

Reproductive performance, lactation traits and body measurements of Manavlı goats

Desempenho reprodutivo, características da lactação e medidas biométricas de caprinos Manavlı

Aykut Asım Akbas^{1*}; Ozkan Elmaz²; Mustafa Saatçı³; Can Metin Yazıcı⁴

Highlights

It's the first study related to Manavlı goats, which no features have been reported.

The twinning rate obtained has a high value compared to other native breeds.

High live weight and body measurement values were detected in favor of Manavlı goats.

Abstract

This study determined reproductive performance, milking traits and body measurements in 630 Manavlı goats that were reared purely in the Denizli province of Türkiye in six goat flocks. In this study, live weights and zoometrical body measurements of does and bucks were defined. Additionally, flock reproductive traits and milk yield were determined for six flocks. Overall, birth rate, twin birth rate, kidding rate and litter size in six flocks were determined as 98.34%, 43.42%, 1.41 and 1.44, respectively. The mean of the lactation milk yield, lactation period and daily milk yield were 160.48 kg, 198 days and 0.810 kg, respectively. The live weights of does ranging in age from 4.1 to 4.7 were between 74.59 and 86.30 kg, while the live weights of bucks ranging in age from 2.1 to 2.7 were between 101.19 and 118.23 kg. Some body measurements of does, such as height at withers, rump height, rump width, body length, heart girth, ear length, tail length, and front and back wrist girth, were measured as 92.80, 93.07, 22.86, 91.97, 105.02, 26.83, 20.19, 12.35 and 12.31 cm, respectively, before mating season. The same values at the abovementioned period were measured as 98.27, 98.71, 23.87, 100.48, 109.89, 26.97, 22.30, 14.46 and 14.41 cm, respectively. This study is the first research related to Manavlı goats, for which no features have been reported to date. The obtained results will help to contribute to livestock diversity.

Key words: Body weight. Indigenous breed. Lactation duration. Milk production.

¹ Associate Prof. Dr., Department of Animal Science, Faculty of Veterinary Medicine, Burdur Mehmet Akif Ersoy University, Burdur, Türkiye. E-mail: icould_akbas@hotmail.com

² Prof. Dr., Department of Animal Science, Faculty of Veterinary Medicine, Burdur Mehmet Akif Ersoy University, Burdur, Türkiye. E-mail: elmaz@mehmetakif.edu.tr

³ Prof. Dr., Department of Animal Science, Fethiye Faculty of Agriculture, Muğla Sıtkı Koçman University, Muğla, Türkiye. E-mail: m_saatci@hotmail.com

⁴ Research Asistant, Department of Animal Science, Faculty of Veterinary Medicine, Burdur Mehmet Akif Ersoy University, Burdur, Türkiye. E-mail: cmetinyazici@mehmetakif.edu.tr

* Author for correspondence

Resumo

O estudo foi planejado para determinar o desempenho reprodutivo, características da lactação e medidas biométricas de 630 caprinos Manavlı, criados exclusivamente na província de Denizli, em Türkiye, em seis rebanhos. No estudo foram aferidos os pesos corporais e medidas biométricas. Além disso, foram tentadas determinar algumas características reprodutivas dos rebanhos e produção de leite para seis rebanhos. No geral, a taxa de natalidade, a taxa de nascimentos gêmeos, a taxa de partições e o índice de prolificidade em seis rebanhos foram determinados como 98,34%, 43,42%, 1,41 e 1,44, respectivamente. A média da produção de leite durante a lactação, o período de lactação e a produção diária de leite foram encontrados como 160,48 kg, 198 dias e 0.810 kg, respectivamente. Enquanto os pesos corporais das cabras, com idades entre 4,1 e 4,7 anos, variavam entre 74,59 e 86,30 kg, os pesos corporais dos bodes, com idades entre 2,1 e 2,7 anos, foram detectados entre 101,19 kg e 118,23 kg. Algumas medidas corporais das cabras, como altura na cernelha, altura do lombo, largura do lombo, comprimento corporal, perímetro torácico, comprimento da orelha, comprimento da cauda, perímetro do pulso frontal e traseiro foram medidas como 92,80 cm, 93,07 cm, 22,86 cm, 91,97 cm, 105,02 cm, 26,83 cm, 20,19 cm, 12,35 cm e 12,31 cm, respectivamente, antes da estação de acasalamento. Os mesmos valores foram detectados no período acima mencionado como 98,27 cm, 98,71 cm, 23,87 cm, 100,48 cm, 109,89 cm, 26,97 cm, 22,30 cm, 14,46 cm e 14,41 cm, respectivamente. Este estudo é a primeira pesquisa relacionada às cabras Manavlı, para as quais nenhuma característica foi relatada até o momento. Os caprinos Manavlı podem contribuir para a biodiversidade e para o futuro da criação de pequenos ruminantes na Turquia.

