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Phenotypic Correlations among Fleece Traits in Norduz and Karakas Sheep

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Abstract: In this research, it was aimed to determine the phenotypic correlations among some physical traits of Norduz and Karakas sheep. Animal material was consisted from 2-6 years of age of breeding flocks of 50 Norduz and 50 Karakas ewes. Traits measured were greasy fleece weight, fiber diameter, clean fleece percentage, staple length, single fiber actual length, single fiber natural length, breaking strength, elasticity and the number of crimp in 2.54 cm. There was a positive correlation between clean fleece percentage and fiber diameter, it was insignificant for both genotypes. The estimated phenotypic correlations between staple length and greasy fleece weight was 0.403 ($p<0.01$) and 0.445 ($p<0.01$) in Norduz and Karakas sheep, respectively. It was understood that traits like fiber diameter, length, fleece weight and the number of crimp should be evaluated together in breeding studies on fleece yield in Norduz and Karakas sheep.

Key words: Phenotypic correlation, fleece traits, wool characteristics, Norduz, Karakas, Turkey

INTRODUCTION

In the world, Turkey is the 10th in the number of sheep, the 4th in the production of greasy wool. The vast majority 92% of the wool production in Turkey is obtained from indigenous sheep breeds. Indigenous breeds in Turkey produce carpet typed wool.

The wool originating from native breeds is essentially a by product contributing very little to the gross income of the enterprise. Nevertheless, wool production plays an important role in the economy of regions where carpet production provides a traditional occupation. In fact, in addition to the dynamic carpet industry found in Turkey, wool craft industries flourish in various regions such as Sardinia, Morocco, Greece, Portugal and Egypt. One of the main factors that have contributed to the development of this activity has been the increase in tourism and a subsequent growth in demand for woolen products. In these countries, the major controversial issue regarding carpet wool, low-priced as an animal product but valuable as an industrial raw material is the fact that the carpet and other traditional industries of woolen commodities often import raw material from overseas countries of the Southern hemisphere. The renewed preference for natural wool fiber in fashion and the rising prices of synthetic fiber will eventually strengthen the importance of production of mixed wool breeds without however, their becoming of major economic significance.

Given certain circumstances, selection within pure breeds to increase wool production could be a possible solution. More radical measures such as the introduction of merino blood are not recommended because they would cause an unwelcomed alterations for the characteristics of these breeds.

Norduz and Karakas sheep are important indigenous sheep genetic resources of Van province localized in the Eastern Anatolia region of Turkey. Both varieties are dual purpose have coarse and mixed type fleece so called carpet wool. Knowing the relationships among production traits is important in breeding programs. This may help to determine more appropriate selection systems. The objective of this study was to estimate phenotypic correlations among greasy fleece weight, fiber diameter, clean fleece percentage, staple length, single fiber actual length, single fiber natural length, breaking strength, elasticity and the number of crimp in Norduz and Karakas sheep.

MATERIALS AND METHODS

Animal material of this study was consisted from 2-6 years of age of breeding flocks of 50 Norduz and 50 Karakas ewes which were bred in Animal Science Breeding Farm of Yuzuncu Yil University. The fleece samples were collected for analysis (15-20 g) from mid-side (rib) region of each animal before shearing. The

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samples were put into labeled nylon bags containing sheep genotype and number for analysis. Shearing was done closely to the skin using fine scissors and then greasy fleece weights were determined. Greasy fleece weight (kg), fiber diameter (μ), clean fleece percentage (%), staple length (mm), single fiber actual length (cm), single fiber natural length (cm), breaking strength (g), elasticity (%) and the number of crimp in 2.54 cm were the traits analyzed in this study. The Pearson correlation analysis was used in the estimate of phenotypic correlations among traits (SAS, 2007).

RESULTS AND DISCUSSION

The estimates of phenotypic correlations among various fleece traits are shown in Table 1. Although, there was a positive correlation between clean fleece percentage and fiber diameter, it was insignificant for both genotypes. The estimated phenotypic correlations of staple length, breaking strength, elasticity, greasy fleece weight with clean fleece percentage were determined to be negative in Norduz sheep. On the other hand in Karakas sheep, correlation between only clean fleece percentage and breaking strength was negative. While the estimated phenotypic correlations of clean fleece percentage with the other traits of Norduz fleece were not significant, the correlations of staple length ($p<0.01$), single fiber actual length ($p<0.01$), single fiber natural length ($p<0.05$) with clean fleece percentage were significant in Karakas fleece. Generally, it was found that the correlation values of clean fleece percentage with the other traits of fleece were compatible with the values reported in other studies (Snyman *et al*., 1998; Wuliji *et al*., 1999, 2010).

