

## Some Cashmere Characteristics of German Fawn × Hair Goat (B<sub>1</sub>) Crossbreeds and Shami (Damascus) Goats of the Eastern Mediterranean Region

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**Abstract:** This study was carried out with Damascus (Shami) goats and German Fawn × Hair goat (B<sub>1</sub>) crossbreeds at Mustafa Kemal University. Animals were housed in semi-open sheds under semi-intensive conditions. Both groups were fed 600 g/head per day of concentrate and grazed in a pasture during lactation. Moulded cashmere was harvested by combing in February, March, and April, 2005, at 14-day intervals. The dimensions of cashmere fibres were determined by measuring 25 cashmere fibres from each goat using a Visopan microscope; fibre length was measured with a ruler. Mean diameter and length of cashmere for Shami and the crossbreeds was calculated as 13.5 ± 0.1 µm and 18.3 ± 0.2 cm, and 12.6 ± 0.1 µm and 18.5 ± 0.2 cm, respectively. Results also revealed that both diameter and length of cashmere showed considerable variation for both genotypes across the moulting days during the season.

**Key Words:** Cashmere, Shami goat, German Fawn × Hair goat (B<sub>1</sub>) crossbreeds

### Alman Alaca × Kıl Keçi (G<sub>1</sub>) Melezleri ve Şam (Damaskus) Keçilerinin Doğu Akdeniz Bölgesindeki Bazı Keşmir Özellikleri

**Özet:** Bu çalışma Mustafa Kemal Üniversitesinde Şam (Damaskus) keçileri ve Alman Alaca × Kıl keçi (G<sub>1</sub>) melezleri ile yapılmıştır. Hayvanlar yarı entansif şartlar altında, yarı açık barınaklarda tutulmuşlardır. Her iki grup laktasyon süresince merada otlatılmış ve 600 g/keçi/gün kesif yem tüketmiştir. Keşmir 2005 yılı Şubat, Mart ve Nisan aylarında 15 gün ara ile taranarak hasat edilmiştir. Keşmir kıllarının çapı, visopan mikroskobu kullanılarak her keçinin 25 kılının ölçümü ile uzunluk ise cetvel yardımı ile ölçülmüştür. Çalışma sonunda Şam keçisi ve melezlerde ortalama incelik ve uzunluk, sırasıyla, 13,5 ± 0,1 µm, 12,6 ± 0,1 µm ve 18,3 ± 0,2 cm, 18,5 ± 0,2 cm olarak hesaplanmıştır. Ayrıca, incelik ve uzunluğun kıl dökümü zamanına göre değiştiği de saptanmıştır.

**Anahtar Sözcükler:** Keşmir, Şam keçisi, Alman Alaca × Kıl keçi (G<sub>1</sub>) melezleri

Most goat populations in developing countries inhabit harsh environments with extreme climatic conditions that adversely affect animal production. Although most populations are concentrated in hot tropical regions, contributing unquestionably to the livelihood of smallholders (1), they are also distributed in harsh tropical and temperate dry environments (2).

Goats are generally raised for milk and meat. Other commodities produced from goats are mohair and cashmere. Cashmere is a typical product of cashmere

goats grown in Central Asia, Sin Kiang, Tibet, Gobi, China, Mongolia, and Tsinghai (3). China is the largest cashmere producer in the world with annual production of 11,057 tonnes of raw cashmere in 2000 (4).

Cashmere is produced via an extensive system, is highly seasonal, and is primarily obtained from flocks run by pastoral nomads. Worldwide, about 150 breeds of goat produce cashmere. The quality of cashmere is determined by its length, texture, colour, and fibre diameter. Top quality cashmere (14-15 µm in diameter

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used in knitted garments) usually comes from China (including inner and outer Mongolia), while lower quality cashmere (17-18 µm in diameter used in weaving) comes mainly from Iran and Afghanistan (3).

In general, fine cashmere less than 16 µm average in diameter is preferred, with few fibres coarser than 25 µm, and the highest prices are paid for white down. Age, sex, birth type, and seasonal conditions can all affect cashmere production and quality (5). Cashmere fibre is grown during part of the year in a circannual cycle; the cycle is initiated during the summer solstice and ends by late winter, with subsequent fibre shedding (6).

Turkey has 6,772,000 head of goat, yielding 259,087 tonnes of milk yield and 45,000 tonnes of meat. The most important goat breeds in Turkey are Hair goats and Angora goats. In addition to these genotypes, Shami (Damascus) goats, known for high milk yield and reproductive characteristics, are raised in the south-eastern Mediterranean region of Turkey (7).

In Turkey, some studies have been carried out with the aim of improving the milk yield of Hair goats. As a result of such studies different crossbred and pure genotypes have been improved, such as Taurus dairy goat, Çukurova dairy goat, German Fawn × Hair goat (B<sub>1</sub>) crossbreds, and Shami goats. Although milk yield, fattening, and reproductive characteristics of these genotypes are reported (8-10), cashmere characteristics have not been studied in detail. The objectives of the present study were to determine and compare the cashmere length and diameter of Shami goats and German Fawn × Hair goat (B<sub>1</sub>) crossbreds of the Eastern Mediterranean region (lat 36°N, long 36°E) of Turkey, and to determine the effect of combing date on cashmere characteristics.