Palavras-chave: Duração da lactação. Peso corporal. Produção de leite. Raça autóctone.

Introduction

Türkiye has a geographical location that is considered one of the world's most important gene centres and one of the first domestication points of cattle, sheep and goats (Akcapınar & Ozbeyaz, 1999). However, there has been a serious loss of livestock genetic resources in Türkiye in the last half century, and some genetic resources, such as Tiflis goat (Batu, 1951), Seferihisar cattle and Kafkas cattle (Batu, 1962), disappeared before they could be identified and registered. This situation has revealed how important it is to create a balance between breeding activities and the conservation of genetic resources (General Directorate of Agricultural Research and Policies [GDARP],

2009). Many countries, including Türkiye, signed the "Convention on Biodiversity" at the United Nations Rio summit in 1992, pledging to contribute to the conservation of indigenous gene resources. After the Summit, the Food and Agriculture Organization (FAO) took over the follow-up on the issue of breed protection. The FAO designated the Ministry of Agriculture or Agricultural Organizations of the countries that signed the convention as authorised. Accordingly, the countries were asked to assess their current situation and take measures for conservation. With their adaptability to the geography and climatic conditions in which they live, local breeds have an important and special place in the livestock breeding policies of countries, both sustaining their lives and

supporting people with their products. It is necessary to identify methods to optimally utilise every farm animal, including goats, to support animal products. Evaluating goats as part of the ecosystem would make a positive contribution to this issue (Akbas et al., 2022). In Türkiye, sheep breeding is intensively carried out with indigenous breeds adapted to Anatolian geography. Generally, goat breeding is the most important source of livelihood in settlements in and around forests. In areas where the terrain is steep, cultivation areas are limited and not very suitable for crop production or the breeding of animal species other than goats. The amount of milk produced in 2023 from goat flocks (543.058 tonnes), which corresponds to approximately 15% of Türkiye's animal existence with nearly 10.5 million goats, meets approximately 2.5% of the total milk production (General Directorate of Livestock [GDL], 2024). Despite the positive changes in the number of animals in the goat population of Türkiye over the years, the unchanging situation for many geographical regions is the predominance of Turkish Hair goats in the population. Although there has been a significant increase in studies on all possible variants of goats, which are indigenous gene sources in Türkiye, and the new breeds that can be determined afterwards, the needs of this field are still not met.

The aim of this study was to determine descriptive traits related to reproductive, milking and live weights of Manavlı goats for which no features have yet been revealed under breeder conditions.

Materials and Methods

The study area, animals and data collections

This study evaluated 630 Manavlı goats in six goat flocks in Denizli province, where pure goats called Manavlı (Figures 1 and 2) were raised. The number of animals for the mentioned flocks were as follows: 55, 225, 118, 110, 57 and 65. Since the measurements of the animals used in the study were carried out in the flocks where they were found, no changes were made in the care or environmental conditions, and no additional care or feeding conditions were provided for the animals. In general, animals in all flocks under follow-up spent 06.00–20.00 hours of the day in the pasture when the pastures were suitable; after returning from the pasture, goats were supported with additional barley/wheat crushed feed according to their needs.



Figure 1. Manavlı does



Figure 2. Manavlı bucks.

