http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 6 (8): 738-740, 2003
ISSN 1028-8880

Relationship Between Some Polymorphic Parameters and Performances in Damascus Goats

O. Güney, O. Özuyanik, O. Torun, M. Görgülü and N. Darcan
Çukurova University, Faculty of Agriculture, Department of Animal Science, 01130, Adana-Turkey

Abstract: The objective of this study was to determine the types of haemoglobin and transferrin found in Damascus goats and demonstrate their relationship with different performance traits. The Hb β^B allele was observed in the Damascus goats studied. No significant deviation from Hardy-Weinberg equilibrium was observed. We observed nine genotypes, namely Tf AA, AC, AD, BB, BC, BD, CC, CD, DD; C and D were the two most commonly occuring alleles at the β locus and A was the rare β-globin variant. The frequencies of Tf β^C and β^D were higher than those of the other transferrin genotypes. There was no significant effect of transferrin genotype on performance ($p>0.05$).

Key words: Goat, Damascus, polymorphism, performance

Introduction

Studies on genetic polymorphisms are one of the methods to study populations in order to detect genetic differences. According Efremov and Braend (1964), called the two genes HbA and HbB where HbA controls the fastest moving component. In addition to this, in goats five transferrin alleles have been (Tf A, TfB, Tf C, TfD and TfE) described of which Tf A and Tf B are most commonly (Tucker and Clarke, 1980; Fesüs *et al.,* 1983). Menrad *et al.* (1994) reported that, after separation of serum proteins, Tf phenotypes were found as one of two dark bands each with a weak anodal additional band. The phenotypes with a single band each are controlled by the homozygote genotypes Tf AA (fast) and Tf BB (slow).

The gene frequencies of haemoglobin and transferrin types are thought to be related to breeds and geographical distribution. According to Menrad *et al.* (1994), haemoglobin and transferrin genotypes may have an influence on the performance of sheep and goat.

Haemoglobin and transferrin polymorphisms were found to have an effect on the performance of German Fawnx Hair (B1) crossbred does (Güney and Darcan, 2000). Besides another study was carried out on the same subject by Darcan and Güney (2001). In this study, it was confirmed that haemoglobin and transferrin polymorphisms were found to be effective on the performances of Awassi and Çukurova Assaf breeds.

Özcan and Güney (1983) reported that, fertility and daily milk yield of pure Damascus goats were 153.8% and 1.39 kg, respectively, under the subtropical climatic conditions of the southern coastal regions of Turkey.

The objective of this research was to determine the values of various blood parameters (haemoglobin and transferrin) of Damascus goat that were raised in subtropical climate conditions; besides to measure some performances of Damascus does and to determine the influences of haemoglobin, transferrin titred groups on the performances of above mentioned does.

Materials and Methods

This experiment was carried out at the Dairy Goat State Farm in North Cyprus. Fifty adult (3 to 4 years old) Damascus does were used as animal material in this study. The does were raised under North Cyprus climatic conditions. Fertility, average daily milk yield, live weights, lengths, heights and breast depths of does, as well as live weights of kids (at kidding) were collected during the study. Kids and does were weighted individually. Blood samples were also obtained for investigating haemoglobin and transferrin types of does. Blood samples were obtained by jugular venipuncture, drawn into 5 ml tubes containing EDTA as anticoagulant. A calorimetric determination using commercial kits (Boeringer) for Hb and Tf. They were grouped based on titres. Electrophoretic examinations were done using a starch gel electrophoresis system for separating the haemoglobin types, and a vertical polyacrylamide gel system was used to separate to the transferrin types. Electrophoresis procedures for Tf typing were those described by Dogrul (1985); Hb was typed by Andrew (1986). The reference samples of Tf and Hb types were provided from Dr. Faruk Doğrul, Etlik Veterinary and Animal Sciences Institute, Serology Laboratory in Ankara, Turkey. All statistical analyses were done, using the SAS package (SAS, 1987). A chi-square homogeneity test was performed to check distribution of alleles. Effects of Hb and Tf phenotype on performance were analyzed by least-square analyses of variance. Means were supported and compared by t-test.

Results and Discussion

Our findings on the fertility, birth weights of kids and daily milk yields of Damascus goats were presented in Table 1. Those data were similar to the findings of Özcan and Güney (1983).

Observed, expected Hb types and frequencies were given in Table 2. The Hb β^B alleles were observed in the Damascus goats that were used in this study. No significant deviation from Hardy-Weinberg equilibrium was calculated. According to the chi-square analyses, there was general agreement between the observed and expected distributions of the haemoglobin genotypes of the Damascus goats.

