THE BREEDING OF DAIRY SHEEP BY GENETIC MARKERS ASSESTED

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Abstract

The investigation involved 66 Teleorman Black Head Tsigai sheep. The animals were monitored throughout their twelve controls determining the total amount of milk. The genetic markers considered by the investigation were the haemoglobin and transferrin. They were identified two genotypes (Hb^A/Hb^B and Hb^B/Hb^B) at the haemoglobin locus and eight genotypes at the transferrin locus. The simultaneous analysis of the two studied markers reveals the superiority of the heterozygous sheep Hb^A Hb^B/Tf^MTf^E, which displayed the highest productive performance for the studied character.

Key words: *genetic marker, sheep, haemoblobin, transferrin*

Introduction

The prediction of the breeding value of the farm animals is important for the selection of the most valuable specimens which to yield the next generation and for pair matching. Among the modern methods assessing the productive capacity of the animals and of their breeding value is the use of biochemical markers whose identification allows the determination of the population's genotypes and the correlation with the productive results (3).

Material and methods

The experiment used 66 Teleorman Black head Tsigai sheep. Sheep were monitored during 12 tests, determining the yield of milk by each test (according to the method of Nica), calculating thereafter the total amount of milk by lactation. The genetic markers under study were the haemoglobin and the transferin.

The genotype categories were identified by vertical electrophoresis using polyacrylamide as migration carrier by means of the Meriaux J.C. technique (2) adapted by Mariana Rebedea and the biochemistry collective of the Faculty of Biology (1, 3).

The data were processed statistically by variance analysis.

Results and discussion

For the haemoglobin marker (Table 1), the frequency of the observed genotypes was 0.3 for the heterozygous genotype HB^AHB^B (P) and 0.2 for the homozygous genotype HB^BHB^B (Q). The frequency of gene A (p) was 0.15 and the frequency of gene B (q) is 0.85, according to the Hardy – Weinberg law.

Table 1

Gene frequency at the haemoglobin locus

Genotype	HB^AHB^A	HB^AHB^B	HB^BHB^B	Total
Genotype frequency	0	0.3	0.7	1
Gene frequency	p (gene A) 0.15; q (gene B) 0.85			

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For the transferrin marker, the frequency is shown in table 2.

Table 2

Gene frequency at the transferrin locus

Genotype	Tf^{B} Tf^{C}	Tf^{B} Tf^{E}	Tf^{B} Tf^{M}	Tf^{C} Tf^{C}	Tf^{C} Tf^{D}	Tf^{C} Tf^{M}	Tf^{M} Tf^{E}	Tf^{M} Tf^{M}	Total
Genotype frequency	0,18	0,05	0,04	0,14	0,14	0,22	0,14	0,09	1
Gene frequency	p (gene B)= 0,227; q (gene C) = 0,204; r (gene D) = 0,068; s (gene E) = 0,25; t (gene M) = 0,250								

There have been identified eight genotypes. The gene frequencies were: 0.227 for gene B, 0.204 for gene C, 0.068 for gene D, 0.251 for gene E and 0.250 for gene M.

Table 3 shows the results obtained for the milk yield trait at the haemoglobin locus.

Table 3

Average performance achieved at the haemoglobin locus

Genotype	Milk yield
$Hb^{A}Hb^{B}$	131.13 ± 16.35
$Hb^{B}Hb^{B}$	89.91 ± 7.58

The best results for this marker were obtained in the heterozygous animals, in which the milk yield per lactation was 131.12 kg, 45% more than in the homozygous animals for gene B. The differences were significant ($p \leq 0.05$).

The productive results according to the genotype at the transferrin locus are shown in Table 4.

