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Mohair Quality Traits of Aleppo and Hair Goats

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ABSTRACT

The aim of this study was to determine the mohair quality traits of Aleppo and Hair goats. The study material was consisted of 12 Aleppo goats (6 males, 6 females) and 12 Hair goats (6 males, 6 females), which were 12 months of age and raised by a farmer in Kırıkkale region. A total of 72 fibre sample were collected from 24 goats from 3 regions of the body (wither, chest, rump) in order to determined the hair characteristics of Hair and Aleppo goats. Mohair quality traits (fibre length, fibre diameter, fibre tenacity, fibre elongation, fibre proportion) were determined in both breeds at Livestock Central Research Institute, wool and mohair laboratory. The means of smallest square of fibre length (barbe), fibre diameter, fibre tenacity, fibre elongation and fibre propotion for Aleppo and Hair goats were defined as 70.92 and 54.98 mm, 66.37 and 65.94 µm, 28.62 and 26.60 %, 12.58 and 11.97 cN/tex, 91.09 and 89.76 %, repectively. While the effects of breed diversty on fibre length (barbe) ($p < 0.01$) and fibre length (hauter) ($p < 0.001$) were statically significant, fibre diameter, fibre tenacity, fibre elongation and fibre proportion traits were not affected by breed diversty. Fibre length was higher in Aleppo goats than that in the hair goats. Although the effects of sex on fibre length ($p < 0.001$), fibre diameter ($p < 0.001$), and fibre proportion ($p < 0.05$) were statically significant, fibre tenacity and fibre elongation were not affected by sex. Fibre length, fibre diameter and fibre proportion of the male goats were significantly higher than those of the female goats in both breed. It was found that fibre quality traits of Aleppo and Hair goats were similar in terms of fibre length, fibre elongation, fibre tenacity and fibre proportion, which are important in textile industry. These findings show that mohair quality traits of Aleppo and Hair Goats are appropriate for the weaving upholstery, blanket, tent, carpet and rug.

Keywords: Aleppo goat, Hair goat, Mohair quality traits

Halep ve Kıl Keçilerinde Elyaf Kalite Özellikleri

ÖZET

Bu araştırmanın amacı Kıl ve Halep keçilerinde elyaf kalite özelliklerinin belirlenmesidir. Araştırmanın hayvan materyalini Kırıkkale ilinde yetiştirilen 12 aylık yaştaki 12 baş Halep keçisi (6 erkek, 6 dişi) ve 12 baş kıl keçisi (6 erkek, 6 dişi) oluşturmuştur. Kıl ve Halep keçilerinde elyaf kalite özelliklerinin belirlenmesi amacıyla 24 keçinin üç ayrı vücut bölgesinden (omuz, kaburga ve sağrı) toplam 72 adet örnek alınmıştır. Her iki ırkta, tiftikte kalite analizleri (elyaf uzunluğu, elyaf çapı, mukavemet, elastikiyet ve randıman), Uluslararası Hayvancılık Araştırma ve Eğitim Merkezi Müdürlüğü yapağı ve tiftik laboratuvarına yaptırılmıştır. Halep ve Kıl keçilerinde uzunluk (barbe), elyaf çapı, mukavemet, elastikiyet ve randıman özelliklerine ait en küçük kareler ortalamaları sırasıyla 70.92 ve 54.98 mm, 66.37 ve 65.94 µm, % 28.62 ve 26.60, 12.58 ve 11.97 cN/tex, % 91.09 ve % 89.76 olarak belirlenmiştir. Irk farklılığının elyaf çapı, mukavemet, elastikiyet ve randıman üzerine etkisi önemsiz iken, barbe elyaf uzunluğuna ($p < 0.01$) ve hauter elyaf uzunluğu a($p < 0.001$) etkisi ise önemli olmuştur. Halep keçilerinin elyaf uzunluğunun, kıl keçilerinin elyaf uzunluğundan daha yüksek değere sahip olduğu tespit edilmiştir. Cinsiyetin mukavemet ve elastikiyet özelliklerine etkisi önemsiz iken, elyaf uzunluğu ($p < 0.001$), elyaf çapı ($p < 0.001$) ve randıman özelliklerine ($p < 0.05$) etkisi ise önemli bulunmuştur. Erkeklerde elyaf uzunluğu, elyaf çapı ve randıman özellikleri dişilerden yüksek olmuştur. Sonuç olarak, Halep ve kıl keçilerinin, dokuma endüstrisinde önemli olan elyaf inceliği, elastikiyet, mukavemet ve randıman özellikleri bakımından birbirine benzer olduğu tespit edilmiştir. Araştırma bulguları Halep ve kıl keçilerinde elyaf özelliklerinin döşemelik kumaş, battaniye, çadır, halı ve kilim dokumasına uygun olduğunu göstermektedir.

