

THE USE OF BLOOD GROUPS AT INDIVIDUAL SELECTION OF CATTLE

Alexandra Konstandoglo, Valentin Focsha

Scientific and Practical Institute by Biotechnologies in Animal Husbandry
and Veterinary Medicine: MD 6525, v. Maximovca, dis. Anenii Noi, Republic of Moldova

Corresponding author email: aconstandoglo@yahoo.com

Abstract

This article presents the results of research, whose purpose was to use alleles AEB-locus of blood groups with individual selection of cattle in animal herds of STE "Maximovca". For individual fixing have been selected 2 bull-producer - Academician 767 and Kiperush 79/395360, which are improvers on a complex of traits with the category A_2E_2 . Productivity of their mothers was 9331 kg of milk, with fat content 4.90% and 10915 kg of milk with 4.42 percent of fat, respectively. At bull Academician 767 allele of EAB locus - $B_2O_1/G_2Y_2E'_1Q'$, at bull Kiperush 79 - $G_2Y_2E'_1Q'/G''$. Heifers (mother of the future bulls) belonged to the lines Rozeyf Siteyshna 2671510, Montvik Chifteyna 95679, Pawnee Farm Arlinda Chifa 1427381, of which 47% - marked with allele B_2O_1 , 20,0% - with allele $G_2Y_2E'_1Q'$ and 35,4% of the animals are marked with other alleles. Genetic distance between the lines, which include dockable bulls and heifers, is large, thus avoiding a future inbreeding.

Key words: genetic markers, selection, alleles, sire, cows, heifer.

INTRODUCTION

Genetic marking in the breeding of cattle is based on the integrated use of modern zootechnical and molecular genetic methods in the assessment of the genetic structure of herds, lines, groups and individual animals. As molecular-genetic markers use a variety of allele pool AEB and AEC loci of blood groups and others., that is, the traditional markers of I-generation (Bukarov et al., 2004). In the current system of dairy cattle selection on the alleles of father demonstrates the reliability of the selection of future "improvers" of their sons at the level of 5% (Popov, 1995). But selection of heifers in the breeding herd with the alleles of blood groups approaches to the selection on yield of mothers.

It should be noted that the selection on blood groups should be used to increase the accuracy of prediction of breeding values in combination with other methods of selection, and can not replace them, if only because the antigenic characteristics of the bull does not give plenty of choice, because at bulls prevail individual alleles and antigens. Secondly, currently certified animal on blood groups are gradually replacing more informative methods for studying DNA polymorphism. For the implementation of individual selection of bulls for breeding stock need the following

information: a) a database of blood groups on bull-producer and all bloodstock inventory of potential fathers and mothers of bulls and cows; b) description of herds over the frequencies of antigens, genes and genotypes. One of the genetic methods, widely used in the Republic of Moldova in the selection of cattle is immunogenetics. Necessarily were subjected for examination of the origin of reconstruction bulls intended for cultivation in elevere and subsequent manning of enterprises in artificial insemination, bull-producing cows, reconstruction young animals and their mothers.

Since 2005, plans for individual fixing for animals of the Moldavian type black and white cattle in a herd of STE "Maximovca" compiled using genetic markers of AEB-locus of blood groups.

The aim of this work is the use the alleles of AEB-locus at individual selection of cattle.

MATERIALS AND METHODS

The materials have served the data on the study of blood groups bulls-produced, as well as serological tests of cows and heifers with expertise authenticity of origin.

In plans of the individual fixing on group of bull-producing cows and heifers in a herd of cattle of STE "Maximovca" attention was

drawn to: a linear membership expectant mothers and to select bulls-produced, breeding category, milk productivity of their mothers, the alleles at AEB locus. Are taken into account genetic distances between the lines of bulls (Focsha V., Alexandra Constandoglo, 2006), which were used in a herd of: STR - Seyling Trayyun Rokita 252803 (n=159); VBA - Vis Back Aidiala 1013415 (n=88); PFAC - Pawnee Farm Arlinda Chifa 1427381 (n=63); RS - Reflection Sovering 198998 (n=62); OA - Osborndeyl Aivengo 1189870 (n=51); MC - Montvik Chifteyna 95679 (n=29); RS - Rozeyf Siteyshna 267150 (n=22); SST - Sanisayd Stendaut Tween 1428104 (n=19); PA - Paklamar Astronaut 1458744 (n=13); UI - Ues Ideal (n=16).

RESULTS AND DISCUSSIONS

As a result, of comprehensive analysis of the breeding and genetic parameters for artificial insemination of heifers were selected 2 bull-produced: Academician 767 and Kiperush 79/395360 (table 1).

