



Milk Yield, Fertility, Udder Characteristics, and Raw Milk Somatic Cell Count of the Damascus Goats Reared in Iğdır Conditions*

Iğdır Şartlarında Yetiştirilen Halep Keçilerinin Süt Verimi, Döl Verimi, Meme Özellikleri ve Çiğ Süt Somatik Hücre Sayısı

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Abstract. The aim of this study is to determine the somatic cell number (SCC), udder characteristics and some yield characteristics in Damascus goats. This study was carried out on the Damascus goats raised on a private farm brought the first time in Iğdır province of Turkey in 2013. In the study, 62 Damascus goats were measured SCC of 620 milk samples, monthly milk yields, and udder characteristics in 2019. In the study, mean values of some udder characteristics such as udder circumference, udder width, udder bottom height, udder upper height, teat angle, udder volume, teat diameter, and teat length were determined as 41.83±0.13 cm, 13.07±0.04 cm, 30.57±0.14 cm, 51.01±0.15 cm, 38.02±0.13°, 1754.84±10.65 ml, 6.09±0.09 mm and 5.44±0.06 cm, respectively. In raw milk, mean values of SCC and logarithmic Log₁₀SCC were found as 503,120±40,020 cells ml⁻¹ and 5,543±0.037 cells ml⁻¹, respectively. The effect of birth type and lactation order on SCC and Log₁₀SCC was found to be significant (p<0.01). Average daily milk yield, lactation length, and lactation milk yield, which are among the factors affecting milk yield, were found as 2.14±0.05 kg, 292.15±0.60 day, and 626.23±12.94 kg, respectively. The effect of lactation length and season on average dairy milk yield was found to be significant (p<0.01). The effects of udder type on lactation length (p<0.05), and lactation duration on lactation milk yield were found significant (p<0.01). As a result, it has been concluded that Damascus goats can be successfully raised under the conditions of Iğdır province.

Keywords: Damascus goat, milk yield, milk quality, SCC, udder characteristics

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Öz. Bu çalışmanın amacı Halep keçilerinde somatik hücre sayısı (SHS), meme özellikleri ve bazı verim özelliklerinin belirlenmesidir. Bu çalışma, Türkiye'nin Iğdır iline ilk kez 2013 yılında getirilen ve özel bir işletmede yetiştirilen Halep keçilerinde yürütülmüştür. Çalışmada 2019 yılında 62 baş keçiye 620 adet süt örneğinde SHS, aylık süt verimi ve meme özellikleri ölçülmüştür. Çalışmada meme çevresi, meme genişliği, meme alt yüksekliği, meme üst yüksekliği, meme başı açısı, meme hacmi, meme başı çapı ve meme başı uzunluğuna ait ortalama değerler sırasıyla 41.83±0.13 cm, 13.07±0.04 cm, 30.57±0.14 cm, 51.01±0.15 cm, 38.02±0.13°, 1754.84±10.65 ml, 6.09±0.09 mm ve 5.44±0.06 cm olarak belirlenmiştir. Sürüde iki parçalı ve düz meme olarak iki meme tipi tespit edilmiştir. Çiğ sütlerde ortalama SHS ve logaritmik Log₁₀SHS değerleri sırasıyla 503.120±40.020 hücre ml⁻¹ ve 5.543±0.037 hücre ml⁻¹ olarak bulunmuştur. Doğum şekli ve laktasyon sırasının SHS ve Log₁₀SHS üzerindeki etkisi anlamlı bulunmuştur (p<0.01). Süt verimini etkileyen faktörlerden ortalama günlük süt verimi, laktasyon süresi ve laktasyon süt verimi sırasıyla 2,14±0,05 kg, 292,15±0,60 gün ve 626,23±12,94 kg olarak tespit edilmiştir. Ortalama günlük süt verimi üzerine laktasyon süresi ve mevsimin etkisi anlamlı bulunmuştur (p<0.01). Meme tipinin laktasyon uzunluğuna (p<0.05), laktasyon süresinin laktasyon süt verimi üzerine etkisi anlamlı (p<0.01) bulunmuştur. Sonuç olarak Halep keçilerinin Iğdır ili koşullarında başarılı bir şekilde yetiştirilebileceği sonucuna varılmıştır.

