of milk fat, kg	431	390	9.5
Yield of milk protein, kg	355	328	7.6

As mentioned above, the index of the projected transmittance of bulls on milk yield, milk fat and milk protein shows how many daughters of the producer exceed the genetic basis (the level of the US cow population in 2015). Table 3 shows that even the initial population of Holstein cattle in the United States exceeded Pachelmskoe khozyaystvo LLC by an average of 11.4% in all indicators of dairy productivity. Therefore, whatever the bull's transfer index, it will be an improver for the cows of this farm. However, it should be borne in mind that the yield of milk fat and protein depends not only on their percentage in the milk yield, but also on the amount of milk obtained. A cow with a high yield of protein and fat can be abundant, but liquid milk. At the same time as in LLC "Pachelmskoe khozyaystvo" it is necessary to increase the quality of milk. Therefore, when choosing a bull, it is necessary to pay attention to the quality of milk of its female ancestors. It is important that they are high enough.

The problem of modern dairy cattle breeding is the reduction of the term of economic use of cows. Therefore, the second priority is to increase the longevity of animals. Therefore, it is necessary to pay attention to the indices

characterizing the health of the daughters of the bull-producer.

The third priority area of work with the herd is to improve the body type of herd cows. In this regard, you should pay attention to the assessment of the exterior of the daughters, the chosen bull.

For the sample, we selected two bulls from the Vis Ajdiala Alta Revolver and Alta Briar line. A comparison of the index score of these producers shows that Briar is inferior to Revolver in some priority features, but the differences are not significant and do not affect its improving ability in relation to the cows of the herd of LLC "Pachelmskoe khozyaystvo ". In addition, the Briar bull is descended from female ancestors with a high fat and protein content in milk: the fat content and protein milk content of the bull's mother are 4.2 and 3.4%, and the bull's mother's mother is 4.1 and 3.4%, respectively. For Revolver such data are not given in the catalog. It should also be noted that Briara's estimate was based on its use in 139 herds based on 721 daughters (MD/H-721/139), so the accuracy of its improving ability (MREL) is higher than 97%. The revolver (2014 year of birth) has not yet been

evaluated for lactating daughters. The forecast of its tribal value is given on the basis of research of its genome, therefore accuracy of this forecast is lower (75%). With all the above, the lifetime profit index, which sets the price of sperm, but not relevant for the Russian Federation in Briara below. Therefore, the purchase of Briara seeds for the economy is more profitable.

## CONCLUSIONS

On the basis of research conducted on the basis of LLC "Pachelmskoe khozyaystvo" we can draw the following conclusion that when selecting producers for the herd is not rational to justify the choice of a high index of lifetime productivity. It is necessary to assess the parameters of the herd, to determine the priority areas for its improvement and to choose a producer according to the indicators of individual characteristics of its transmitting ability, corresponding to the priorities in the direction of selection of a particular farm.

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