RESEARCH ARTICLE

Comparison of Growth and Development Characteristics of Hair and Damascus Kids Reared under Extensive Conditions

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ABSTRACT

The present study aimed to compare the growth and the development of Hair and Damascus kids reared under extensive conditions. The body weights of Damascus goats were significantly higher than that of the Hair goats during the 360 days growth period ($P < 0.05$; $P<0.001$). Body weight was influenced by birth type only at birth and on the 360th day of the growth period, and single-birth kids had higher values than twin-born kids ($P < 0.05$). Exceptfor the 120th day of the growth period, the body weight of kids born in dam age group III was higher than that of kids born in the other dam age groups ($P < 0.05$; $P < 0.01$; $P < 0.001$). The breed effect was markedly observed after the 120th day of the growth period concerning body measurements especially chest depth, rump height, and body length. Damascus goats were significantly higher than that in the Hair goats for these traits ($P < 0.001$). It can be suggested that comparative studies containing the entire growth period should be conducted on other indigenous goat breeds (Angora, Honamlı, Kilis, and Norduz goat breeds) and to demonstrate the growth and development characteristics of these breeds.

Key Words: Damascus goat, development, growth, Hair goat, Turkey

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Ekstansif Şartlarda Yetiştirilen Kıl Ve Halep Keçilerinde Büyüme Ve Gelişim Özelliklerinin Karşılaştırılması

ÖZ

Bu araştırma ekstansif koşullarda yetiştirilen Kıl ve Halep oğlaklarında büyüme ve gelişim özelliklerinin karşılaştırılmasını amaçlamıştır. 360 günlük büyüme döneminde Halep keçilerinin canlı ağırlıkları Kıl keçilerinden belirgin düzeyde yüksek olmuştur ($P < 0.05$; $P < 0.001$). Canlı ağırlık sadece doğumda ve büyüme periyodunun 360. gününde doğum tipinden etkilenmiş ve tek doğan oğlaklar ikiz doğanlara göre daha yüksek değerlere sahip olmuştur ($P < 0.05$). Büyüme döneminin 120. günü hariç anayaşı III olan gruptan doğan oğlakların canlı ağırlıkları diğer anayaş gruplarında doğan oğlaklardan yüksek olmuştur ($P < 0.05$; $P < 0.01$; $P < 0.001$). Vücut ölçülerinde (özellikle göğüs derinliği, sağrı yüksekliği ve vücut uzunluğunda) ırk etkisi büyümenin 120. gününden sonra belirgin olarak gözlemlenmiştir. Bu özelliklerde Halep keçisi, Kıl keçisine göre belirgin derecede yüksek olmuştur ($P < 0.001$). Diğer yerli keçi ırkları (Ankara, Honamlı, Kilis ve Norduz keçi ırkları) üzerinde tüm büyüme dönemini içeren karşılaştırmalı çalışmaların yapılması ve bu ırkların büyüme ve gelişme özelliklerinin ortaya konulması önerilebilir.