Anahtar kelimeler: Halep keçisi, Kıl keçisi, Elyaf kalite özellikleri

INTRODUCTION

Goats (10.634.672 head) constitute about 17,65 % of the total Turkey population of small ruminants (60.255.894 head) and occur in a multiplicity of breeds over a wide range of environments in the Turkey regions where they form an important source of meat, milk and mohair. Turkey's most regions have favorable conditions for goat breeding in terms of ecological and socio-economic structure. Goat production is important for cultivators who living mountains and rural areas of Turkey. Hair goats are predominant breed and its constitute 93% of the goat population in Turkey. Mohair production was 2684 tons in 2001, and its increased 5796 tons in 2017 in Turkey. mohair production was 400 tons in 2001 and dropped to 194 tons until 2011, and then it has showed a relative increase for the following years and rose to 356 tons in 2015 (22).

Wool, cotton, bamboo, cellulosic fibers and synthetic fibers (polyacrylic, polyester, etc.) are used in the textile industry. Polyester fibers and cotton fibers are dominant in the world market (9). The use of organic materials such as cotton and wool fibres in the clothing industry is important for health. Sheep fleece is preferred in the clothing and apparel industry, while goat mohair is preferred in the production of blankets, tents and rugs (5, 16 and 25). It's desirable to use thin (low fibre fineness) and high-strength (high fibre tenacity) fibers in textile industry. The most preferred in apparel industry Merino wool known for elastic and strong due to the structure of the fibre, and also feel-soft, and its allow air and heat exchange (25). Previous studies have determined fiber diameter (20.40 - 28.73 µm), fibre tenacity (7.60 - 9.69 %) and fibre elongation (31.48 - 32.50 cN/tex) of Anatolian Merino Sheep fleece quality traits (5, 16). Moreover, the fibre diameter of Merinos fleece, which is considered as suitable for the clothing industry and classified as fine quality, has been reported as 15 - 23 µm (13).

Aleppo goats are raised in the southern provinces of Turkey in small numbers. It is a milk breed kept in the towns and around cities, in groups of 2 - 5 animals. The colour of animals vary from yellow to Brown. The ears are very large and dropping. The body size is medium- large with an average withers (65 - 70 cm) and a body weight of 40-50 kg in female goats. The udders well-developed. Hair goat, it is also called black goat. The hair goats are raised in all parts of Turkey. The colour is generally black. However, brown, grey, white or spotted animals also seen. The ear is generally large and dropping, but animals with medium-sized or short ears are also seen. The body size is considered large. The body size is large with an average withers (72 cm) and a body weight of 40 - 45 kg in female goats (26).

Fibres of hair goats were described as coarse, long and without ondulation, Halep goats fibres were described as short and soft (26). Mohair yield, fibre length (hauter), fibre diameter, fibre elongation in goat breeds of Turkey were reported as 2.40 - 2.96 kg, 62.9 - 65.9 mm, 34.2–37.7 µm, 29.6 - 39.9 %, respectively (1, 3, 8, 12, 18 and 23). Previous studies have examined fibre traits of hair goats (6, 7, 11 and 21), however not any information could be obtained about the determination fibre traits of Aleppo goats which bred for the purpose of milk and meat yield. Therefore, the objective of this study was to determine mohair quality traits of Aleppo and Hair goats.

MATERIAL and METHODS

The study material consisted of a total of 12 Aleppo goats (6 males, 6 females) and 12 Hair goats (6 males, 6 females), which were 12 months of age. Goats were raised by a farmer in a Kırıkkale province (Sulakyurt county/Yağbasan village), Yağbasan village located at latitude 40° 09′ 21.662″ N and longitude at 33° 34′571.7610″. The village 13 km distance to the Kırıkkale central district (10, 24). A total of 72 fibre sample were collected from 24 goats from 3 regions of the body (wither, chest, rump) in order to determined the mohair quality traits of Hair and Aleppo goats. Mohair samples were collected with wool card. Mohair traits (fibre length, fibre diameter, fibre tenacity, fibre elongation, fibre proportion) were determined for both breeds at Livestock Central Research Institute, wool and mohair laboratory. For fibre length and diameter analysis, an Uster AL100-FL100 (Hauter and Barbe) and USTER OFDA 100 instruments were used. For the tenacity and elongation analyses, a Fafegraph HR + ME single fibre tensile tester instrument was used. Fibre proportion expressed as Fibre proportion (%) = [Clean mohair weight + (clean mohair weight

x 0.14) / total weight of mohair] x 100 (2, 8, 14, 17 and 19).