Anahtar Kelimeler: Halep keçisi, süt verimi, süt kalitesi, SHS, meme özellikleri

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INTRODUCTION

Goats (*Capra hircus*) were domesticated in the Near East during the Neolithic period, which dates back an estimated 10,000 years ago, and have now spread to all regions and continents of the Earth (Fernandez et al., 2006). Goats make good use of low-quality pastures, shrubberies, and brush areas, and turn them into meat, milk, and other products (Günlü and Alaşahan, 2010). They meet a significant portion of the animal-derived food requirements of farmers living in rural areas (Lu and Miller, 2019). For this reason, the goat has an important place among the species used for their meat and milk in Turkey (Anitaş et al., 2017).

Damascus goat is a goat breed originating from the Syrian city of Damascus and being grown in many regions and countries of the world (e.g., Turkey, Syria, Lebanon, Egypt, Cyprus, and Israel). It has particularly well adapted to the conditions of regions (Middle East) that have a temperate climate and extends to India and the conditions of countries with Mediterranean shores (Özcan, 1989).

In general, goat breeds grown in Turkey are hair goats (Anatolian black goat). Damascus goat, on the other hand, is a breed of goat grown primarily for milk yield in South-Eastern Anatolia and Eastern Mediterranean regions and the regions of Turkey bordering Syria (Kaçar et al., 2010).

The genotype, which is widely grown in Gaziantep, Kilis, and Hatay provinces of Turkey, is the Kilis goat type. This type has been formed as a result of the hybridization of hair goats for many years (Damascus + hair goat= Kilis goat) and is also accepted as a breed (Gül et al., 2016; Ünal and Ceyhan, 2017).

Many studies have shown that Damascus goat can be easily grown in areas dominated by plants such as alfalfa, which grow in a hot, arid, and salty soil structure (Abdalla et al., 2013; Abd al-Hamid et al., 2017). The milk yield of the Damascus goat breed is high, it is resistant to high temperatures, and has the ability to use weak and barren pastures very well. Also, the fact that they make better use of non-productive pastures compared to sheep and evaluates stubble areas more effectively after harvest is one of their other characteristics (Barıtçı and Adıgüzel, 2017).

Countries such as Switzerland and France, which give importance to animal husbandry and have developed many different breeds of dairy goats, have realized the high levels of yield and income, which they get per animal in goat milk production, through selection programs that they do at the national level (South et al., 2006). The Damascus goat breed, which has adapted well to environmental conditions (climate, diseases and nutrition), is a breed whose genetic characteristics should be benefited to increase milk and meat production in difficult conditions (Keskin et al., 2004).

Damascus goats, which are of Syrian origin, have been taken to many regions and provinces, such as Çanakkale, in Turkey after the outbreak of the Civil War in Syria (Önal, 2016). One of the provinces where Damascus goats have been taken to is Iğdır province in Turkey. In this study, for the first time, by determining data such as milk yields, fertility, udder sizes, and somatic cell counts of Damascus goats grown in Iğdır region, suggestions were made about their adaptation and breeding in this region.

MATERIAL AND METHOD

Animal Material, Feeding, and Climate

For this study, it was used a total of 62 head Damascus goats with the first (21 head), second (21 head) and third (20 head) birth within the 2019 year, which were brought to a private enterprise located in Iğdır province in 2013. Ear-tag numbers of all goats have been determined. All the goats gave birth in March. In the pre-birth months of 2018 (December, January, and February) and in the birth month (March), 1.5 kg of dried alfalfa grass, 1 kg of dried meadow grass, and 0.3 kg of barley were given to each maternal goat per day. In April, the goats began to be grazed in the pasture (good quality), and in addition, the daily amount of alfalfa, dry grass, and barley was given as 1, 1, and 0.2 kg, respectively. From May to November (2019 year), goats were kept in the shelter at night, and during the day they were grazed in the

pasture (village pasture, rental pasture, field stubble such as wheat, and clover stubble after harvesting); no additional feed was given.