Anahtar Kelimeler: Büyüme, gelişme, Halep keçisi, Kıl keçisi, Türkiye

INTRODUCTION

In Turkey, small family enterprises, which was practiced extensive goat breeding, prefer the Hair goat breed widely. However, Kilis and Damascus goat breeding is also carried out by breeders successfully. Hair goat is known as "Black goat" or "Anatolian black", an indigenous goat breed of Turkey, and it is a predominant breed and constitutes about 90% of the goat population in Turkey. Hair goats are specified by good resistance to diseases and parasites, the ability to withstand harsh climates and endure a poor quality of grazing. The purpose of hair goat breeding is to benefit from multiple yields (mainly meat and milk). But, the productivity of Hair goats isconsidered low. The color of the breed is generally black. However, brown, grey, white, or spottedanimals are also seen. It has generally large andpendulous ears and straight nose structure, but animals with medium-sized or short ears are also seen. The body size is large withan average withers height (70-75 cm), and a body weight of 40 - 45 kg in female goats at adult age. Damascus goat is known as "Shami goat" or "Aleppo goat" is raised in the southern provinces of Turkey insmall numbers. The most important advantage of this goat breeds raised in Turkey, especially in Southeast Anatolia, Central Anatolia, and the Mediterranean region, it makes better use of inefficient pastures than sheep in high-temperature conditions. In addition, it effectively utilizes the stubble areas after the harvest. The breed is well adapted to arid and semi-arid climatic conditions, also it has relatively high milk and fertility in these climatic conditions. It is a milk breed kept in the towns and aroundcities, in groups of 2-5 animals. The color of the animals variesfrom yellow to reddish-brown. Theblack coat color is extremely rare. However, there are varieties of Damascus goats with white, ash color, and red-white spots. It has long and pendulous ears and an arched nose structure. The body size is medium-large with an average withers height (65-70 cm) and a body weight of 40-50 kg in female goats. The udders well-developed. This breed is known for its high fertility and milk yield. (Akçapınar, 2015; Erdem et al., 2019; Yalçın, 1986; Barıtçı ve Adıgüzel, 2017). Body weight and body measurements are used to describe animals numerically, to determine breed characteristics, to compare breeds, and to monitor growth and development in animals. Body weight and body measurements are affected by environmental factors such as genotype, gender, age, birth type, year, and management (Akçapınar and Özbeyaz, 1999; Alızadehasl and Ünal, 2011).Although many studies have been conducted on the growth and development of Hair goats (Toplu and Altınel, 2008; Gökdal, 2013; Aktaş et al.,2015; Akbaş and Saatçi, 2016; Elmaz et al., 2016; Çelik and Olfaz, 2017; Alaşahan and Öztürk, 2019)the number of studies, which wasconducted on Damascus goats is so scarce(Güney et al., 2006; Khazaal, 2009; Mahmoud et al., 2012).

Also, studies conducted on Damascus goats were limited to a certain period of growth (Abd-Allah et al., 2019; Tatar et al., 2019; Al-Dawood et al., 2020), and thus there is no research on body development in the entire growth period.In addition, there was no comparative study examining the growth and body characteristics of these two breeds in the same extensive conditions.Therefore,the present studyaimed to compare the growth and development of Hair and Damascus kids reared under extensive conditions.

MATERIALS AND METHODS

Location of the study, animals and their management

The study was carried out in a family enterprise, which was performed in extensive goat breeding in Yağbasan village. The Yağbasan villageis located at 40°05'39.0"N 33°37'32.7"E. It isapproximately 13 km from the Sulakyurt county district of Kırıkkale province in the Central Anatolia Region. The economic livelihood of the village is provided by agriculture and animal husbandry (Anonymous 2021-a; Anonymous 2021-b). The animal material of the study consisted of 51 Hair kids (24 males, 27 females) and 50 Damascus kids (25 males, 25 females) obtained from Hair and Damascus goat herds in the same enterprise. During the research, the animals were kept in the hands of the breeder, and no change was made in the management, care, and feeding conditions of the Hair and Damascus dams and kids. Goats were grazed by the breeder in open fields and pastures every day from morning to noon.At noon, the herds rested in the shaded area, and in the afternoon grazing continued until evening.In the evening the herd went back to their stockyard.To determine the growth and development characteristics individually, ear tags were applied to each kid separately at birth. Sex, type of birth, and dam age were recorded. Kids were suckling in the morning and at night everyday, and any extra feed wasn't given to kids. The weaning age of the kids was 105 days ofage. When kids were 105 d old age, they were started to go out to the graze with their dams.

Data Collection

Body weight and ten exterior traits were determined on each animal. The birth weight of the kids was taken within twelve hours after birth. Body weight of the kids were determined at regular intervals from birth to 12 months of age. The body weight of kids on the 30, 60, 90, 120, 180, 240, and 360 days of age were recorded. The body weights of the kids were taken with a precision digital scale sensitive to 20 g. The ages of dams were classified into three groups: 24-35 months of age (dam age group I), 36-47 months of age (dam age group II), and 48 months of age and older (dam age group III). Body measurements (head length, head width, ear length, chest depth, chest width, chest girth, withers height, rump height, body length, cannon bone