The reproductive traits of the flocks, such as parturition rate, birth rate, number of kids per birth, and single and multiple birth rates, were determined in line with previous studies (Kaymakçı & Askin, 1997; Akcapınar & Ozbeyaz, 1999; Karadag, 2016). Milk yield records were made according to the International Committee for Animal Recording (ICAR) method. Milked goats

were considered lactating until their daily milk yield was < 0.2 kg/day or milk yield per milking was 0.05 kg/lactation (International Committee for Animal Recording [ICAR], 2011). To calculate lactation milk yield, measurements were started on the 15th day of lactation and measurements were made monthly. For the period when the kids were suckling in the controls (days 15–75), the

kids were separated from their dams 12–14 hours before milking on the first day. Milking was done in the evening, and the kids were left with their dams. The kids were separated from their dams 12–14 hours before the morning milking to be done the next day, and the morning milking was performed; the amount of milk obtained was collected and one-day milk yield was calculated. For the period after the kids were weaned, the goats were milked only once every day in the evening due to the field conditions, and on the milk control days, data from the evening milking and the following morning milking 12–14 hours later were collected and evaluated (Tekerli et al., 2002). The lactation milk yield was calculated according to the Trapez II Method (Fleischmann Method) (Maria & Gabina, 1992; Keskin et al., 2017). Within the scope of the study, live weights and some body measurements (height at withers, rump height, body length, heart girth, front and back wrist girth, and rump width) of goats and bucks were taken at 3-month intervals (February, May and August before mating) in accordance with literature reports (Adebayo, 2009; Elmaz et al., 2011; Karaca et al., 2012).

This study was approved by the Burdur Mehmet Akif Ersoy University Local Ethical Committee on Animal Experiments (meeting number: 77, resolution number: 647).

Statistical analysis

Statistical software package Minitab version 19.1 (Minitab Statistical Software [MINITAB], 2019) was used for statistical data comparison. A statistical model with the fixed effects (flock and period) was used to determine the least square (LS) means of the live weight and body measurement traits using the generalised linear model (GLM) procedure. When the dual interactions between the groups were examined, interaction analyses were not performed since no statistical significance was found. Additionally, Tukey's analysis was employed to control for the significance of differences between sub-groups ($p < 0.05$).

Results and Discussion

The reproductive traits of Manavli goat flocks are given in Table 1. The birth rates in the flocks (1–6) were 100, 93.33, 98.30, 100, 100 and 98.46%. The rates of twin births were 45.46, 56.25, 39.66, 55.47, 33.93 and 29.69%, while the rates of triplet births were 0.90 and 3.63% in flocks 2 and 4, respectively. The number of born kids per number of breeding goats (kidding rate) was 1.45, 1.46, 1.37, 1.59, 1.31 and 1.33, and litter size, which is another important fertility trait, was 1.45, 1.57, 1.39, 1.59, 1.33 and 1.35.

Table 1
Reproductive performances of Manavlı goats.

Flock	Breeding goat (n)	Pregnant goat (n)	Kidding goat (n)	Parturition rate (%)	Birth rate (%)	Born kids (n)	Single birth rate (%)	Twinning rate (%)	Triplet birth rate (%)	Kidding Rate (KR)	Litter Size (LS)
1	55	55	55	100	100	80	54.54	45.46	0.00	1.45	1.45
2	225	210	210	93.33	93.33	330	42.85	56.25	0.90	1.46	1.57
3	118	116	116	98.30	98.30	162	60.34	39.66	0.00	1.37	1.39
4	110	110	110	100	100	175	40.90	55.47	3.63	1.59	1.59
5	57	56	56	98.24	100	75	66.07	33.93	0.00	1.31	1.33
6	65	65	64	100	98.46	87	70.31	29.69	0.00	1.33	1.35
Overall	630	612	611	98.31	98.34	909	55.83	43.42	0.75	1.41	1.44

KR: Number of born kids / Number of breeding goat LS: Number of born kids / Number of kidding.

The values of lactation period, average daily milk yield and lactation milk yield in Manavlı goat flocks are given in Table 2 according to flock and age. The average lactation period among the six flocks was 196.10, 198.15, 197.12, 201.11, 199.01, 196.22 and 197.95 days. The average daily

milk yield values in the flocks ranged from 0.700 (flock 3) to 0.920 kg (flock 4), while the average lactation milk yield for all flocks was 160.48 kg ($p < 0.05$). As shown in Table 2, the average daily milk yield values ranged from 0.689 to 0.911 kg ($p < 0.05$) according to the different doe ages.

Table 2
Milking traits of Manavlı goats.