Igdir province where Damascus goats are grown is located in the eastern most part of the Eastern Anatolia region of Turkey at Latitude 44 E 02 and longitude 39 N 55. The average annual temperature of the province is 11.6 °C; air temperatures falling to -30 °C in winter and sometimes exceeding 41 °C in summer are encountered. It receives very little precipitation (average annual precipitation is 259.9 mm) and has a semi-arid climate (Anonymous, 2019).

Determination of Udder Characteristics

Determination of udder characteristics is performed by the method applied by Aktaş (2012) and Mavrogenis et al. (1988) (Figure 1). Udder measurements were taken 3 times on the 45th, 90th, and 135th days of lactation. Udder measurements were done about an hour before milking in the morning and immediately after milking. In determining udder characteristics, a measuring strip was used for udder circumference (UC) (Figure e); a tape measure for values of udder upper height (UUH) (Figure d: A-D); udder bottom height (UBH) (Figure d: K-D); udder width (UW) (Figure d: B-C); udder circumference (UC) (Figure e); caliper for measuring teat length (TL) (Figure a: c); teat diameter (TD) (Figure a: d); goniometer for measuring teat angle (TA) (Figure f), and a water cup for identifying udder volume (UV) (Figure b). Detection of udder type from qualitative properties was made according to Figure c.

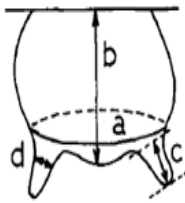


Figure a. Udder measures (a: Udder circumference, b: Udder depth, c: Teat length, d: Teat diameter)

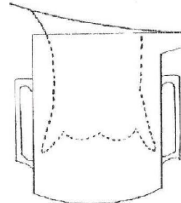


Figure b. Udder volume



Figure c. Udder types (1: Two pieced, 2: Flat udder, 3: Broken breast, 4: Asymmetric)

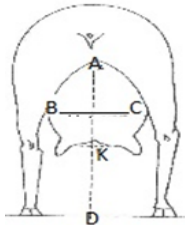


Figure d. Udder features (A-D: udder upper height, K-D: udder bottom height, B-C: udder width)



Figure e. Breast circumference



Figure f. Teat angle

Figure 1. Udder features, udder measures and udder types

Şekil 1. Meme özellikleri, meme ölçüleri ve meme tipleri şekilleri.

Milk Control and Milk Somatic Cell Counts

In this study, milk controls were performed once a month, in the morning and evening by hand. The Holland method was used to determine each lactation milk yield calculation. According to this method, the yields measured at 30 days interval day during lactation are considered as the average daily milk yield (Kaymakçı, 2006).

Determination of milk yields and identification of somatic cell counts were carried out on the farm (in the enterprise) on the day of milk control. Measured milk quantity and SCC were written across the ear

number of each goat. The quantity of milk obtained on the control day (kg) was determined by weighing and the SCC measurements were made with DeLaval Cell Counter (DCC). DCC counts somatic cells colored with DNA-specific fluorescent probe Propidium Iodide. The somatic cell count appears as numerically on its screen in a minute. The use of the device and the method were performed based on DeLaval (2018).

Mating and Offspring Yield

In the Damascus goat herd, a form of free grafting method (mating) is practiced in the insemination of goats that come into a rut; male animals roam freely in the herd. As fertility, the offspring yield of goats by age group was studied. According to this, the information of twin and single-born offspring was recorded across their mother's earring and the number of offspring per maternal goat was determined.