Statistical Analysis

Data were tested for normality of distribution using the Kolmogorov–Smirnov test and for homogeneity of variance using Levene's test. Fibre length (hauter) and fibre elongation traits were determined by (GLM) General Linear model and the significance of the difference between means was determined Tukey test which were conforming to normal curve of distribution. Length (barbe), fibre diameter, fibre tenacity and fibre proportion traits were determined by Mann-Whitney U test and the significance of the difference between means was determined by Kruskal Wallis test which were not conforming to normal curve of distribution. Statistical analyses were performed using SPSS for Windows. A value of $p < 0.05$ was considered statistically significant (4, 20).

RESULTS

The mohair traits of Aleppo and Hair goats were summarized in Table 1. Least squares means of fibre length (barbe), fibre diameter, fibre tenacity, fibre elongation and fibre propotion for Aleppo and Hair goats were defined as 70.92 and 54.98 mm, 66.37 and 65.94 µm, 28.62 and 26.60 %, 12.58 and 11.97 cN/tex, 91.09 and 89.76 % . While the effects of breed diversty on fibre length (barbe) ($p < 0.01$) and fibre length (hauter) ($p < 0.001$) were statically significant, fibre diameter, fibre tenacity, fibre elongation and fibre proportion traits were not affected by breed diversty. Fibre length was higher in Aleppo goats than that in the hair goats. Although the effects of sex on fibre length ($p < 0.001$), fibre diameter ($p < 0.001$), and fibre proportion ($p < 0.05$) were statically significant, fibre tenacity and fibre elongation were not affected by sex. Fibre length, fibre diameter and fibre proportion of the male goats were significantly higher than those of the female goats in both breed. It was found that fibre quality traits of Aleppo and Hair goats were similar in terms of fibre length, fibre elongation,

Table 1: Mohair quality traits of Aleppo and hair goat ($X \pm S_x$)

Breed	Sex	Body region	Fibre length (Hauter) (mm)	Fibre length (Barbe) (mm)	Fibre diameter (µm)	Fibre tenacity (%)	Fibre elongation (cN/tex)	Fibre proportion (%)
Aleppo goat	**Male**	**Wither**	66.68±11.06	76.87±11.18	71.51±4.72	27.55±3.95	11.74±0.97	93.28±0.55
		Chest	76.17±6.48	84.30±7.32	68.01±1.78	27.83±4.50	11.77±1.23	91.47±2.16
		Rump	62.00±7.56	71.17±10.04	66.88±2.39	29.04±3.15	13.79±1.61	93.93±2.16
	Female	**Wither**	57.53±11.74	68.72±11.47	65.54±3.12	30.58±2.98	15.20±2.88	89.62±1.84
		Chest	46.75±5.75	59.87±7.65	62.54±1.71	29.35±2.14	11.71±1.48	91.58±1.68
		Rump	56.23±10.04	64.58±10.07	63.73±2.73	27.40±3.02	11.29±1.69	86.63±4.65
Hair goat	**Male**	**Wither**	54.83±9.20	65.52±9.54	70.04±3.87	28.28±3.38	13.71±1.14	87.95±4.01
		Chest	50.12±3.66	61.87±3.98	68.17±2.51	22.99±4.16	12.33±1.08	92.83±1.12
		Rump	55.08±5.72	68.33±5.15	69.57±2.77	30.12±4.35	13.61±2.18	89.88±3.75
	Female	**Wither**	37.32±3.09	44.42±3.33	63.76±0.74	28.66±2.72	11.50±0.87	89.65±0.79
		Chest	39.10±2.51	45.90±2.51	62.06±1.29	20.08±3.17	9.31±0.79	89.92±0.45
		Rump	37.50±4.03	43.87±4.28	62.05±1.70	29.45±3.56	11.38±1.66	88.32±2.20
				Total				
Aleppo goat			60.89±3.02	70.92±3.20	66.37±1.09	28.62±1.42	12.58±0.64	91.09±1.02
Hair goat			45.66±3.02	54.98±3.20	65.94±1.09	26.60±1.42	11.97±0.64	89.76±1.02
	Male		60.81±3.02	71.34±3.20	69.03±1.09	27.63±1.42	12.82±0.64	91.56±1.02
	Female		45.74±3.02	54.56±3.20	63.28±1.09	27.59±1.42	11.73±0.64	89.29±1.02
		Wither	54.09±3.70	63.88±3.92	67.71±1.33	28.77±1.74	13.03±0.79	90.13±1.24
		Chest	53.03±3.70	62.98±3.92	65.20±1.33	25.06±1.74	11.28±0.79	91.45±1.24
		Rump	52.70±3.70	61.99±3.92	65.56±1.33	29.00±1.74	12.52±0.79	89.69±1.24
Grand Mean			53.28±2.13	62.95±2.27	66.15±0.77	27.61±1.01	12.28±0.45	90.42±0.72
				p-Value				
Breed			0.001	0.006	0.528	0.318	0.585	0.193
Sex			0.001	0.000	0.000	0.981	0.154	0.016
Body region			0.962	0.961	0.788	0.210	0.371	0.869