circumference) of kids on the 30, 90, 120, 180, and 360 days of age were measured. In body measurements, measuring type was used to determine head length, head width, ear length, chest girth, body length, and cannon bone circumference. Chest depth, chest width, withers height, and rump height were determined by a surveyor's stick. Head length (distance from Crista occipitalis to the tip of nose), head width (at the widest part of the head, the distance between two eye angles), ear length (the distance between auricula's junction to the cranium and the farthermost auricula's tip), body length (distance between tuber ischii and caput humeri), withers height (measured as the distance between the most dorsal point of the withers and the ground), rump height (distance between the most dorsal point of the rump and the ground), chest depth (the highest point of the withers and the sternum vertical distance between the two caput humerus), chest girth (measurement of body circumference taken right after behind the scapulae), chest width (distance between left and right caput humeri), and cannon bone circumference (measure taken from the middle of the distance between the articulus carpi and the fetlock joint) were measured in each animal with ear-tag. The circumference of the cannon bone was taken from the right hind leg. Throughout the research, individual body weight and body measurements were determined by the same researcher at regular one-month intervals from birth to one-year-old age on each goat (Toplu and Altınel, 2008; Yakubu, 2009; Alızadehasl and Ünal, 2011; Elmaz et al., 2012; Koncagül et al., 2012; Akbaş and Saatçi, 2016; Elmaz et al., 2016)

Statistical analysis

Effects of genotype, dam age, sex, and birth type on growth and development were analyzed by using the Repeated Measures General Linear Models. If GLM showed an acceptable level of significance (P < 0.05), Tukey's test was applied for post hoc comparison. Independent t-test was used to determine the significance of differences between breeds, sexes, and birth types. The statistical analyses were performed using the software package SPSS for Windows. Data were presented as means ± standard error (SE). A value of P<0.05 was considered statically significant (Dawson and Trapp, 2001).

RESULTS

Growth

Birth weight, 60th, 90th, 180th, 240th, and 360th days of age were significantly influenced by breed. Damascus kids were higher than Hair kids in terms of body weight at entire growth periods (P < 0.05; P <0.001). Also, body weight was affected by sex, and the body weight of male kids was significantly higher than that of female kids during the entire growth period (P < 0.05; P < 0.01; P < 0.001). Birth type only affected the body weight at birth and 360 days of age. Body weight of single-birth kids was higher than that of those twin-born kids (P < 0.05). Birth weight, 30th, 60th, 90th, 180th 240th and 360th days of age were significantly affected by dam age. Except for the 120th day of the growth period, the body weight of kids born in dam age group III was higher than that of kids born in the other dam age groups (P < 0.05; P < 0.01; P < 0.001) (Table 1).

Development

Although there was a difference between the two breeds in terms of head length was statistically significant on the 90th and 360th days of the growth period, and on the 180th and 360th days in terms of head width, the differences in ear length were statistically significant in the entire growth period. Damascus kids were higher than the Hair kids in terms of head length on the 90th and 360th days of the growth period (P <0.05; P < 0.01). Likewise, the Halep kids got higher values in terms of head width on the 180th and 360th days of growth period (P<0.05; P < 0.01). Ear length was higher in Halep kids than those of hair goats during the entire growth period (P < 0.001). Head length and head width were influenced by sex in certain growth periods, however, ear length was not influenced by sex during the entire growth period. Male kids have higher values than female kids in head length and head width characteristics (P < 0.05; P < 0.01; P < 0.001). While chest depth and chest girth were affected by the breed on the 120th, 180th and 360th days of growth period, the effect of breed for chest width was statically significant on the 120th and 360th days of the growth period. Damascus kids were higher than the hair kids in terms of chest depth, chest width and chest girth characteristics in these days of growth period (P < 0.01; P < 0.001). Sex significantly affected chest depth and chest width especially on the 90th days of age and the later stages of the growth period. The chest depth, chest width and chest girth of male kids were significantly higher than that of female kids (P < 0.05; P < 0.01; P < 0.001) (Table 2). The difference between breeds was statically significant for withers height and rump height on the 30th, 180th, and 360th days of the growth period. On the 30th, 180th, and 360th days of the growth period, in terms of withers height and rump height, Damascus kids were higher values than Hair kids (P < 0.05; P < 0.001). Withers height and rump height were influenced by sex with different statistical levels entire growth period. Withers height and rump height of male kids were higher than those of female kids (P < 0.05; P <0.001). Body length and cannon bone circumference were affected by breed on the 120 th, 180 th and 360th days of the growth period. Damascus kids had higher body length and cannon bone circumference means than that of Hair kids (P< 0.05; P <0.01; P <0.01). Withers height and cannon circumference were affected by sex in entire stages of the growth period, which was higher in male kids than in female kids (P < 0.05; P <0.001)   (Table 3)