Data Editing and Statistical Analysis

In Damascus goats, two types of udders were identified: two-piece and flat udder types. In the evaluation of the seasons, the March-April-May months were used as the 1st season (Spring), June-July-August as the 2nd season (Summer), and September-October-November as the 3rd season (Autumn). As a type of birth, single birth= 1 and twin birth=2 were used in the evaluations. Effects of factors such as lactation order and udder type on the udder characteristics (UC, UD, TL, TD, UUH, UBH, UW) and SCC of Damascus goat milk were analyzed in a repeated measurement on animals by using the Least Squares Mixed Model Procedures of SPSS statistic package program (Yıldız and Bircan, 1991). Correlations between all udder characteristics and milk yield characteristics were analyzed (SPSS, 2013).

RESULTS AND DISCUSSION

In the study, the data obtained during lactation in 2019 from Damascus goats grown in a private enterprise in Iğdir province were statistically analyzed. In the process of obtaining the data, lactation length, daily average milk yield, lactation milk yield, SCC, udder type and udder characteristics were examined. The obtained results were compared with the results of scientific studies conducted in different regions and countries. Some descriptive statistics belonging to the udder characteristics examined in the study are given in Table 1. The variation coefficients for teat diameter, teat length, udder volume, and udder bottom height, which have the highest variation coefficient among the breast characteristics, were determined as 28.49%, 25.78%, 13.52%, and 11.29%, respectively (Table 1).

Table 1. Descriptive statistics for examined udder characteristics of Damascus goats.

Çizelge 1. Halep keçilerinin incelenen meme özelliklerine ait tanımlayıcı istatistikler

Parameters	N	Some statistic values					
		\bar{X}	$S_{\bar{x}}$	SD	Min.	Max.	CV
Udder circumference (cm)	62	41.83	0.13	2.33	33	51	5.57
Udder width (cm)	62	13.07	0.04	1.25	10	16	9.56
Udder bottom height (cm)	62	30.57	0.14	3.45	21	39	11.29
Udder upper height (cm)	62	51.01	0.15	3.44	40	59	6.74
Teat angle (°)	62	38.02	0.13	3.20	28	45	8.42
Udder volume (ml)	62	1754.84	10.65	237.21	1100	2500	13.52
Teat diameter (mm)	62	6.09	0.09	1.57	4	14	25.78
Teat length (cm)	62	5.44	0.06	1.55	2.5	9	28.49

\bar{x} : Mean of least squares, $S_{\bar{x}}$: Standard error, SD: Standard deviation, Min.: Minimum, Max: Maximum, CV: Coefficient of Variation.

In this study, the minimum, maximum and average udder circumference lengths were determined as 33 cm, 51 cm, and 41.83±0.13 cm, respectively (Table 1). El-Gendy et al. (2014) reported these values as 16 cm, 57 cm, and 30.95±0.46 cm, respectively in Damascus goats. Also, in this study, the minimum, maximum and average teat lengths of Damascus goats were obtained as 2.5 cm, 9 cm, and 5.44±0.06 cm, respectively. El-Gendy et al. (2014) reported these values as 1.5 cm, 4.75 cm, and 10±0.04 cm, respectively.

In this study, a high degree of variation was detected between breast characteristics of Damascus goats. This situation may provide an advantage for improving of breast structure.

Subgroup mean values and standard errors related to effects of lactation order, udder type, birth type, and season, which are effective factors on milk yield characteristics and SCC, are given in Table 2. The effect of birth type on lactation length, lactation milk yield and daily average milk yield was not significant. The effect of udder type on lactation length was found to be significant ($p<0.05$), while its effect of it on lactation milk yield and daily average milk yield was not significant (Table 2). The results of variance analysis showed that the lactation order did not cause any variation in lactation length, but it caused significant variations in lactation milk yield and average daily milk yield ($p<0.01$) (Table 2). In addition, it was determined that whereas the lactation order caused a significant variation in SCC ($p<0.01$), the udder type and season did not cause any variation in SCC (Table 2). In the study, while the effect of udder type on $\text{Log}_{10}\text{SCC}$ value was not found to be significant, the effects of lactation order, birth type ($p<0.01$), and season ($p<0.001$) were found to be significant (Table 2).

Table 2. Effects of lactation order, udder type, and birth type on milk yield characteristics and SCC.

