

THE INFLUENCE OF THE FACTOR «GENETIC VALUE OF THE SIRE» ON THE IMPLEMENTATION OF THE GENETIC POTENTIAL OF THE INDICATOR «MILK PRODUCTION OF MAXIMUM LACTATION » OF THE YAROSLAVL BREED COWS

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Communication

Abstract: Dairy products are the main food elements of the man. Milk is the sole food for infants and it plays an important role in feeding of the sick, convalescent, and healthy adults. The Yaroslavl Region is a leading region of the Yaroslavl cattle breed. Therefore, the aim of our research was to determine the strength and reliability of the influence of the factor «genetic value of the sire» on productive characteristics of animals as a factor that helps to increase the productivity of animals. When we determine the strength of the influence of factors for statistical data we used the procedure of generalized linear models (General Linear Models - GLM), and evaluation components of phenotypic variation attributes were analyzed by multivariate dispersive analysis. Our research has allowed to allocate bulls with genetic value which has the improving effect. Using the recommended lines the farmers of the Yaroslavl region may increase productive characteristics of animals and the profit of the farms and improve the efficiency of breeding.

Keywords: cattle, productive characteristics, genetic potential

Introduction

Accelerating the race of genetic improvement of the breed by breeding and productive indicators is possible by using bulls - improvers having high productive offspring (*Mazepkin, 2000; Moskalenko and Konovalov, 2010*). The impact of the

productivity of daughters is decisive in the selection process. Improvement of cattle in sense of improvement of the genetic basis of the population of cattle for milk production, production of milk fat and content of milk fat in present conditions is done through bull sires and bull dams. By application of high quality breeding animals with proven genetic capacity (sons of bull dams and bull sires) production and reproduction traits of cattle population can be improved. (Petrovic et.al., 2006; Pantelic et.al., 2009, Petrovic et.al., 2012). Common genetic contribution of bulls in the genetic improvement of dairy cattle population is up to 95% (Mityukov, 2007; Moskalenko et. al., 2012). According to native and foreign scholars who study the impact of the factor «genetic value of the sire», 43-46% of the maximum possible selection effect is determined by selection of the bulls sires, 30-35% - by the selection of bulls mothers, 16-20% of cow sires and only 6% is due to the selection of cow mothers (76-78% of breeding progress is determined selection of bulls and only 22-24% - by selection of cows).

Producers used in the herd influence not only on the growth and development of young animals, but also in the future - on productive characteristics of animals. This influence obeys the law: the offspring will be more productive if the difference between the productivity of the mother of the sire and mother of the daughter is small (Ovchinnikov, 2008).

We have a large number of literary sources devoted to the study of the environmental and genetic factors influencing on genetic potential and its realization. It is also given a great importance in the existing breeding programs. The Yaroslavl region is the leading district in breeding of the Yaroslavl cattle. Therefore, the aim of our research was to determine the strength and reliability of the impact of the factor «genetic value of the sire» on the implementation of the genetic potential of the indicator «Yield of maximum lactation» of the Yaroslavl cattle breed.

Material and methods

The object of the study were pure-bred cows of the Yaroslavl breed and crossbreed cows of the Holstein x Yaroslavl breed having different thoroughbredness of the Holstein breed, in the amount of 6230 cows, 4776 of them are leavers.

Material is prepared on the basis of the «Information database of the Yaroslavl cattle breed» (№ of the state registration is 2013620064), data of the program ARMZS (up to 2009 year) and ARMS -W (№ of the state registration is 2009613920 from 22.07.2009 year), information software module «PAVKA».

Farms of the Yaroslavl region with different keeping technology were selected for study: LLC breeding plant «Rodina» (Loose - boxed keeping of cows and

equipment of «Westfalia» company), Joint Stock Company, breeding farm named after Dzerzhinsky (captive keeping with the use of installations of «DeLaval» company).

We determined the realization of the genetic potential estimated by Kuznetsovsk algorithm, 1983 (*Malyukova, 2012*). The evaluation of components of phenotypic variability was performed using a multi-factorial dispersive analysis (*Kuznetsov, 2000*).