Factors		Lactation period (day)	Lactation milk yield (kg)	Average daily milk yield (kg)
Flock	n	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$
1	25	196.10±0.80	154.30±3.12c	0.785±0.015c
2	35	198.15±0.73	172.45±3.11b	0.870±0.023ab
3	25	197.12±0.67	138.10±4.16d	0.700±0.031d
4	30	201.11±0.76	185.20±2.89a	0.920±0.018a
5	25	199.01±0.82	159.20±3.44c	0.800±0.021bc
6	20	196.22±0.59	154.05±4.01c	0.790±0.022c
P-value		0.678ns	0.003**	0.027*
Age				
2	36	194.21±0.72	147.49±2.48c	0.689±0.021c
3	38	197.25±0.63	155.26±3.15bc	0.786±0.019b
4	42	199.24±0.37	166.40±3.42ab	0.855±0.034ab
5+	44	201.18±0.49	172.45±2.86a	0.911±0.017a
P-value		0.341ns	0.023*	0.030*
Overall	160	197.95±0.47	160.48±2.29	0.810±0.011

^{a,b,c,d}: Values in the same column with different superscripts are statistically different ($p < 0.05$).

^{ns}: nonsignificant ($p > 0.05$). *: $p < 0.05$, **: $p < 0.01$.

The live weights and zoometrical body measurements of Manavlı goats are presented in Table 3. The average live weights of goats aged between 4.1 and 4.7 years among the six flocks were 77.29, 84.61, 74.59, 86.30, 76.10 and 81.23 kg, respectively ($p < 0.05$). In the body measurements taken in three periods (February, May, August), there were increases in live weights as the mating season approached ($p < 0.05$). The body measurements of Manavlı goats in the period before the mating season (August),

such as height at withers, rump height, rump width, body length, heart girth, ear length, tail length, and front and back wrist girth, were 92.80, 93.07, 22.86, 91.97, 105.02, 26.83, 20.19, 12.35 and 12.31 cm, respectively. Similar to live weight, although there were increases in body size values between measurement periods, the differences between measurement periods (except heart girth) were not statistically significant ($p > 0.05$).

Table 3
The effects of flock and period on live weights and body measurements of Manavli goats ($\bar{x} \pm S_{\bar{x}}$)

Flock	n	Average age (year)	Body weight (kg)	Height at withers (cm)	Rump height (cm)	Rump width (cm)	Body length (cm)	Heart girth (cm)	Ear length (cm)	Tail length (cm)	Front wrist girth (cm)	Back wrist girth (cm)
			$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$	$(\bar{x} \pm S_{\bar{x}})$
1	22	4.2	77.29±0.09 ^d	92.85±0.26 ^{ab}	92.92±0.26 ^{ab}	22.75±0.05	92.34±0.31 ^{ab}	105.23±0.33 ^b	26.87±0.13	20.12±0.14	12.64±0.03	12.59±0.06
2	45	4.3	84.61±0.12 ^b	92.77±0.51 ^{ab}	92.88±0.33 ^{ab}	22.86±0.07	92.31±0.44 ^{ab}	104.59±0.29 ^c	26.16±0.17	20.45±0.21	12.14±0.06	12.12±0.08
3	30	4.1	74.59±0.20 ^e	91.26±0.48 ^c	91.57±0.54 ^c	22.12±0.06	90.72±0.56 ^d	103.57±0.38 ^d	26.01±0.21	20.01±0.15	12.02±0.08	12.00±0.09
4	35	4.5	86.30±0.14 ^a	93.28±0.56 ^a	93.43±0.34 ^a	23.18±0.05	92.65±0.61 ^a	106.05±0.28 ^a	27.04±0.12	20.79±0.23	12.91±0.03	12.87±0.05
5	20	4.2	76.10±0.19 ^d	92.75±0.28 ^{ab}	92.86±0.28 ^{ab}	22.13±0.07	91.76±0.32 ^c	104.68±0.51 ^c	26.75±0.23	20.13±0.29	12.25±0.05	12.13±0.07
6	25	4.3	81.23±0.13 ^c	92.15±0.27 ^b	92.48±0.24 ^b	22.35±0.06	92.04±0.48 ^{bc}	105.01±0.44 ^b	26.44±0.16	20.67±0.17	12.33±0.06	12.21±0.03
P-value			0.000**	0.042*	0.039*	0.098 ^{ns}	0.007**	0.006**	0.411 ^{ns}	0.546 ^{ns}	0.501 ^{ns}	0.489 ^{ns}
Period												
February			75.63±0.18 ^c	92.48±0.41	92.79±0.41	22.48±0.09	91.78±0.41	103.49±0.46 ^c	26.42±0.26	20.19±0.19	12.27±0.07	12.15±0.08
May			78.49±0.09 ^b	92.73±0.53	93.03±0.46	22.59±0.05	91.86±0.32	104.56±0.28 ^b	26.78±0.14	20.26±0.30	12.31±0.04	12.26±0.06
August			82.16±0.15 ^a	92.80±0.32	93.07±0.22	22.86±0.08	91.97±0.54	105.02±0.42 ^a	26.83±0.12	20.38±0.13	12.35±0.08	12.31±0.03
P-value			0.002**	0.723 ^{ns}	0.512 ^{ns}	0.660 ^{ns}	0.811 ^{ns}	0.021*	0.559 ^{ns}	0.881 ^{ns}	0.912 ^{ns}	0.799 ^{ns}