Table 1: Phenotypic correlation coefficients (r) among fleece traits in Norduz and Karakas sheep

Traits	Norduz	Karakas
Clean fleece percentage-Fiber diameter	0.175	0.110
Clean fleece percentage-Staple length	-0.078	0.419**
Clean fleece percentage-Single fiber actual length	0.033	0.529**
Clean fleece percentage-Single fiber natural length	0.005	0.287*
Clean fleece percentage-The number of crimp	0.147	0.222
Clean fleece percentage-Breaking strength	-0.118	-0.207
Clean fleece percentage-Elasticity	-0.084	0.119
Clean fleece percentage-Greasy fleece weight	-0.064	0.177
Fiber diameter-Staple length	0.447**	0.432**
Fiber diameter-Single fiber actual length	0.375**	0.283*
Fiber diameter-Single fiber natural length	0.532**	0.450**
Fiber diameter-The number of crimp	-0.383**	-0.245
Fiber diameter-Breaking strength	-0.514**	-0.514**
Fiber diameter-Elasticity	0.078	-0.004
Fiber diameter-Greasy fleece weight	0.312*	0.485**
Staple length-Single fiber actual length	0.406**	0.396**
Staple length-Single fiber natural length	0.573**	0.482**
Staple length-The number of crimp	-0.415**	-0.281*
Staple length-Breaking strength	-0.018	-0.189
Staple length-Elasticity	0.227	0.051
Staple length-Greasy fleece weight	0.403**	0.445**
Single fiber actual length-Single fiber natural length	0.831**	0.739**
Single fiber actual length-The number of crimp	-0.379**	0.067
Single fiber actual length-Breaking strength	0.029	-0.336*
Single fiber actual length-Elasticity	0.262	0.190
Single fiber actual length-Greasy fleece weight	0.523**	0.364**
Single fiber natural length-The number of crimp	-0.603**	-0.388**
Single fiber natural length-Breaking strength	-0.070	-0.309*
Single fiber natural length-Elasticity	0.279	0.078
Single fiber natural length-Greasy fleece weight	0.595**	0.461**
The number of crimp-Breaking strength	0.062	-0.015
The number of crimp-Elasticity	-0.229	0.147
The number of crimp-Greasy fleece weight	-0.280*	-0.361**
Breaking strength-Elasticity	0.330*	0.282*
Breaking strength-Greasy fleece weight	0.106	-0.131
Elasticity-Greasy fleece weight	0.317*	0.109

*:$p<0.05$, **:$p<0.01$

The fiber diameter is a very important economical trait in textile and carpet industry. Therefore, the fiber diameter in sheep is an important selection criterion (Hunter *et al*., 1982; Snyman *et al*., 1998; Wuliji *et al*., 2010). As shown in Table 1, the phenotypic correlations of fiber diameter with other traits of Norduz and Karakas fleece ($p<0.05$, $p<0.01$) were found to be significant.

Generally, fiber length reduces with the decrease in fiber diameter. Selection to increase staple length should be applied carefully because the increase in staple length may result in thickening of fiber which is a poor fleece quality for wool industry (Hatcher, 2002). Important negative correlations were found between staple length and the number of crimp. The other researchers found that there were negative correlations between staple length and the number of crimp in coarse-mixed fleece with sheep.

Similar to some studies (Yilmaz *et al*., 2003), a positive correlation was found between greasy fleece weight and staple length for Norduz and Karakas sheep. The estimated phenotypic correlations between staple length and greasy fleece weight was 0.403 ($p<0.01$) and 0.445 ($p<0.01$) in Norduz and Karakas sheep, respectively. Altin has been reported that because of these relationships, criterions of fiber diameter, staple length and greasy fleece weight were evaluated together in many selection studies.

CONCLUSION

The estimated phenotypic correlations in this study showed that traits like fiber diameter, length, fleece weight and number of crimp should be evaluated together in breeding studies on fleece yield in Norduz and Karakas sheep. Relative economic values of wool around the world is decreasing.

This reflects in scientific studies on fleece as well. However, the heritability of fleece yield and physical traits are high and success in the improvement of fleece traits is possible by direct selection. Meanwhile, correlations between fleece and other yields of sheep should not be neglected.

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