Table 1. Body weights of Hair and Damascus goats from birth to 360 days of age (kg)$(X \pm S_{x})$.
Tablo 1. Kıl ve Halep keçilerinde doğumdan 360 günlük yaşa kadar canlı ağırlıklar(kg) $(X \pm S_{x})$.

Factors		n	Birth	n	Day 30	n	Day 60	n	Day90	n	Day120	n	Day180	n	Day240	n	Day360
Hair	M	24	2.45 ± 0.05	22	6.17±0.35	21	10.65±0.39	21	15.39±0.56	21	19.28±0.59	21	20.16±0.49	21	20.97±0.41	21	22.64±0.44
	F	27	2.28±0.05	23	5.90±0.37	21	10.46±0.42	21	14.74±0.59	21	15.71±0.63	21	17.65±0.52	21	19.01±0.43	21	21.74±0.48
Damascus	M	25	2.49±0.04	23	7.13±0.31	22	12.77±0.36	22	18.41 ± 0.51	21	19.91±0.54	21	21.73±0.44	21	22.84±0.37	21	25.08±0.40
	F	25	2.54±0.05	24	5.62±0.32	22	10.68±0.39	22	13.75±0.55	21	15.50±0.58	21	20.39±0.48	21	21.58±0.38	21	23.98±0.44
TOTAL																	
Breed			*		-		*		*		-		***		***		***
Hair		51	2.36±0.04	45	6.05±0.26	42	10.54±0.29	42	15.04±0.41	42	17.33±0.43	42	18.79±0.36	42	19.90±0.30	42	22.15±0.33
Damascus		50	2.52±0.03	47	6.37±0.23	44	11.23±0.26	44	16.08±0.37	42	17.71±0.39	42	21.06±0.32	42	22.21±0.27	42	24.53±0.29
Sex			**		**		***		***		***		***		***		*
M		49	2.47±0.03	45	6.57±0.23	43	11.80±0.27	43	17.04±0.37	42	19.62± 0.37	42	21.11±0.39	42	21.99±0.27	42	23.97±0.29
F		52	2.41±0.04	47	5.89±0.25	43	10.07±0.29	43	14.24±0.40	42	15.61±0.43	42	19.02±0.35	42	20.30±0.29	42	22.86±0.32
Birth type			*		-		-		-		-		-		-		*
Single		67	2.48±0.03	58	6.36±0.28	56	10.93±0.23	56	15.78±0.36	56	17.95±0.35	56	20.16±0.28	56	21.17±0.24	56	23.56±0.26
Twinning		34	2.39±0.04	34	6.09±0.20	30	10.86±0.32	30	15.36±0.46	28	17.07±0.48	28	19.78±0.39	28	21.04±0.33	28	23.24±0.36
Dam age			***		***		***		*		-		***		***		**
2		31	2.31±0.05 [b]	29	6.15±0.32 [b]	27	10.86±0.36[b]	27	15.57±0.51[b]	26	17.41±0.54 [b]	26	19.81±0.44[b]	26	21.01±0.37[b]	26	23.40±0.41[b]
3		41	2.51±0.04[a]	35	6.44±0.28 [a]	33	10.99±0.32 [a]	33	15.54±0.45[b]	32	17.67±0.48 [a]	32	20.44±0.39 [a]	32	21.45 ±0.33[a]	32	23.48±0.36 [a]
4+		29	2.50±0.04 [a]	28	6.04±0.29 [a]	26	10.84±0.33 [b]	26	15.64±0.47[a]	26	17.53±0.49 [b]	26	19.64±0.41 [b]	26	20.84±0.34 [b]	26	23.27±0.37[b]

