

## Determination of Cashmere Fiber Production and Quality Traits in Turkish Hair Goat

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**Abstract:** The aim of this research was to determine the cashmere fiber production potential and quality characteristics in Turkish hair goat. In this study, 58 cashmere fiber samples taken from three different geographical areas were evaluated. Greasy cashmere weight (GCW), fineness, fiber length, cashmere out put, elasticity, resistance and degree of curvature were found to be as  $46 \pm 1$  g,  $16.6 \pm 1$   $\mu$ m,  $25 \pm 1$  mm,  $87 \pm 1$  %,  $33 \pm 1$  %,  $2.5 \pm 0.1$  g/den and  $62 \pm 1$  deg/mm, respectively. The area effect on GCW, cashmere out put and resistance was significant. In addition, the age effect was significant on GCW and fineness, however, the sex effect did not affect on all traits.

**Key words:** Cashmere, Turkish hair goat, Quality

### Introduction

Turkey's goat population consists of Turkish Hair Goat (THG), Angora Goat, Kilis Goat and Maltese Goat, is estimated to be 8.3 million (Anonymous 2002). These breeds represent respectively 94.4, 4, 1.5 and 0.5 % of the whole goat population. The main product of Angora goat is mohair, Kilis and Maltese goats are raised for milk and meat production. Turkish Hair Goat are reared for meat, primarily and some milk and hair. Turkish Hair Goats are well adapted to ecological conditions in Turkey and about 95 % of their population are owned by traditional farmers.

They are raised over a vast area and live in various environmental conditions. In the green season the Turkish goat population grazes in range and forest areas. In the dry season, goats are mainly housed and given supplementary feed. Goats provide a valuable source of cash income. Besides meat, milk, hair and skin are also produced for home consumption. Researches related to goat in Turkey are rare. Cashmere production interests Turkey, because it can be obtained from THG. That's why some researches on cashmere production and quality have been reported. Recently in Turkey, Kaymakçı ve Akpınar (1997) reported that cashmere yield, fineness and cashmere length were 55 g, 16.2  $\mu$ m and 53 mm, respectively for Kilis goat. Eliçin *et al.* (2000) found that cashmere length and fineness were 28 mm and 16  $\mu$ m in THG, respectively. Investigations about THG showed that cashmere begins to grow after the onset of spring. The purpose of the present study was to determine cashmere production and quality traits of THG.

### Materials and Methods

This study was made in the province of Konya, at the central Anatolia. This region can be accepted as representative for all areas where THG is run. Study regions are hilly, at an altitude of 1120 to 1902 meters. The average of the annual temperature is 12.3 °C, the average of annual precipitation is 727.6 mm. Goats, which are used in the present study, were raised in three regions in Konya; Güney dere village, Güney dere highland and Kuran Village. The animals are housed in winter which minimize environmental differences. The management practice does not make any difference between farms. Breeders go to highland in the spring until the autumn. The breeding occurs in October-November. Kids of THG are weaned at 2½ months old. Goats usually are not sheared because the hair is not enough grown. However goats were combed for this research.

Greasy and cleaned cashmere weights were determined using a scale sensible to one gram. The cashmere can be combed with several combs (Fig. 1). The Chinese comb injured goats because the THG cashmere stick to the hair firmly and this comb was also deformed during the combing. Therefore, combs showed as b in Fig. 1 were developed for the study.

Cashmere traits which are fineness, fiber length, cashmere output, elasticity, resistance and degree of curvature were determined from cleaned cashmere. All of the traits were analysed by the wool laboratory of Lalahan Livestock Research Institute. Laboratory conditions were in accordance with IWTO standards. Fineness and degree of curvature were determined on 1200 fibres which were actually measured by using OFDA (Optical Fibre Diameter Analyser). Fiber length was determined by using the Uster 100 instrument, elasticity and resistance were determined by the fagraph instrument. The fagraph is a device which is used for elasticity and resistance measurements. This device reports as extension percentage for elasticity and as gram/denier for resistance when the fiber break off. Cashmere output was calculated from the followed equation (Ymeriyüz, 1968).

Cashmere Output (CO) % = ((Cleaned and Dried Fiber Weight g) x 1.17) / (Greasy Fiber Weight) x 100  
Least squares method was used for statistical analyses (Harvey, 1987).