Results and discussion

In cattle herds Yaroslavl breed we determined the effect of the factor «genetic value of the sire» on the implementation of the genetic potential of the indicator «milk production of maximum lactation» (picture 1). Assessing the effects of the gradation of the factor «genetic value of the sire» on the studied characteristics of cattle is presented in the table 1.

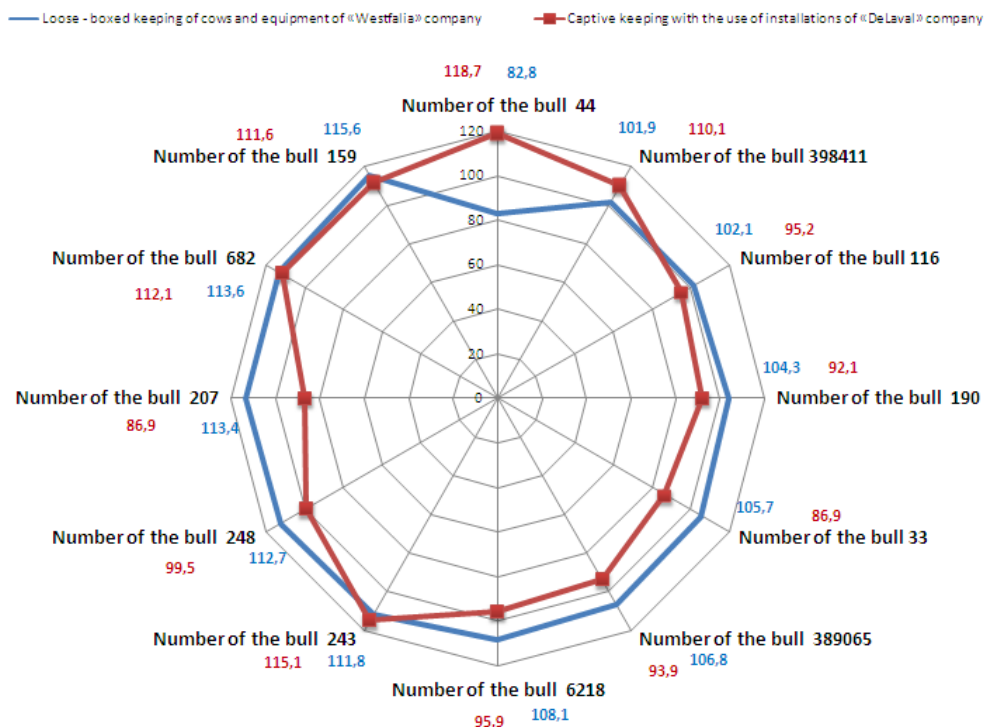


Figure 1. The effect of the factor «genetic value of the sire» on the indicator «milk production of maximum lactation»

Table 1. The Results of the application of various technologies in the context of thoroughbredness of the Holstein breed

Number of the bull	Technology of The		Loose - boxed keeping of cows and equipment of «Westfalia»	Captive keeping with the use of installations of «DeLaval» company
	keeping cows	Index		
116	the number of cows		32	27
	milk production of maximum lactation		6898,6	5288,0
	genetic potential		6756,8	5554,6
	genetic superiority, %		102,1	95,2
159	the number of cows		79	54
	milk production of maximum lactation		6397,2	7519,7
	genetic potential		5533,9	6737,5
	genetic superiority, %		115,6	111,6
190	the number of cows		22	131
	milk production of maximum lactation		7045,4	5129,9
	genetic potential		6754,6	5569,9
	genetic superiority, %		104,3	92,1
207	the number of cows		89	22
	milk production of maximum lactation		6276,0	5885,9
	genetic potential		5534,4	6773,2
	genetic superiority, %		113,4	86,9
243	the number of cows		127	31
	milk production of maximum lactation		7503,9	6386,1
	genetic potential		6711,9	5548,3
	genetic superiority, %		111,8	115,1
248	the number of cows		36	18
	milk production of maximum lactation		7601,3	5526,1
	genetic potential		6744,7	5553,9
	genetic superiority, %		112,7	99,5
33	the number of cows		25	14
	milk production of maximum lactation		7140,5	4829,0
	genetic potential		6755,4	5556,9
	genetic superiority, %		105,7	86,9
389065	the number of cows		80	82
	milk production of maximum lactation		5919,1	6363,8
	genetic potential		5543,2	6777,2
	genetic superiority, %		106,8	93,9
398411	the number of cows		9	71
	milk production of maximum lactation		6133,8	7740,6
	genetic potential		5641,5	7596,3
	genetic superiority, %		110,5	101,9
44	the number of cows		110	53
	milk production of maximum lactation		4621,5	7988,7
	genetic potential		5581,5	6730,2
	genetic superiority, %		82,8	118,7
6218	the number of cows		11	17
	milk production of maximum lactation		7299,3	5326,5
	genetic potential		6752,4	6200,8
	genetic superiority, %		108,1	95,9
682	the number of cows		28	40
	milk production of maximum lactation		6304,2	7561,7
	genetic potential		5549,5	6745,5
	genetic superiority, %		113,6	112,1