M: Male, **F:** Female; -: P> 0.05; *: P< 0.05; **: P< 0.01; ***: P< 0.001, [a-b]: means within a column with different letters are significantly different (p < 0.05)
M: Erkek, **F:** Dişi; -: P > 0.05; *: P < 0.05; **: P < 0.01; ***: P < 0.001, [a-b]: aynı sütunda farklı harfleri taşıyan ortalamalar arası farklılık önemlidir (p < 0.05)

Table 2. Head length, head width, ear length, chest depth, chest width and chest girth in Hair and Damascus kids(cm) (X ± S$_x$)

Tablo 2. Kıl ve Halep keçilerinde baş uzunluğu, baş genişliği, kulak uzunluğu, göğüs derinliği, göğüs genişliği ve göğüs çevresi ile ilgili değerler (cm) (X ± S$_x$)

Factors			Head length						Head width						Ear length				
Breed	Sex	n	Day 30	Day 90	Day 120	Day 180	Day 360	n	Day 30	Day 90	Day 120	Day 180	Day 360	n	Day 30	Day 90	Day 120	Day 180	Day 360
Hair	M	20	21.87 ± 0.21	22.84 ± 0.30	26.68 ± 0.25	26.99 ± 0.58	27.76 ± 0.32	19	10.06 ± 0.24	10.11 ± 0.16	11.71 ± 0.14	12.18 ± 0.17	12.47 ± 0.18	18	14.35 ± 0.29	17.16 ± 0.44	17.74 ± 0.19	18.02 ± 0.21	18.40 ± 0.22
Hair	F	20	20.89 ± 0.21	22.01 ± 0.31	25.81 ± 0.24	26.33 ± 0.55	27.18 ± 0.30	18	9.14 ± 0.23	9.41 ± 0.15	11.67 ± 0.13	12.01 ± 0.16	12.18 ± 0.19	19	14.65 ± 0.28	16.66 ± 0.43	17.81 ± 0.18	18.10 ± 0.19	18.89 ± 0.21
Damascus	M	20	21.32 ± 0.20	23.91 ± 0.29	26.31 ± 0.27	27.18 ± 0.56	28.65 ± 0.33	19	9.45 ± 0.22	10.03 ± 0.15	11.68 ± 0.12	12.98 ± 0.16	13.03 ± 0.17	19	15.59 ± 0.27	18.89 ± 0.42	19.33 ± 0.19	19.82 ± 0.23	21.35 ± 0.19
Damascus	F	19	20.98 ± 0.15	22.63 ± 0.20	25.42 ± 0.24	25.79 ± 0.57	27.92±0.29	19	8.94±0.21	9.52±0.14	11.28±0.11	12.22±0.15	12.49±0.16	19	16.09±0.25	19.11±0.43	20.19±0.17	21.33±0.24	22.23±0.21
TOTAL																			
Hair		40	21.38 ± 0.15	22.42±0.20	26.24±0.17	26.66±0.41	27.47±0.19	37	9.61±0.16	9.77±0.11	11.69±0.09	12.10±0.12	12.33±0.13	37	14.51±0.20	16.91±0.29	17.78±0.134	18.06±0.23	18.65±0.15
Damascus		39	21.15 ± 0.14	23.28±0.25	25.87±0.20	26.49±0.42	28.28±0.22	38	9.19±0.15	9.78±0.12	11.48±0.09	12.60±0.11	12.76±0.12	38	15.84±0.23	19.00±0.32	19.76±0.132	20.57±0.20	21.79±0.15
	M	40	21.59 ± 0.15	23.37±0.23	26.49±0.16	27.08±0.44	28.21±0.20	38	9.75±0.14	10.07±0.11	11.69±0.01	12.58±0.11	12.75±0.11	37	14.99±0.22	18.05±0.31	18.56±0.134	18.94±0.19	19.92±0.16
	F	39	20.93 ± 0.14	22.32±0.25	25.62±0.17	26.06±0.39	27.55±0.18	37	9.04±0.16	9.47±0.12	11.48±0.01	12.12±0.12	12.34±0.13	38	15.37±0.18	17.88±0.29	19.01±0.132	19.71±0.17	20.56±0.14
Breed			-	*	-	-	**		-	-	-	**	*		***	***	***	***	***
Sex			***	***	***	-	*		**	***	-	**	*		-	-	-	-	-