## Results and Discussions

**Greasy Cashmere Weight (GCW):** The least squares mean (LSM) of the GCW was  $46 \pm 1$  g. A similar result was obtained by Utkanlar *et al.* (1963). However, Altınbaş (1976) reported the mean GCW in Turkish hair goat as 55 g. Couchman and McGregor (1983), Pattie and Restall (1989) reported GCW values in Australian cashmere goats higher than the present study ones. The area effect on GCW was significant. Means of GCW were found as 42.1 g for Kuran village, 47.0 g for Güneydere village, 49.8 g, and for Güneydere highland, respectively. Mean values for Güneydere highland and Güneydere village were higher than for the Kuran village. This result may be explained by the lower altitude of the Kuran village which is moderately warmer than the high altitude. The cashmere yield is expected to decrease in low altitudes; similar results were reported by Utkanlar (1963). The age effect on the GCW was also significant. Differences between 1½, 2½ and 3½ years old groups were not significant, while means of 4½ and 4½+ ages were lower than others. A decrease in GCW with age has been reported by Pengonca (1966). However, the sex effect was not significant (Table 1).

**Cashmere Fineness:** The LSM of cashmere fineness was  $16.6 \pm 0.1$  μm. Similar values were reported by Holst *et al.*, (1982), Wilkinson (1987), Ning *et al.*, (1996) and Eliçin *et al.*, (2000). On the contrary, Abdullaev and Musalaev (1983) reported lower values than our value, while Utkanlar *et al.*, (1963) reported the highest than ones. The area affects significantly the fineness which means were 16.2 μm, 17.3 μm and 16.3 μm for the Güneydere highland, Güneydere village and Kuran village, respectively. There was any significant difference between the Güneydere highland and the Kuran village while the mean of fineness for the Güneydere village was lower than the Güneydere highland and the Kuran village ( $p < 0.01$ ). The age effect on fineness was significant ( $p < 0.01$ ). The finest cashmere was obtained from 1½ year old goats. The most coarse cashmere was obtained from 2½ and 4½ years old goats. Similar results concerning fineness, for the 1½ years of age was obtained by McGregor (1996). The sex had not a significant effect on fineness (Table 1).

**Cashmere Fiber Length (FLC):** The LSM of the FLC was  $25 \pm 1$  mm. This result was similar to the value reported in THG by Eliçin *et al.*, (2000). However, Holst *et al.*, (1982), Abdullaev and Musalaev (1983), Wilkinson and Stark (1987) were reported higher values. The FLC value in this study was suitable for textile industry. However, the longer fiber makes stronger yarn than pills. The pilling is caused by the abrasion of short fibers into small balls on the surface of the fabric. Some pilling will occur in the most of new sweaters, but the problem will not persist in a good garment after the first cleaning. Lower quality manufacturers use shorter fiber because it is cheaper (Anonymous, 2003).

Area, age and sex effects on the FLC were not significant.

**Cashmere Output (CO):** The LSM of CO was  $87 \pm 1$  %. This value was higher than that reported by Ning *et al.*, (1996) in the Liaoning breed. There was not any other reference related to CO. The area effect on CO was found significant ( $p < 0.01$ ). CO means for Kuran village, Güneydere village and Güneydere highland were 82, 89 and 88 % respectively. The difference between Güneydere village and Güneydere highland was by chance, while means of the Güneydere village and the Güneydere highland were higher than the Kuran village's ( $p < 0.01$ ). This result may be explained by the fact of that goats in Kuran village were housed longer than in the Güneydere village and the Güneydere highland.

**Cashmere Elasticity (EC):** The LSM of EC was  $33 \pm 1$  %. This result was not compared with other references, because there was not any study concerning the EC. Area, age and sex effects on the EC were not significant.

**Cashmere Resistance (RC):** The LSM of RC was  $2.5 \pm 0.1$  g/den. Also there was not any reference for the RC. Area effects was significant ( $p < 0.01$ ), while age and sex of ones did not affect on the RC. The best resistance was found in the Güneydere village. RC means were found to be as 2.5, 3.0 and 1.9 g/den for the Kuran village, the Güneydere village and the Güneydere highland, respectively. All of the differences among the means were significant ( $p < 0.01$ ).

**Cashmere Curvature Degree (CDC):** The CDC was determined by the OFDA instrument as deg/mm. The LSM of the CDC was  $62 \pm 1$  deg/mm. We did not find any reference related to the CDC. The factors effects on the CDC were not significant.

Table 1: Least Squares Means ( $\pm$  SE) for effecting cashmere properties of the research materials