Information shown in the picture 1 and table 1 reflect the results of the evaluation of the quality of bull's offspring. So the bull having nickname Zavetnyy 159 has breeding category A3 with a bias toward neutral side, its rating falls in all farms. The bull Jasmine 6218 (category A1B1) using in studied technologies (loose and captive keeping of cows) shows a high implementation of the genetic potential and genetic superiority (95.9-108.1%) of the indicator «milk production of maximum lactation». The bull Stinger 243 has a rating category A1 which has sufficiently manifested in the characteristics of the daughters using in studied technologies (his genetic superiority from 111.8 to 115.1 %). The daughters of the bulls 159 and 207 shows low implementation of genetic potential in the terms of the, breeding farm named after Dzerzhinsky on the variability of the indicator «milk production of maximum lactation». The effect of «genetic value of the sire» had a strong and significant influence (9.2%) on the variability of the indicator «milk production of maximum lactation». The analysis of factors effecting on productive traits were evaluated by *Mazepkin (2000)*; *Moskalenko and Kononov (2010)*; *Adediran et al., (2010)*. *Hric and Pavlik (2012)* in their research find that sire have significant effect on milk production of lactating cows.

Conclusion

Based on research and the results obtained, we can conclude the following:

There is a significant genetic variability of the studied traits. The genetic merit of the sire had a strong influence on the variability of the indicator «milk production of maximum lactation».

Our studies has allowed to allocate bulls having genetic value which has the effect of improving on the productivity of the herds in which they are used. We recommend to use lines and their animal representatives to increase breeding efficiency in the cattle herds.

Acknowledgments

Institute for Animal Husbandry (Belgrade, Serbia); FSBEI HPE «Yaroslavl State Agricultural Academy» (Yaroslavl, Russia); Yaroslavl Research Institute of Livestock and fodder production (Yaroslavl, Russia); Fund of Assistance to Small Forms of Enterprises in Science and Technology sphere in program «UMNIK – 2013» (Yaroslavl, Russia).

Uticaj faktora «genetska vrednost oca» na implementaciju genetskog potencijala indikatora « proizvodnja mleka u maksimalnoj laktaciji » kod krava jaroslavske rase

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Rezime

Mlečni proizvodi su glavni elementi ishrane čoveka. Mleko je jedina hrana za odojčad i igra važnu ulogu u ishranu bolesnika, rekovalescenata i zdravih odraslih osoba. Jaroslavski region je vodeći region u gajenju istoimene – jaroslavske rase goveda. Dakle, cilj našeg istraživanja bio je da se utvrdi snaga i pouzdanost uticaja faktora «genetske vrednosti oca» na produktivne osobine životinja kao faktor koji pomaže da se poveća produktivnost krava. Da bi smo odredili snagu uticaja faktora podatke koje smo koristili, podvrgli smo u proceduri obrade putem generalnog linearnog modela (Opšti Linearni modeli - GLM). Komponente evaluacije fenotipske varijacije atributa su analizirane putem multivarijacione disperzivne analize. Naše istraživanje je omogućilo da se izdvoje bikovi sa genetskim vrednostima koje imaju efekat poboljšanja željenih svojstava populacije. Upotrebom preporučenih linija odgajivači goveda u jaroslavskoj oblasti mogu povećati proizvodne performanse životinja. Sve ovo void ka povećanju profita, a time otvara mogućnost za dalji napredak u proizvodnji.