Factors			Chest depth						Chest width						Chest girth				
Breed	Sex	n	Day 30	Day 90	Day 120	Day 180	Day 360	n	Day 30	Day 90	Day 120	Day 180	Day 360	n	Day 30	Day 90	Day 120	Day 180	Day 360
Hair	M	18	14.42 ± 0.20	20.17 ± 0.37	24.06 ± 0.16	24.22 ± 0.18	24.72 ± 0.23	18	7.22 ± 0.19	13.53 ± 0.31	15.16 ± 0.01	15.81 ± 0.12	16.23 ± 0.12	19	42.43 ± 0.62	51.46 ± 0.39	64.49 ± 0.24	67.09 ± 0.22	69.99 ± 0.27
Hair	F	20	13.83 ± 0.28	18.62 ± 0.35	22.56 ± 0.15	23.19 ± 0.16	24.06 ± 0.22	20	6.55 ± 0.17	13.04 ± 0.29	13.47 ± 0.09	15.23 ± 0.11	15.51 ± 0.11	18	39.55 ± 0.63	50.73 ± 0.41	61.42 ± 0.25	63.48 ± 0.23	65.67 ± 0.28
Damascus	M	20	14.34 ± 0.29	20.91 ± 0.39	24.65 ± 0.17	26.07 ± 0.17	26.48 ± 0.23	19	7.04 ± 0.18	13.12 ± 0.28	15.40 ± 0.02	16.36 ± 0.13	17.52 ± 0.13	19	43.76 ± 0.61	52.93 ± 0.42	66.63 ± 0.23	72.80 ± 0.19	73.28 ± 0.27
Damascus	F	18	14.41 ± 0.20	18.92 ± 0.36	23.94 ± 0.14	24.08 ± 0.18	26.08 ± 0.24	19	7.37 ± 0.19	12.50 ± 0.30	14.35 ± 0.09	14.93 ± 0.12	15.99 ± 0.12	18	42.51 ± 0.63	52.66 ± 0.40	62.13 ± 0.25	63.74 ± 0.21	71.68 ± 0.30
TOTAL																			
Hair		38	14.11±0.20	19.35±0.30	23.27±0.12	23.68±0.12	24.37±0.16	38	6.87±0.14	13.27±0.21	14.27±0.07	15.50±0.08	15.85±0.08	37	41.03±0.44	51.11±0.29	63.01±0.18	65.33±0.15	68.33±0.19
Damascus		38	14.37±0.19	19.97±0.26	24.32±0.13	25.13±0.13	26.29±0.17	38	7.21±0.13	12.81±0.20	14.87±0.07	15.64±0.07	16.76±0.09	37	43.15±0.45	52.80±0.28	64.44±0.17	68.39±0.14	72.50±0.20
	M	38	14.37±0.22	20.56±0.25	24.37±0.15	25.19±0.14	25.64±0.18	37	7.13±0.13	13.32±0.21	15.28±0.06	16.09±0.07	16.89±0.08	38	43.09±0.43	52.20±0.27	65.56±0.18	69.94±0.16	71.63±0.18
	F	38	14.10±0.20	18.76±0.29	23.21±0.14	23.61±0.13	25.02±0.17	39	6.95±0.12	12.77±0.19	13.90±0.05	15.08±0.06	15.75±0.07	36	41.03±0.45	51.69±0.28	61.78±0.16	63.61±0.15	68.68±0.21
Breed			-	-	***	***	***		*	-	***	-	***		**	***	**	***	***
Sex			-	***	***	***	*		-	*	***	***	***		**	-	***	***	***

M: Male, **F:** Female; -: P> 0.05; *: P< 0.05; **: P< 0.01; ***: P <0.001; **M:** Erkek, **F:** Dişi; -: P > 0.05; *: P < 0.05; **: P < 0.01; ***: P < 0.001

Table 3. Withers height, rump height, body length, and cannon bone circumference in Hair and Damascus kids(cm) ($X \pm S_{\bar{x}}$)
Tablo 3. Kıl ve Halep oğlaklarında cidago yüksekliği, sağrı yüksekliği, vücut uzunluğu ve incik çevresi ile ilgili değerler (cm) ($X \pm S_{\bar{x}}$)