Çizelge 2. Laktasyon sırası, meme tipi ve doğum tipinin süt verim özellikleri ve SHS üzerine etkisi.

Classification	n	Lactation	Lactation milk	Daily average	Somatic Cell	$\text{Log}_{10}\text{SCC}$
		Length (day)	yield (kg)	milk yield (kg)	Score (cells ml^{-1})	
		$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$
General		292.15±0.60	626.23±12.78	2.14±0.05	503,120±40,020	5.54±0.04
Lactation order		NS	**	**	**	**
1 st	21	291.60±0.90	561.73±22.05 ^a	1.89±0.73 ^a	358,850±47,540 ^a	5.42±0.05 ^a
2 nd	21	291.84±1.05	638.08±17.44 ^b	2.15±0.59 ^b	473,840±71,600 ^a	5.50±0.07 ^a
3 rd	20	293.05±1.16	653.98±22.05 ^b	2.19±0.73 ^b	685,340±69,490 ^b	5.72±0.05 ^b
Udder type		*	NS	NS	NS	NS
Two-piece	51	291.62±0.61	602.53±06.68	2.01±0.38	482,800±39,660	5.53±0.04
Flat	11	294.61±1.71	632.17±16.88	2.13±0.46	597,320±132,360	5.61±0.12
Birth type		NS	NS	NS	**	**
Single	32	291.20±0.59	606.108±16.48	2.12±0.05	395,520±43,760	5.45±0.05
Twin	30	293.10±0.61	629.336±19.77	2.24±0.10	617,880±62,430	5.66±0.05
Seasons					NS	***
Spring	186	-	-	-	461,540±38,440	5.45±0.03 ^a
Summer	186	-	-	-	508,840±30,610	5.56±0.03 ^b
Autumn	248	-	-	-	530,000±27,660	5.60±0.02 ^b

NS: Non-significant; *: $p<0.05$; **: $p<0.01$; ***: $p<0.001$; the difference between the means denoted by a, b, c is significant.

In the study, the average lactation length of Damascus goats was determined as 292.15±0.60 days (Table 2). This value was similar to the value of 300 days determined in Damascus goats in the hands of the public in Lebanon (Khazaal, 2009). However it was higher than the values of 227.48 days and 170.39 days determined respectively in Damascus and Kilis goats grown in Turkey (Tatar et al., 2019), 176 days and 183 days found respectively in one year old and two years old goats grown in Cyprus (Mavrogenis and Constantinou, 1982), and 254.7±2.359 days determined in those grown in Northern Cyprus (Guney et al., 2006).

In this study, when lactation milk yields of Damascus goats grown in Iğdir province were examined, it was determined that the average was 626.23±12.78 kg (Table 2). This value was higher than the values reported as 238,185 kg, 329 liters, 347.6±19.05 liters and 453.75 kg in Damascus goats by Yakan et al. (2019), Keskin (2000), Keskin et al. (2004), and Özüyanık (2004), respectively. In this study, it was determined that older goats had higher milk yields than younger ones (Table 2). Similarly, it was also reported by Yakan et al. (2019) that older goats had higher milk yields than younger goats.

In this study, the effects of udder type and birth type on the daily average milk yield of Damascus goats were not significant, while the effects of lactation order ($p<0.01$) and season ($p<0.001$) were found

significant. The average daily milk yield of Damascus goats was determined as 2.14 ± 0.04 kg day⁻¹ in the growing conditions of Iğdir province (Table 2). This value was higher than the values reported as 1.13 and 1.90 kg in Damascus goats by Yakan et al. (2019) and Günay et al. (2006), respectively and lower than the value reported as 3.16 ± 0.84 liter by Omar-Musa (2015).

In this study, a long lactation period, high average daily milk yield and thereby high annual milk yield were determined in Damascus goats compared to some other study results. The reason for this is that there is easy access to quality fresh and green feed sources throughout the year for grazing of animals after the last harvest in alfalfa fields, areas under fruit trees, grain and silage cornfields, and sugar beet plantation areas because roughage agriculture is carried out in Iğdir province.