References

- ADEDIRAN, S.A., NISH, P., DONAGHY, D.J., Genetic and environmental factors influencing milk, protein and fat yields of pasture-based dairy cows in Tasmania, *Animal Production Science*, 2010, 50 (4), 265-275.
- HRIC P., PAVLÍK I (2012): Factors Effecting of the Milk Production in Select Herd of Slovak Spotted Breed. *Animal Sciences and Biotechnologies*. 45 (1)185-188.
- KONOVALOV, A., MALYUKOVA, M. 2014: The increasing of milk productivity of Yaroslavl breed cattle due to the increasing genetic potential under various keeping technologies. *Journal of Micro-biology, Biotechnology and Food sciences*, 3 (special issue 2), 51-53.
- KOSYACHENKO, N. 2009. ARMS -W Avtomatizirovannoe rabochee mesto selekcionera [ARMS -W Automated workplace breeder»] (Certificate of the state registration of computer programs; reg. number 2009613920 from 22.07.2009)

- KOSYACHENKO, N., KONOVALOV, A., FURAEVA, N. 2012. Informacionnaja baza dannyh po jaroslavskoj porode krupnogo rogatogo skota (Certificate of the state registration of database reg . Number 2013620064 from 13.12.2012)
- KUZNETSOV, V. 1983. Ocenka geneticheskikh izmenenij v stadah i populacijah sel'skohozjajstvennyh zhivotnyh, Guidelines, P - 44
- KUZNETSOV, V. 2000. Osnovy nauchnyh issledovanij v zhivotnovodstve. Zonal Agricultural Research Institute of the North- East, P - 568
- MAZEPKIN, A. 2000. O povyshenii produktivnogo ispol'zovanija molochnyh korov, Dairy and beef cattle. - № 7, 24-26
- MALYUKOVA, M. 2012. Realizacija geneticheskogo potencijala pozhiznennoj produktivnosti pri raznyh tehnologijah sodержanija korov jaroslavskoj porody, Bulletin of the of AIC, 2(18), 92-95
- MITYUKOV, A. 2007. Puti povyshenija jeffektivnosti ocenki i ispol'zovanija bykov proizvodeitelej, Proceedings of the International Scientific Conference «New methods in genetics and breeding livestock». P - 138
- MOSKALENKO, L., KONOVALOV, A. 2010. Puti povyshenija geneticheskogo potencijala molochnogo skota v Jaroslavskoj oblasti, Yaroslavl. P - 105
- MOSKALENKO L., MURAVYEVA N., FURAEVA N. 2012. Osobennosti i jeffektivnost' selekcii vysokoproduktivnyh korov s uchetom rjada priznakov, monograph, FSBEI HPE «Yaroslavl State Agricultural Academy». P - 46 [in Russian]
- OVCHINNIKOVA, L. 2008. Genetiko-populjacionnye processy pri golshtinizacii cherno-pestrogo skota Urala. Dissertation of the doctor of agricultural Sciences. P - 35 [in Russian]
- PANTELIĆ V, NOVAKOVIĆ Ž, OSTOJIC ANDRIĆ D (2009): Selection of bull dams in population of Simmental cattle. Biotechnology in Animal Husbandry 25 (5-6), p 301-313.
- PETROVIĆ M.M., SRETENOVIĆ LJ, PANTELIC V, ALEKSIĆ S, MIŠČEVIĆ B, BOGDANOVIĆ V, OSTOJIC D, PETROVIĆ M (2006): Results of the application of the technology of genetic improvement of Simmental cattle population in Serbia. Biotechnology in Animal Husbandry 22 (1-2), p 1-8.
- PETROVIĆ P.M , PETROVIĆ M.M., CARO PETROVIĆ V, RUŽIĆ MUSLIĆ D, ILIĆ Z, PETROVIĆ M ,PAVLOVSKI Z (2012): Principles of livestock development in the Republic of Serbia. Biotechnology in Animal Husbandry 28 (2), p 147-154.