Table 1. Characteristics of bulls, assigned to heifers

Indices	Bulls-produced	
	Academician 767	Kiperush 79
Breed	Holsteins	Holsteins
Genealogical line	Vis Back Aidiala	Pawnee Farm Arlinda Chifa
Breeding category	A ₂ B ₂	A ₂ B ₂
Place of birth	Canada	
A number of progenitor	4th	2nd
Productivity mother milk: yield, kg	9331	10915
fat, %	4,90	4,10
Productivity father's mother: yield, kg	11713	11485
fat, %	4,20	3,60
Alleles of AEB-locus	B ₂ O ₁ /G ₂ Y ₂ E ₁ Q'	G ₂ Y ₂ E ₁ Q'/G"

The bull-producer Academician 767 - line Vis Back Aidiala 1013415, Holstein breed is improver on a complex of traits with the category A₂B₂. Productivity of the mother for the highest lactation was 9331 kg of milk, with fat content 4,90% and the mother of his father - 11713 kg and 4,20%, respectively Allele of AEB locus - B₂O₁/G₂Y₂E₁Q'.

The bull-producer Kiperush 79-395360 - belongs to the line of Pawnee Farm Arlinda Chifa 1427381 and is the grandson of progenitor line. Yield of his mother was 10915 kg of milk with 4.42 percent of fat, and

his mother's of father, respectively 11485 kg and 3.60%. Allele of AEB locus is G₂Y₂E₁Q'/G". It should be noted that mothers of bulls used in terms of selection, combined such features as richly-dairy and high fat content of milk, especially at the mother of the bull Academic productivity which was 9331 kg of milk with fat content 4.90%, which is very important for fixing sign of butterfat Holsteins offspring.

It should be noted that in our studies of animals in different herds (Focsha et al., 2003, 2005) it was found that the cow-bearer of alleles B₂O₁ and G₂Y₂E₁Q' have combinability high milk yield and milk fat and significantly superior to cows-bearer of other alleles. Therefore, our emphasis was mainly on the allele G₂Y₂E₁Q' and B₂O₁.

In studies (Grindina and Romanenko, 2011) observed the dynamics of allele frequencies carrying a high milk production. Thus, the frequency of allele G₂Y₂E₁Q' for the entire sample ranged from 10% in 2008 to 18% in 2009, similar results were obtained in studies (Efymenko et al., 2009), where the daughter of the bull Montfrech 91779 were marked with allele G₂Y₂E₁Q' with a high milk yield.

Selection was carried out and taking into account the genetic distances between the lines of bulls used in the herd of STE "Maximovca" for a long time (Focsha et al., 2006). Figure 1 shows a diagram of genetic distances between the lines indicating the affiliation of bulls to a particular line.

Thus, the line Rozeyf Siteyshna and Montvik Chifteyna, which include the mother of the future of bulls are in different clusters (Fig.2). Relative to the lines, which include dockable bulls, it should be noted that the line Vis Back Aidiala (Academic 767) is located on the dendrogram apart, and the line Pawnee Farm Arlinda Chifa (Kiperush 79) clustered with the line Sanisayd Stendaut Tween.

The results of cluster analysis showed that the above lines, which are lockable bulls, and also heifers (Table 2, fragment of one of the planes of individual selection), substantially separated from each other, that is the genetic distance between them is large, which will avoid future inbreeding.

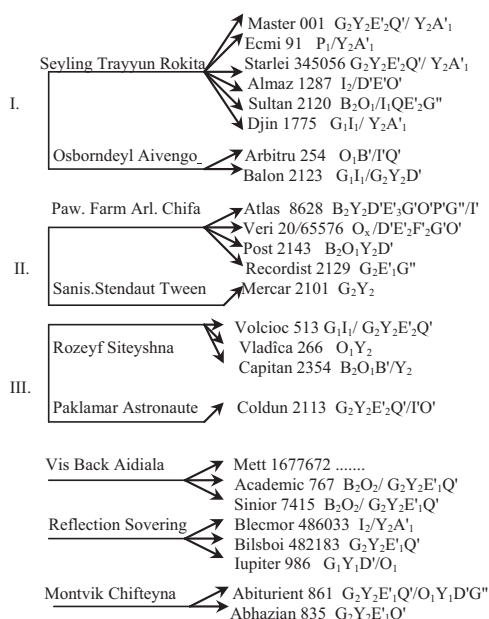


Figure 1. Scheme of genetic distances between the lines of bulls

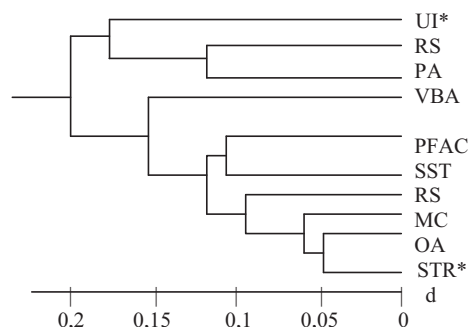


Figure 2. Micro-phylogeny of genetic relationships between the lines bulls-produced in a herd of STE "Maximovca"

Note: *STR - Seyling Trayyun Rokita; OA - Osborneyl Aivengo; MC - Montvik Chifteyna; RS - Reflection Sovering; SST - Sanisayd Stendaut Tween; PFAC - Pawnee Farm Arlinda Chifa; VBA - Vis Back Aidiala; PA - Paklamar Astronaut; RS - Rozeyf Siteyshna; UI - Ues Ideal.