^{a,b,c,d,e}: Values in the same column with different superscripts are statistically different (p < 0.05).
ns: nonsignificant (p > 0.05). *: p < 0.05, **: p < 0.01, ***: p < 0.001.

The live weight and zoometrical body size values of Manavlı bucks are presented in Table 4. The average live weights of bucks aged between 2.1 and 2.7 years in the six flocks were 112.10, 108.32, 101.19, 118.23, 105.25 and 106.30 kg, respectively ($p < 0.05$). In the body measurements taken in three periods (February, May, August), there were increases in body weights as the goats approached the mating season ($p < 0.05$). The body measurements of Manavlı bucks in the period before the mating season (August), such as height at withers, rump height, rump width, body length, hearth girth, ear length, tail length, and front and back wrist girth, were 98.27, 98.71, 23.87, 100.48, 109.89, 26.97, 22.30, 14.46 and 14.41 cm.

Being successful in animal breeding independently of all yield aspects is closely related to regular offspring production. The protection of flock integrity, efficient production, effective selection and culling are the main objectives of reproductive efficiency (Orman, 2013). Reproductive performance is the productivity of the animal flock in terms of offspring produced and can be expressed in many ways. In small ruminants, it varies by breed, season, age, nutritional status, health, breeding management and farm supplies (Đuričić et al., 2012). When the birth rate (98.29%) determined for the flocks (except for flock 2) is compared with the findings of other studies on Turkish Hair goats, it is higher than the values reported by Sengonca et al. (2003), Erisir and Gürdoğan (2004), Tozlu (2006), and Erduran (2017). Similarly, the birth rate reported for different genotypes was higher than the values reported by Elmaz et al. (2012b) and Karadag (2016) for Honamli goats (92.8 and 87%), Abbasoğlu (1999) for Damaskus goats (84.5%), Ceyhan and

Karadag (2009) for Saanen goats (81.7%), and Keskin (1995) for Hatay goats (96%), but lower than the value reported by Gul (2008) for Hatay goats (100%). The relatively higher birth rates found in Manavlı goat flocks, which are raised under breeder conditions, can be interpreted as good flock management and awareness during the mating and pregnancy periods. More scientific research is needed to evaluate the differences detected as an effect of genotype. In this study, the twin birth rate (43.42%) in Manavlı goat flocks is higher than that found by Eser (1998) (7.14%), Atay et al. (2010) (9.21%), and Erduran and Dag (2015) (15.2%) for Hair goats, Elmaz et al. (2012b) (32.8%) and Karadag (2016) (28.37%) for Honamli goats, and Keskin (1995) (16.2%) and Acuz (2005) (37.58%) for Hatay goats, while it was lower than the twin birth rate values (71.4 and 54.5%) reported by Taskin et al. (2003) for Saanen and Bornova goats. The twinning rate had a high value compared to other native breeds. In addition to the fact that the effect of genotype should be considered in this situation, it can be associated with the positive body condition of goats and bucks as a result of careful care and feeding methods before the mating season. The value of litter size (1.44) determined in the study is higher than the values reported by Sengonca et al. (2003), Atay et al. (2010), and Erten and Yılmaz (2013) for Turkish Hair goats raised under extensive conditions. These values are lower than the values reported by Ince (2010) and Teke et al. (2011) for Saanen goats. Another fertility trait determined in the project, number of born kids per number of breeding goats (1.41), is higher than that reported by Çelik and Olfaz (2015) and Elmaz et al. (2020) and lower than that reported by Taskin et al. (2003).