The study animals were housed in semi-open sheds under semi-intensive conditions. Some climatic properties during the harvesting period are shown in Table 1. Shami (5 heads) and the crossbred goats (5 heads) were randomly chosen from a flock of 200. All experimental goats were female and were 4 years old. Both groups were fed 600 g/head per day of concentrate (16% crude protein and 2500 kcal ME/kg) and grazed in 150 ha of pasture during lactation. The goats were mated in September of 2004.

Moulted cashmere was harvested by combing on February 12 and 26, March 12 and 26, and April 9 and 23 in 2005. The goats were weighed on those same dates. The samples of moulted cashmere were washed in ether solution to remove any contamination, such as soil and grease (4). The diameters of 25 cashmere fibres were measured using a Visopan microscope and the lengths of the fibres were measured with a ruler. The effect of breed and combing time on cashmere fibre diameter and length were statistically analysed using repeated measurements in SPSS (11).

In the present study cashmere fibres were brown for both genotypes. Investigated cashmere characteristics of German Fawn × Hair goat (B<sub>1</sub>) crossbreds and Shami goats are shown in Table 2.

The results indicated that German Fawn × Hair goat (B<sub>1</sub>) crossbreds produced finer cashmere than Shami goats. Lynch (12) reported that there is large variation in the timing of the onset of moulting among animals. Because of difficulties in predicting the optimum time to comb a large group of animals, in our study combing was performed over an extended period of time. Therefore, cashmere was harvested by combing every 14 days beginning February 12, 2005.

Table 1. Some indoor climatic parameters during the experiment.

Properties	Combing dates*					
	C1	C2	C3	C4	C5	C6
Max. temperature (°C)	16.4	15.9	17.2	18.9	21.8	21.3
Min. temperature (°C)	4.8	3.6	8.4	8.1	8.4	9.0
Humidity (%)	56	49	54	48	57	52

\* Combing dates: C1: February 12, 2005; C2: February 26, 2005; C3: March 12, 2005; C4: March 26, 2005; C5: April 9, 2005; C6: April 23, 2005.

Table 2. Some cashmere characteristics of German Fawn × Hair goat (B<sub>1</sub>) crossbreds and Shami goats.

	Combing dates <sup>a</sup>							Total
	C1	C2	C3	C4	C5	C6	P	
	Diameter (µm)							
Sh	13.1 ± 0.3 <sup>a</sup>	12.8 ± 0.2 <sup>a</sup>	12.9 ± 0.2 <sup>a</sup>	14.2 ± 0.3 <sup>b</sup>	13.8 ± 0.3 <sup>b</sup>	14.2 ± 0.3 <sup>b</sup>	***	13.5 ± 0.1
Cr	11.7 ± 0.3 <sup>a</sup>	12.0 ± 0.3 <sup>a</sup>	12.0 ± 0.3 <sup>a</sup>	13.2 ± 0.3 <sup>bc</sup>	12.8 ± 0.3 <sup>b</sup>	13.8 ± 0.3 <sup>c</sup>	***	12.6 ± 0.1
P	**	*	**	**	**	NS		***
	Length (cm)							
Sh	14.9 ± 0.4 <sup>a</sup>	18.0 ± 0.4 <sup>c</sup>	16.8 ± 0.4 <sup>b</sup>	19.3 ± 0.4 <sup>bc</sup>	19.0 ± 0.5 <sup>d</sup>	21.5 ± 0.4 <sup>e</sup>	***	18.3 ± 0.2
Cr	18.0 ± 0.5 <sup>abc</sup>	17.0 ± 0.4 <sup>ab</sup>	18.4 ± 0.5 <sup>bc</sup>	19.1 ± 0.5 <sup>c</sup>	16.6 ± 0.5 <sup>a</sup>	21.7 ± 0.5 <sup>e</sup>	***	18.5 ± 0.2
P	***	NS	*	NS	**	NS		NS
	Live weights (kg)							
Sh	37.9 ± 0.9	37.1 ± 0.6	39.6 ± 0.7	38.4 ± 0.7	38.7 ± 0.7	39.7 ± 1.4	NS	38.6 ± 0.4
Cr	38.0 ± 2.6	38.1 ± 3.0	39.5 ± 2.9	40.2 ± 2.5	40.5 ± 3.2	41.6 ± 3.5	NS	39.6 ± 1.1
P	NS	NS	NS	NS	NS	NS		NS

Cr: German fawn × Hair goat (B<sub>1</sub>) crossbred; Sh: Shami goat; \*P < 0.05; \*\*P < 0.01; \*\*\*P < 0.001; NS: non-significant; different letters as superscript in the same line show significant differences among the combing dates. <sup>a</sup>Combing dates are the same as in Table 1.

The genetic factors of different breeds affect cashmere characteristics (4). Cashmere diameters detected in the present study were 13.5 µm for the crossbreds and 12.6 µm for Shami goats. As reported by Millar (13), fibre diameter of high quality cashmere ranges between 13 and 16 µm. The cashmere in the present study is in the quality cashmere category. The diameter measured in the present study was less than that obtained from Spanish goats (6). In this study we also detected that combing date had an effect on cashmere diameter and length. Both cashmere diameter and length increased across the combing dates (P < 0.001). Furthermore, the breed × combing date

interaction was not significant for cashmere diameter; however, this interaction was significant for cashmere length (P < 0.001). This was affected by the seasonal fluctuation of cashmere growth.

In conclusion, the diameter and length of cashmere for both genotypes used in this study were of acceptable quality. In addition to the characteristics reported in this study, cashmere yield capacity of the goat genotypes should be investigated in larger flocks. If large variation is detected in these parameters, these characteristics could be improved by using selection programmes or crossbreeding.

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