fibre tenacity and fibre proportion, which were important in textile industry.

DISCUSSION and CONCLUSION

Fibre diameter (66.37 and 65.94 µm), fibre tenacity (28.62 and 26.60 %) and fibre elongation (12.58 and 11.97 cN/tex) in Aleppo and Hair goats were higher than those of Anatolian Merino sheep (fibre diameter 20.40 - 28.73 µm, fibre tenacity 7.60 - 9.69 %, and fibre elongation 31.48 - 32.50 cN/tex). Grand means of fibre length (hauter) (53.28) was lower, fibre diameter (66.15 µm) was higher than those reported in Angora goats, also fibre tenacity (27,61 %) was below the lower limit (1, 3, 8, 12, 18, 23).

Fibre diameter of Aleppo and hair goats (66,37 µm and 65,94 µm) which was determined in the present study were in agreement with previous report about hair goats. However, fibre lengths (barbe) (70,92 mm and 54,98 mm) were lower than the study (129,80 mm) by Toplu ve Altınel, 2008 (21). Although fibre length (barbe) (70,92 mm ve 54,98 mm), fibre tenacity (28,62 % and 26,60 %), fibre elongation (12,58 cN/tex and 11,97 cN/tex) observed in this study were lower, and fibre diameter (66,37 ve 65,94 µm) was higher than those reported by Erol ve ark., 2014 (8) for the 1 years old Angora goats that raised pure bred in Livestock Central Research Institute (81,48 mm, 38,92 % and 18,85 cN/tex). These differences may be due to genotype diversity.

Hunter (1993) (13) described goat mohair as "Because of its coarseness, mohair has some limitations in certain apparel applications, but has proved extremely popular non-apparel applications, such as furnishings, blankets and upholstery. Mohair's excellent properties, such as resilience and durability, make it particularly suitable for house-hold textiles, such as upholstery fabrics, curtains and carpets." Besides, according to fineness wool classification system, values between 17 -20.60 µm are good quality, values between 22.05 - 29.30 µm are medium quality, values between 31 - 34.40 µm are coarse and values of 36 -40 µm and above are called very coarse (15). Therefore, mohairs of Halep and Hair goats (66.37 and 65.94 µm, respectively in present study) are not appropriate for clothing industry due to the thick fibre structure.

Fibre traits of Aleppo and Hair goats were similar in terms of fibre length, fibre elongation, fibre tenacity and fibre proportion, which were important in textile industry. Fibre diameter, fibre tenacity and fibre elongation in Aleppo and Hair goats were higher than those of Anatolian Merino sheep. The fibre diameter of Aleppo and Hair goats determined in this study were higher than those in the Angora goats; however the fibre length, fibre elongation and fibre tenacity were lower than those in the Angora goats. These findings show that goat mohair is not suitable for clothing industry due to the thick fibre structure. Its suitable for the weaving furnishings, blankets, upholstery, hair tent, carpet and rug. Goat hair are used extensively domestic and local enterprises which makes hair tent, carpet and rug. In order to contribute to the country economy, this study may be conducted in other breeds/genotypes and provinces.

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