Factors/Traits		n	Greasy Cashmere Weight (g)	Fineness ( $\mu$ m)	Fiber Length of cashmere (mm) (%)	Cashmere output (%)	Elasticity of Cashmere (g/den)	Resistance of chasmere	Curvature degree of Cashmere (deg./mm)
Areas	Kuran Village	18	42 <sup>b</sup> $\pm$ 2	16.3 <sup>b</sup> $\pm$ 0.3	24 $\pm$ 2	82 <sup>b</sup> $\pm$ 1	34 $\pm$ 1	2.5 <sup>b</sup> $\pm$ 0.2	62 $\pm$ 1
	Güneydere Village	13	47 <sup>a</sup> $\pm$ 2	17.3 <sup>a</sup> $\pm$ 0.3	25 $\pm$ 2	89 <sup>a</sup> $\pm$ 1	32 $\pm$ 2	3.0 <sup>a</sup> $\pm$ 0.2	63 $\pm$ 2
	Güneydere Highland	27	50 <sup>a</sup> $\pm$ 2	16.2 <sup>b</sup> $\pm$ 0.2	24 $\pm$ 2	88 <sup>a</sup> $\pm$ 1	32 $\pm$ 1	1.9 <sup>c</sup> $\pm$ 0.2	62 $\pm$ 1
Ages	1.5	21	52 <sup>a</sup> $\pm$ 2	15.7 <sup>b</sup> $\pm$ 0.2	25 $\pm$ 2	86 $\pm$ 1	32 $\pm$ 1	2.2 $\pm$ 0.2	65 $\pm$ 1
	2.5	16	47 <sup>ab</sup> $\pm$ 2	17.2 <sup>a</sup> $\pm$ 0.3	25 $\pm$ 2	86 $\pm$ 1	33 $\pm$ 1	3.0 $\pm$ 0.2	61 $\pm$ 1
	3.5	9	50 <sup>a</sup> $\pm$ 3	16.4 <sup>ab</sup> $\pm$ 0.3	25 $\pm$ 2	88 $\pm$ 1	32 $\pm$ 2	2.2 $\pm$ 0.2	63 $\pm$ 2
	4.5	5	43 <sup>bc</sup> $\pm$ 3	17.1 <sup>a</sup> $\pm$ 0.4	24 $\pm$ 3	87 $\pm$ 2	35 $\pm$ 2	3.0 $\pm$ 0.3	59 $\pm$ 2
	>4.5	7	40 <sup>c</sup> $\pm$ 3	16.6 <sup>a</sup> $\pm$ 0.4	24 $\pm$ 3	86 $\pm$ 2	30 $\pm$ 2	2.5 $\pm$ 0.3	62 $\pm$ 2
Sex	Male	24	47 $\pm$ 2	16.3 $\pm$ 0.2	24 $\pm$ 2	86 $\pm$ 1	32 $\pm$ 1	2.4 $\pm$ 0.2	62 $\pm$ 1
	Female	34	46 $\pm$ 1	16.9 $\pm$ 0.2	25 $\pm$ 1	87 $\pm$ 1	33 $\pm$ 1	2.5 $\pm$ 0.1	62 $\pm$ 1
Total		58	46 $\pm$ 1	16.6 $\pm$ 1.0	25 $\pm$ 1	87 $\pm$ 1	33 $\pm$ 1	2.5 $\pm$ 0.1	62 $\pm$ 1

a, b, c, : Means within a column not followed by the same letter differ ( $p < .05$ )

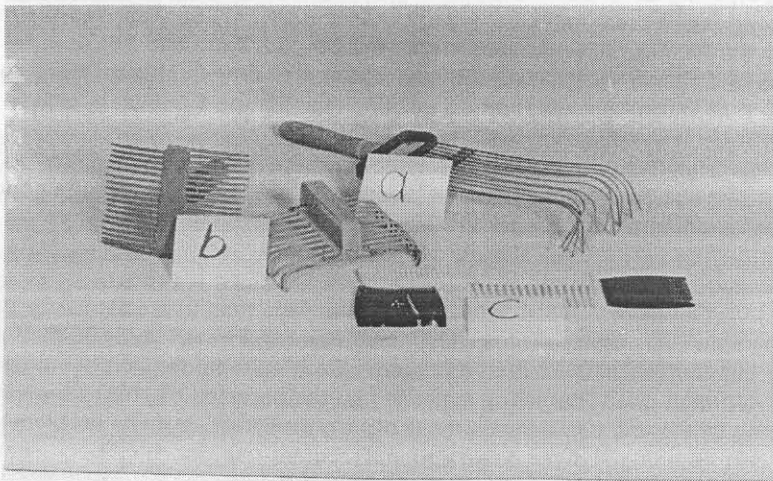


Fig. 1: The combs used in combing cashmere in the study

- a: The combs developed in China
- b: The combs developed especially for this study
- c: The combs developed in other research in Turkey

In conclusion, these first results showed that the cashmere potential of the THG was suitable. Cashmere production from the THG can provide some income to Turkish breeders. On the other hand, THG cashmere traits were found available for hand-made textile products such as hat, scarf, gloves and stocking. It is possible that GCW, fineness, FLC, CO, EC, RC and CDC for textile industry can be improved by the selection; because of the lack of studies concerning the improvement of these traits in THG. However, the introduction of cashmere in Turkey could represent an aviable alternative to goat breeders.

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