Factors			Withers height						Rump height				
Breed	Sex	n	Day 30	Day 90	Day 120	Day 180	Day 360	n	Day 30	Day 90	Day 120	Day 180	Day 360
Hair	M	18	36.31 ±0.51	48.44±0.57	49.25±0.75	51.84±0.24	53.22±0.29	20	37.95±0.59	49.56±0.65	51.25±0.43	52.20±0.19	54.61±0.26
Hair	F	19	35.05 ±0.49	45.78±0.55	48.48±0.73	51.29±0.23	52.08±0.28	20	35.90±0.60	46.87±0.64	49.15±0.45	50.59±0.21	53.30±0.29
Damascus	M	18	38.96 ±0.51	48.38±0.56	49.88±0.76	52.89±0.21	56.47±0.30	20	39.75±0.57	49.90±0.65	51.68±0.42	56.83±0.17	57.98±0.28
Damascus	F	19	36.37 ±0.49	46.27±0.55	47.15±0.72	51.31±0.25	55.29±0.27	19	37.44±0.59	47.49±0.62	48.18±0.46	52.52±0.20	56.20±0.30
TOTAL													
Hair		37	35.66±0.36	47.08±0.40	48.85±0.52	51.56±0.17	52.64±0.20	40	36.93±0.40	48.21±0.46	49.97±0.32	51.39±0.18	53.95±0.20
Damascus		37	37.63±0.35	47.30±0.41	48.48±0.51	52.08±0.16	55.86±0.19	39	38.63±0.42	48.73±0.43	50.20±0.35	54.73±0.16	57.11±0.21
	M	36	37.63±0.37	48.41±0.41	49.56±0.53	52.36±0.17	54.84±0.20	40	38.85±0.40	49.73±0.45	51.46±0.33	54.51±0.20	56.30±0.20
	F	38	35.71±0.35	46.03±0.39	47.82±0.50	51.30±0.15	53.69±0.22	39	36.65±0.43	47.17±0.46	48.67±0.32	51.53±0.15	54.71±0.23
Breed			***	-	-	*	***		*	-	-	***	***
Sex			***	***	*	***	*		***	***	***	***	***

Factors			Body length						Cannon bone circumference				
Breed	Sex	n	Day 30	Day 90	Day 120	Day 180	Day 360	n	Day 30	Day 90	Day 120	Day 180	Day 360
Hair	M	19	33.53 ±0.59	47.93±0.64	53.72±0.24	56.48±0.24	59.05±0.08	19	6.01±0.14	7.66±0.14	8.03±0.04	8.15±0.08	8.22±0.08
Hair	F	20	30.80 ±0.57	43.70±0.63	53.13±0.23	54.85±0.24	58.78±0.07	19	5.67±0.13	6.80±0.16	7.06±0.07	7.39±0.05	7.68±0.07
Damascus	M	19	34.00 ±0.55	48.21±0.61	57.58±0.24	59.55±0.19	61.07±0.04	19	6.33±0.10	7.41±0.15	8.20±0.03	8.67±0.08	8.80±0.06
Damascus	F	19	31.44 ±0.55	45.82±0.59	55.33±0.22	58.37±0.21	59.70±0.06	19	6.06±0.12	6.48±0.11	7.37±0.06	7.59±0.07	8.01±0.07
TOTAL													
Hair		39	32.13±0.409	45.76±0.453	53.42±0.171	55.64±0.16	58.91±0.06	38	5.84±0.09	7.23±0.10	7.55±0.04	7.77±0.05	7.95±0.06
Damascus		38	32.72±0.414	47.01±0.459	56.46±0.173	58.96±0.17	60.38±0.04	38	6.19±0.10	6.95±0.11	7.79±0.03	8.13±0.04	8.41±0.03
	M	38	33.76±0.414	48.07±0.459	55.65±0.173	58.02±0.15	60.06±0.06	38	6.17±0.08	7.53±0.08	8.12±0.06	8.41±0.03	8.51±0.02
	F	39	31.12±0.409	44.76±0.453	54.23±0.171	56.61±0.14	59.24±0.05	38	5.87±0.10	6.64±0.11	7.22±0.05	7.49±0.05	7.84±0.06
Breed			-	-	***	***	***		*	-	*	*	**
Sex			***	***	***	***	***		*	***	***	***	***