This study showed that SCC value was $503,120 \pm 40,020$ cells ml⁻¹ in Damascus goats. This value was lower than the values obtained as $599,600 \pm 60,000$ cells ml⁻¹, $727,195 \pm 61,480$ cells ml⁻¹ and $1,098,000 \pm 81,730$ cells ml⁻¹ by Burns et al. (2019) at the beginning, middle, and end of the lactation, respectively. The effect of season and udder type on SCC was not significant. In a study conducted by Göçmen et al. (2019), it was reported that in the SCC control performed on the 30th day in Damascus goat milk, 86.6% remained below the value of 1,000,000 cells ml⁻¹ and 13.4% remained above the value of 1,000,000 cells ml⁻¹.

On the other hand, although a study conducted by Darbaz et al. (2019) found that the effects of lactation order and birth type on SCC in Damascus goat milk samples were not significant, the effects of lactation order and birth type on SCC were found statistically significant in this study ($p < 0.01$). However, according to the results of the Duncan comparison test, the effect of the third lactation order on SCC was found to be different (Table 2). The fact that the SCC value of old goats in the same herd is naturally high can be shown as a reason for this (Granado et al., 2014; Anitaş et al., 2017)

Although many standards have been determined in the world for acceptable SCC upper limit values in cow milk, there are a few standards for goat milk that only some countries accept for themselves. Currently, there is no legal limit on the value of SCC in goat milk in the European Union (Paape et al., 2007). In this study, the mean SCC value in Damascus goats was determined as $503,120 \pm 18,440$ cells ml⁻¹ (Table 1). The legal milk SCC limit for goats is 1,000,000 cells ml⁻¹ in the United States (Paape et al., 2007; Anitaş et al., 2017). However, in the Grade "A" Pasteurized Milk Ordinance regulation, the SCC Value specified for goat milk is stated as 1,500,000 cells ml⁻¹ by the United States FDA (2017). As a result of bacteriological tests performed to detect the presence of breast infection in a study of Damascus goats, the threshold SCC Value was reported as 1,000,000 cells ml⁻¹ (Doaa et al., 2014), while it was found in another study that the SCC threshold value in Nubian goats was 1,600,000 cells ml⁻¹ (El - Saied et al., 2003).

In this study, Log₁₀SCC value was determined as 5.54 ± 0.04 in Damascus goats grown in Iğdir province. This value was higher than the Log₁₀SCC values of 2.59 ± 0.64 , 2.60 ± 0.51 , and 2.41 ± 0.56 obtained by Göçmen et al. (2019) on the 10th, 20th and 30th days of lactation in Damascus goats, respectively (Table 2).

The statistical evaluation conducted in this study to understand whether udder type caused any variation between udder characteristics showed that any variation did not occur ($p > 0.05$) (Table 3). Subgroup means, standard errors, and statistical analysis results of the change of udder characteristics by udder types are given in Table 3.

As shown in Table 3, the mean values for UC, UBH, UUH, TA, UV, TD, and TL were determined as 41.81 ± 0.29 cm, 30.62 ± 0.44 cm, 51.06 ± 0.44 cm, 38.08 ± 0.410 , $1,756.45 \pm 30.13$ lt, 6.09 ± 0.09 mm, and 5.44 ± 0.20 cm, respectively.

Correlations between udder characteristics and Log₁₀SCC examined in Damascus goats were given in Table 4.