Table 2. Individual fixation of bulls per heifers

No. of heifers	The allele of AEB-system of heifers	Mather		Fixed bulls-producer	The allele of AEB-system of bulls
		No. of heifers	productivity		
Line Vis Back Aidiala					
1	B ₂ O ₂ B'	718	1-4899-3,62	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
11	B ₂ O ₁	1085	1-6536-3,72	Kiperush 79	G ₂ Y ₂ E' ₁ Q'/G''
114	O ₁ T ₁ Y ₁	432	1-3157-4,08	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
116	P ₂ Y ₂	674	3-4613-3,59	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
Line Pawnee Farm Arlinda Chifa					
3	B ₂ O ₂ /Q	1037	1-6566-4,08	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
5	B ₂ O ₂ /G ₁ I ₁ I'B''	1055	1-6664-3,99	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
7	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'	959	1-4945-4,09	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
9	G ₂ Y ₂ O'/O ₂	979	1-6830-4,04	Kiperush 79	G ₂ Y ₂ E' ₁ Q'/G''
15	B ₂ O ₁ /G ₂ G'	1201	1-6753-4,08	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
Line Montvik Chifteyna					
106	O ₁ /Y ₂ D'G'O'	710	1-3294-3,52	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
108	G ₁ I ₁	404	1-5695-4,07	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
110	P ₂ Y ₂	246	2-3607-3,70	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'
118	G ₂ Y ₂ E' ₁ Q'/O ₁	243	3-4653-3,86	Kiperush 79	G ₂ Y ₂ E' ₁ Q'/G''
122	G ₂ Y ₂ E' ₁ Q'/P ₂ B'E' ₃	744	3-5081-4,58	Kiperush 79	G ₂ Y ₂ E' ₁ Q'/G''
Line Rozeyf Siteyshn					
17	B ₂ O ₁ /I ₁ QY ₂ E' ₂ Y'	712	1-5933-3,97	Academician 767	B ₂ O ₂ /G ₂ Y ₂ E' ₁ Q'

Heifers (the mother of the future bulls) belonged to the lines Rozeyf Siteyshna 2671510, Montvik Chifteyna 95679, Pawnee Farm Arlinda Chifa 1427381, of which 47% - marked with allele B_2O_2 , 20.0% - with allele $G_2Y_2E'_1Q'$ and 35.4% of the animals marked with other alleles.

CONCLUSIONS

In the selection takes into account genetic markers of bulls-produced and broodstock, all animals belong to genetically distant lines. Screening and selection of bulls-produced and broodstock is aimed at increasing the

proportion of animals in a herd with these genotypes, which in the future will help increase milk production and milk fat.

REFERENCES

- Bukarov N.G., Lebedev E.J., Kaneev A.Z., Morozov I., 2004. Actual problems of genetic research in breeding dairy cattle. "Genetics guarantee of success breeding." VNIIPlem with.. nr.1 (80), 12
- Efymentko M.J., Podoba B.E., Biryukova O.D., 2009. The role of genetic markers in the genomic selection. Materials Intl. Scientific Conference "Advances in genetics, breeding and reproduction of farm animals" June 9-11, part 2: Sankt. Petersburg, 78-82.
- Focsha V., Konstandoglo A., 2003. Using of genetic markers to select cattle. International scientific conference "70 years of State Agrarian University of Moldova" October 7 to 8, Chisinau, 24-25
- Focsha V., Konstandoglo A., Smirnov E., Ciubaticu V., 2005. Monitoring of alelofund of cattle herd in the experimental section of INZMV. Scientific papers, Livestock and bioengineering. Animal, Vol.13, 138-142
- Focsha V., Alexandra Konstandoglo, 2006. The genetic structure of the lines used in herd of experimental section of Institute of Animal Husbandry and Veterinary Medicine, Moldova. Scientific, Animal series. Publishing "Ion Ionescu de la Brad" Iasi, Vol.49, 256-262
- Gridina S.L., Romanenko G.A., 2011. Immunogenetic studies in the selection of the Ural Black Pied cattle. Agrarian bulletin Urals, №1 (80), 37.
- Popov N.A., 1995. The frequency of occurrence of genes of blood groups and some aspects of selection dairy cattle. Tr. Kostroma MR, Conf. anniversaries, 65-70.