Table 4
The effects of flock and period on live weights and body measurements of Manavli bucks

Flock	n	Average age (year)	Body weight (kg)	Height at withers (cm)	Rump height (cm)	Rump width (cm)	Body length (cm)	Heart girth (cm)	Ear length (cm)	Tail length (cm)	Front wrist girth (cm)	Back wrist girth (cm)
1	3	2.7	112.10±0.12 ^b	99.42±0.27 ^b	99.65±0.28 ^b	24.32±0.06 ^a	101.45±0.25 ^b	109.47±0.27 ^b	27.28±0.27 ^a	22.85±0.29	14.79±0.03	14.73±0.03
2	6	2.6	108.32±0.13 ^c	100.48±0.41 ^b	100.86±0.41 ^b	24.18±0.07 ^a	100.26±0.34 ^{bc}	110.58±0.38 ^b	26.69±0.12 ^b	22.49±0.26	14.16±0.06	14.09±0.07
3	4	2.1	101.19±0.18 ^e	95.43±0.32 ^d	95.52±0.36 ^d	22.95±0.06 ^d	97.85±0.27 ^d	107.11±0.44 ^d	25.46±0.24 ^c	21.64±0.16	14.04±0.08	14.03±0.06
4	4	2.7	118.23±0.09 ^a	102.86±0.53 ^a	102.67±0.54 ^a	23.95±0.08 ^{ab}	103.13±0.28 ^a	112.98±0.32 ^a	27.35±0.27 ^a	22.92±0.24	15.01±0.04	15.00±0.08
5	3	2.4	105.25±0.19 ^d	97.15±0.26 ^c	97.19±0.32 ^c	23.28±0.09 ^{cd}	98.46±0.41 ^d	108.24±0.55 ^c	26.15±0.19 ^b	22.13±0.17	14.55±0.06	14.51±0.09
6	3	2.5	106.30±0.15 ^d	98.10±0.56 ^c	98.15±0.25 ^c	23.72±0.05 ^{bc}	99.48±0.5 ^c	109.72±0.36 ^b	26.52±0.21 ^b	22.17±0.24	14.61±0.08	14.57±0.05
P-value			0.000 ^{***}	0.002 ^{**}	0.003 ^{**}	0.006 ^{**}	0.000 ^{***}	0.004 ^{**}	0.019 [*]	0.679 ^{ns}	0.148 ^{ns}	0.356 ^{ns}
Period												
February			98.16±0.09 ^c	98.15±0.48	98.49±0.58	23.75±0.07	100.25±0.38	108.67±0.54 ^b	26.75±0.23	22.08±0.19	14.30±0.03	14.28±0.08
May			105.45±0.14 ^b	98.22±0.28	98.56±0.31	23.81±0.08	100.32±0.45	109.11±0.29 ^a	26.89±0.13	22.19±0.16	14.39±0.07	14.36±0.03
August			112.39±0.20 ^a	98.27±0.51	98.71±0.23	23.87±0.05	100.48±0.21	109.89±0.42 ^a	26.97±0.26	22.30±0.23	14.46±0.05	14.41±0.07
P-value			0.003 ^{**}	0.724 ^{ns}	0.801 ^{ns}	0.779 ^{ns}	0.720 ^{ns}	0.037 [*]	0.690 ^{ns}	0.821 ^{ns}	0.890 ^{ns}	0.901 ^{ns}

^{a,b,c,d}: Values in the same column with different superscripts are statistically different (p < 0.05).
ns; nonsignificant (p > 0.05). *: p < 0.05, **: p < 0.01, ***: p < 0.001.

There are many factors affecting milk yield in goats, such as breed, age, feeding, body structure, body weight and udder structure (Solaiman, 2010). The average lactation period (197.95 days) in Manavlı goat flocks is higher than the data obtained from Turkish Hair goats by Tuncel and Okuyan (1985), Eser (1998), Simşek et al. (2006), and Ata (2007). Erduran (2017) reported a longer lactation period compared to this study.

According to the age groups of the animals, average daily milk yield values ranged from 0.689 to 0.911 kg, and lactation milk yield values ranged from 147.49 to 172.45 kg. Although these values are higher than the values reported in other studies (Tuncel & Okuyan, 1985; Cengiz & Yener, 1993; Eser, 1998; Sengonca et al., 2003; Ata, 2007; Elmaz et al., 2012a) for local goat breeds, they are lower than Saanen x Turkish Hair goat crosses.