Table 4

Average performance achieved at the transferin locus

Genotype	Milk yield	Ranking
Tf^{M}/Tf^{E}	131,30 ± 4,88	1
Tf^{C}/Tf^{D}	115,65 ± 5,41	2
Tf^{C}/Tf^{M}	112,04 ± 7,03	3
Tf^{C}/Tf^{C}	104,08 ± 6,32	4
Tf^{M}/Tf^{M}	99,02 ± 8,57	5
Tf^{B}/Tf^{E}	92,06 ± 3,66	6
Tf^{B}/Tf^{C}	91,28 ± 4,27	7
Tf^{B}/Tf^{M}	86,88 ± 2,97	8

The superiority of genotype Tf^{M}/Tf^{E} was observed. In this case, the total milk yield per lactation was 131.30kg, 13.5% more than the genotype on the second position.

Table 5 shows the data obtained by genotype aggregated from the haemoglobin and transferrin loci.

Table 5

Average performance by aggregate genotype

Genotype	Milk yield	Ranking
$Hb^{A}Hb^{B}/Tf^{M}Tf^{E}$	135.61 ± 6.68	1
$Hb^{B}Hb^{B}/Tf^{M}Tf^{E}$	129.15 ± 7.33	2
$Hb^{B}Hb^{B}/Tf^{C}Tf^{D}$	115.65 ± 7.24	3
$Hb^{B}Hb^{B}/Tf^{B}Tf^{C}$	114.62 ± 7.37	4
$Hb^{A}Hb^{B}/Tf^{C}Tf^{M}$	112.05 ± 8.06	5
$Hb^{B}Hb^{B}/Tf^{C}Tf^{C}$	104.08 ±6.87	6
$Hb^{A}Hb^{B}/Tf^{M}Tf^{M}$	99.02 ± 5.72	7
$Hb^{B}Hb^{B}/Tf^{B}Tf^{E}$	92.06 ± 3.16	8
$Hb^{A}Hb^{B}/Tf^{B}Tf^{M}$	86.88 ± 6.23	9
$Hb^{A}Hb^{B}/Tf^{B}Tf^{C}$	83.50 ± 5.9.0	10

The analysis of the aggregated genotype showed that genotype $Hb^{A}Hb^{B}/Tf^{M}Tf^{E}$ ranked first, with a total milk yield of 135.61 kg, 5% more than genotype $Hb^{B}Hb^{B}/Tf^{M}Tf^{E}$ ranked secondly. The differences between groups are not significant ($p \leq 0.05$). Taking into consideration the data obtained at the transferrin locus, one may observe that irrespective of the genotype existing at the haemoglobin locus, the $Tf^{M}Tf^{E}$ heterozygous individuals will have better results of the total milk yield.

Conclusions

1. At the *haemoglobin* locus, two types of migration were observed by electrophoresis, corresponding to two genotypes Hb^{A}/Hb^{B} and Hb^{B}/Hb^{B}. Gene frequency was: 0.15 for gene Hb^{A} and 0.85 for gene Hb^{B}.

2. At the *transferrin* locus, eight types electrophoretic movements were noticed, determined by genotypes Tf^{B}/Tf^{C}, Tf^{B}/Tf^{E}, Tf^{B}/Tf^{M}, Tf^{C}/Tf^{C}, Tf^{C}/Tf^{D}, Tf^{C}/Tf^{M}, Tf^{M}/Tf^{E} şi Tf^{M}/Tf^{M}. Gene frequency was: 0,227 for gene Tf^{B}, 0,204 for gene Tf^{C}, 0,068 for gene Tf^{D}, 0,251 for gene Tf^{E} and 0,250 for gene Tf^{M}.

3. The simultaneous analysis for haemoglobin and transferin revealed the superiority of $Hb^{A}Hb^{B}/Tf^{M}Tf^{E}$ group in analyzed trait (total amount of milk).

4. Irrespective of the genotype existing at the haemoglobin locus ($Hb^{A}Hb^{B}$ or $Hb^{B}Hb^{B}$), the $Tf^{M}Tf^{E}$ heterozygous individuals will have better results of the total milk yield

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