Table 3. Subgroup means, standard errors and t-test results for the change of udder characteristics by udder types

Çizelge 3. Meme tiplerine göre meme özelliklerinin değişimine ait alt grup ortalamaları, standart hataları ve t-test sonuçları.

	n	UC	UBH	UUh	TA	UV	TD	TL
		$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$	$\bar{X} \pm S_{\bar{x}}$
General	62	41.81±0.29	30.62±0.44	51.06±0.44	38.08±0.41	1756.45±30.13	6.09±0.09	5.44±0.20
UT		NS	NS	NS	NS	NS	NS	NS
1	51	41.85±0.35	30.82±0.49	51.19±0.49	37.69±0.45	1749.02±35.34	6.21±0.03	5.32±0.22
2	11	41.59±0.49	29.68±0.91	50.46±1.01	39.91±0.78	1790.91±45.64	5.97±0.15	5.96±0.43

UT: Udder type, 1: Two-piece udder, 2: Flat udder, UC: Udder circumference, UBH: Udder bottom height, UUh: Udder upper height, TA: Teat angle, UV: Udder volume, TD: Teat diameter, TL: Teat length.

Table 4. Spearman's rho correlations between udder characteristics and lactation length, lactation milk yield, and Log₁₀SCC⁽¹⁾.Table 4. Meme özellikleri ile laktasyon süresi, laktasyon süt verimi ve Log₁₀SHS nin Spearman's rho korelasyonları ⁽¹⁾.

Characteristics	UBH	UUh	TA	UV	Log ₁₀ SCC	LL
UUh	0.761**					
TA	-0.263*	-0.129				
UV	-0.317*	-0.030	0.428**			
Log ₁₀ SCC	-0.189	0.012	-0.082	0.326**		
LL	-0.086	0.020	0.269*	0.231	0.120	
LMY	-0.170	0.027	0.299*	0.461**	0.109	0.469**

UBH: Udder bottom height, UUh: Udder upper height, UV: Udder volume, Log₁₀SCC: Logarithmic somatic cell count, TA: Teat angle, LL: Lactation length, LMY: Lactation milk yield.

*: Correlation is significant at the 0.05 level, **: Correlation is significant at the 0.01 level.

⁽¹⁾: $r < 0.5$ indicates to weak, $0.5 < r < 0.7$ indicates to moderate, and $0.7 < r$ indicates to strong correlations.

As seen in Table 4, no significant correlation was found between udder characteristics and characteristics that affect particularly SCC and lactation milk yield. It was determined that all of the correlations identified as significant (at levels of $p < 0.05$ and $p < 0.01$) were correlations that had a low ($r < 0.5$) effect. Similarly, Aktaş et al. (2012) obtained similar results for the same characteristics in Turkish Saanen goats.

In addition, fertility was also examined in Damascus goats in this study. Birth type rates of Damascus goats by age group are shown in Table 5. Although the rate of twin-birth increased as age increased, this increase was not statistically significant ($p > 0.05$).

Table 5. Birth type ratios of Damascus goats by age group.

Çizelge 5. Halep keçilerinin yaş gruplarına göre doğum tipi oranları.

Birth Types	Age groups						Average	
	Two years old		Three years old		Four years old		N	%
	n	%	n	%	n	%		
Single Birth	14	66.7	10	47.6	8	40.0	32	51.6
Twin Birth	7	33.3	11	52.4	12	60.0	30	48.4
Total	21	100.0	21	100.0	20	100.0	62	100.0

$\chi^2 = 3.120$, $p > 0.05$.

In this study, while there was no triplet birth type, twin birth rates were found to be 33.3%, 52.4%, 60.0% and 48.4% for ages of two, three, four years and for average, respectively (Table 5). The average kid fertility per maternal goat was 1.48 kid goat⁻¹. On the other hand, another study showed that the average twin birth rates in Damascus and Saanen goats raised in Lebanon were 1.75 kid goat⁻¹ and 1.08 kids goat⁻¹, respectively (Khazaal, 2009).

CONCLUSION

In light of the obtained findings, when lactation length, daily milk yield and average lactation milk yield are compared to studies conducted in Turkey and many other countries, it was determined that Damascus goats had a satisfactory level of milk yield in Iğdir province. However, the value obtained for SCC in the study is below the upper limit values accepted by many countries for goat milk. This study has shown that Damascus goats can be successfully bred in Iğdir province.

CONFLICT OF INTEREST

There is no conflict of interest between the authors.

AUTHOR CONTRIBUTION

The authors contributed equally to this study.

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