In this study, the live weight averages of goats aged between 4.1 and 4.7 years varied between 74.59 and 86.30 kg, and the live weight average of bucks aged between 2.1 and 2.7 years varied between 101.19 and 118.23 kg. In parallel with the locations where the study was carried out, in the study in which Turkish Hair goats were used in Denizli province (Varol, 2014), the live weight values of goats and bucks were 52.75 and 72.75 kg, respectively, and these values were well above the values reported in other studies (Eser, 1998; Erduran, 2017) for Turkish Hair goats. When the values in the present study are compared with studies conducted on goats in similar conditions and in the same geographical area, values above the live weights were reached in favour of Manavlı goats. Considering native goat breeds, this situation arouses excitement in

terms of the body structure and productivity characteristics of Manavlı adult goats and bucks. The live weights of Manavlı goats and especially bucks increased before the mating period (August) compared to February and May. A similar situation was reported by Erduran (2017). Although there are studies indicating a decrease in body weights between the birth period and the mating period (Tolu et al., 2009), there are also reports stating that the changes in body weight are not significant (Browning & Leite-Browning, 2009). In this study, the body measurements of Manavlı goats, such as height at withers, rump height, rump width, body length, heart girth, ear length, tail length, and front and back wrist girth, in the period before the mating season (August) were 92.80, 93.07, 22.86, 91.97, 105.02, 26.83, 20.19, 12.35 and 12.31 cm, respectively. The body measurements of Manavlı bucks in the period before the mating season (August) were 98.27, 98.71, 23.87, 100.48, 109.89, 26.97, 22.30, 14.46 and 14.41 cm, respectively. In a study carried out in Denizli province, the values of height at withers, rump height, heart girth and body length of bucks were 85.88, 82.07, 93.05 and 76.42 cm, respectively, while the same values for goats were 80.24, 77.78, 90.59 and 74.78 cm, respectively (Varol, 2014). In a study conducted in Yayladağı district of Hatay, Acuz (2005) found that Hatay goats had a height at withers of 72.22 cm, rump height of 71.49 cm, body length of 68.58 cm, chest depth of 30.66 cm, heart girth of 84.10 cm and wrist girth of 9.62 cm. Aktepe (2009) determined the averages of body weight, body length, height at withers, chest width, chest width and chest depth as 56.4 kg, 60.5 cm, 60.7 cm, 14.8 cm and 26.9 cm, respectively. Elmaz et al. (2012a) determined the mean values of measurements such

as height at withers, rump height, body length, hearth girth, tail length, snout length, distance between two horns, neck length, left front wrist girth and left back wrist girth for 3.5-year-old Honamlı goats as 83, 83.3, 88.3, 91, 20.8, 25.9, 2.2, 36.2, 10.2 and 10.2 cm, respectively. Karadag (2016) determined the values of the height at withers, chest depth, body length, heart girth, rump height, tail length, head length, forehead width, and front and back wrist girth of Honamlı goats as 81.33, 79.4, 90.1, 82.6, 21.8, 28.1, 17.1, 10.4 and 10.3 cm, respectively. Tekin and Garip (2013) reported the height at withers, rump height, body length, rump width, chest width, chest depth, heart girth and wrist girth of Turkish Hair Goats as 76.2, 75.4, 75.0, 17.9, 19.5, 34, 89.1 and 9.7 cm, respectively. The body measurements of Manavlı goats and bucks were generally higher than the values reported for local goat breeds.

Conclusion

Despite the positive developments in goat breeding in recent years, the high age of the breeders and the negative perspective towards young shepherds in social life have caused the number of farms to decrease. This puts the future of goat breeding, which has an important place in animal husbandry in Türkiye, at risk.

Although there has been a significant increase in the studies on all possible variants of goats, which are local gene sources in Türkiye, and on new breeds that can be determined afterwards, there are still not enough numbers that meet the requirements of the field. The attributes of Manavlı goat should be investigated in every aspect and have not yet been scientifically

characterised. Manavlı goats are a local gene resource that is thought to be pure raised. Manavlı goats can make a positive contribution to biodiversity and to the future of small ruminant breeding in Türkiye.

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