The allele frequencies at the β locus of Tf types clearly given that in Table 3. It has been determined that nine transferrin genotypes, namely Tf AA, AC, AD, BB, BC, BD, CC, CD, DD, exists whereas C and D are the two common occuring alleles at the β locus and A is the rare β-globin variant. The frequencies of Tf β^C and β^D in this study were higher than those of the other transferrin genotypes. The allele frequencies found in this study is not corresponding with published data in that allele TfA and Tf B are most common in goats (Tucker and Clarke, 1980). A significant difference ($p<0,01$) in the polymorphic distribution was observed in the Damascus goats. The wide variation seen in the allele frequencies for the transferrin genotypes may be attributed to selection and random change. Also, the small sample size in this report may be a factor that might have caused frequency drift, which could then have resulted in the greater difference in the frequency of occurrence.

Table 1: Fertility, average birth weight of kids and average milk yields of Damascus goat

		Milk yield (kg day^{-1})	
Fertility (%)	Birth weight of kids(kg)	Male	Female
162.4	4.3	3.8	1.62

Table 2: Haemoglobin genotypes of Damascus goats

Haemoglobin genotypes								
Hb AA		Hb BB		Hb AB		Frequencies		
O	E	O	E	O	E	β^A	β^B	χ^2
-	-	49	49	-	-	-	1.0	0.005

- : p>0.05 O: Observed E: Expected

Table 3: Transferrin genotypes of Damascus goats

Transferrin Types	Observed	Expected
AA	-	0.24
AC	2	2.6
AD	5	2.5
BB	-	1.8
BC	14	7.2
BD	5	6.8
CC	3	11.0
CD	16	13.7
DD	5	6.5
β^A	0.07 b	
β^B	0.19 b	
β^C	0.38 a	
β^D	0.36 a	
χ^2	12.5 **	

(** : p<0.01)

Table 4: Relationship between transferrin genotypes and body measurements of Damascus goats

Tf types	N	Live weight (kg)	Height (cm)	Body length (cm)	Depth of breast (cm)
BD	5	67.9±4.3	78.7±1.0	79.6±1.6	33.9±0.6
CD	16	67.7±2.2	78.6±0.7	79.0±0.7	33.6±0.4
AD	5	74.6±5.7	77.6±1.6	81.3±2.5	34.8±0.9
CC	3	63.6±2.5	77.8±2.4	77.6±0.6	34.1±1.0
AC	2	71.7±7.6	78.0±3.0	79.7±0.2	34.2±0.7
BC	14	71.6±1.8	80.2±0.9	81.2±0.8	34.6±0.5
DD	5	74.3±3.1	78.2±0.7	80.4±1.0	36.3±0.5
f		-	-	-	-

- : p>0.05

The data in Table 4 point to a relationship between Tf phenotypes and body measurements of Damascus. Live weight, height, body length and depth of breast of does that have different transferrin genotypes are given in Table 4. According to the data obtained there were no significant effects of transferrin genotype on performances ($p>0.05$). The body measurements of all goats were found to be similar.

At the end of this research, Hb B was detected and general agreement between the observed and expected distributions of haemoglobin phenotypes in Damascus goat breed was observed. There are many factors effects the distribution of haemoglobin phenotypes such as origin, artificial selection etc. The allelic frequencies of Tf C and D were greater than those of Tf A and B whether Tf A and B most common Tf phenotypes in goats. Additionally, no significant effects of transferrin genotype on performance were detected.

References

Andrew, A.T., 1986. Electrophoresis: Theory, Techniques and Biochemical and Clinical Applications. Clarendon Press, 2nd Ed., pp: 79-92.

Darcan, N. and O. Güney, 2001. Effects of haemoglobin and transferrin polymorphisms on the performance of Awassi and crossbred ewes under subtropic environment. J. Appl. Anim. Res., 19: 187-192.

Dogrul, F., 1985. Transferrin and haemoglobin types in different sheep breeds. J. Etlik Vet. and Ani. Sci., 5: 61-73.

Efremov, G. and M. Braend, 1964. Hemoglobin's, Transferrin and Albumins of Sheep and Goats. Proc. 9th European Animal Blood Group Conference Prague, August, 18-22, 313-320.

Fesüs, L., J. Varkonyhi and A. Ats, 1983. Biochemical polymorphisms in goats with special reference to the Hungarian native breeds. Animal Blood Groups and Biochemical Genetics, 14: 1-6.

Güney, O. and N. Darcan, 2000. The effect of hb and tf phenotypes on the performances of German fawn x Hair crossbred does under subtropic Çsukurova environments. Proc. 7th International Conference on Goats, Tours, France, pp: 252.

Menrad, M., E. Muller, C.H. Stier, H. Gelderman and C. Gall, 1994. Protein polymorphisms in the blood of German improved Fawn and Boer goats. Small Ruminant Res., 14: 49-54.

Özcan, L. and Güney, O.,1983. A study on performances of Damascus goats under Çukurova climate conditions. J. Çukurova Univ. Faculty of Agric., 14: 21-25.

SAS, 1987. SAS Users Guide, Release 6.03 Editions, Cary North Caroline, SAS Institute Inc., USA.

Tucker, E.M. and S.W. Clarke, 1980. Comparative aspects of biochemical polymorphisms in the blood of caprinea species and their hybrids. Animal Blood Groups and Biochemical Genetics, 11: 163-183.