M: Male, **F:** Female; -: P> 0.05; *: P< 0.05; **: P< 0.01; ***: P<0.001; **M:** Erkek, **F:** Dişi; -: P > 0.05; *: P < 0.05; **: P < 0.01; ***: P < 0.001

DISCUSSION

Growth

In the present study, birth weight obtained for Hair kids (2.36 kg) was lower than those reported by Alaşahan and Öztürk (2019)for Hair kids (3.11 kg) raised undersemi-intensive conditions in the province of Van. The values obtained for male Hair kids at birth (2.45 kg) implicitly accordedwith the birth weight value reported for males (2.46 kg) raised under the extensive system in the province of Aydın, while the values obtained for female goats (2.28 kg) were higher than the value reported in the same study (1.92)(Toplu and Altınel, 2008). The body weight values obtained for male and female Hair goats on the 60th day of the growth period (10.65 and 10.46 kg) were higher than the values reported by Erten and Yılmaz (2014) for male and female hair goats (9.86 and 9.75 kg) raised under extensive conditions in the province of Van. In the study, the average body weight obtained hair goats on the 60th day (10.54 kg) was lower than the average body weight (11.80 kg) reported by Şimşek and Bayraktar (2006) for hair goats raised under the intensive conditions in the province of Elazığ. In this study, the average body weight value for Hair kids obtained for the 120th days of age (17.33 kg) was lower than the other study values reported for Hair goats (21.64 kg) at the same age(120th day) (Alaşahan and Öztürk, 2019). Body weights obtained for hair goats on the 180th and 360th days of the growth period (18.79 kg and 22.15 kg) were lower than the values specified on the 180th and 360th days for the hair goats raised under intensive (26.69 kg) and extensive (24.80 kg) conditions in provinces of Elazığ and Amasya (Gökdal et al., 2013; Çelik and Olfaz, 2018). Body weights of the male and female Damascus kids at birth, 60th and 90th days of the growth period (2.49 and 2.54 kg, 12.77 and 10.68 kg and 18.41 and 13.75 kg) lower than those of Taşkın et al. (2000)who reported that body weight values at birth, 60th and 90th day of male and female Damascus kids (4.35 and 4.01 kg,17.08 and 16.91 kg, 21.33 and 20.27 kg) raised under intensive conditions in the province of Tokat. In the present study, the body weights of the male and female Damascus kids obtained on the 60 th, 90 th, 120 th, 180 th, 240 th days of the growth period (12.77 and 10.68 kg, 18.41 and 13.75 kg, 19.91 and 15.50kg, 21.73 and 20.39 kg, 22.84 and 21.58 kg, respectively) were lower than the other studies, which was carried out in the same growth periods of Shami (Damascus) goats (14.98 and 14.41 kg, 23.25 and 22.00 kg, 23.60 and 19.50, 30.40 and 24.90 kg, 38.0 and 29.60 kg, respectively) reared under the intensive system in Lebanon and Sudancountry(Khazaal,2009; Mahmoud et al., 2012). Depending on the region where it is grown and the management conditions provided by the breeders, there was a wide variation in growth characteristics. This variation causes differences in growth-related values ofthe studies conducted in different regions

and management conditions. Body weight of Damascus kids was higher than those of Hairkids throughout the growth period. Many other studies on other goatbreeds indicated that the differences in the body weight among different goatbreeds, i.e. the body weight is atop of Saanen X Hair crossbred F1 over Saanen breed kids (Akdağ et al., 2011), Hair goat is superior to Honamlı kids (Aktaş et al., 2015), Honamlı X Hair hybridsis superior to Honamlı breed kids (Akbaş and Saatçi, 2016), and Hamdani over Hair breed kids (Alaşahan and Öztürk, 2019). It is obvious that the differences in body weight between breeds, which are compared in terms of growth characteristics under the same management conditions, were due to genotype differences. In some studies mentioned above, this situation has occurred as hybrid-vigor in hybrids where two breeds are crossbreeding is implemented.Thus, it is possible to explain the reason for the differences in body weight between Hair goats and Damascus goats during the growth period with genetic differences.120th-day body weight of kids was only affected by sex. This situation was implicitly compatible with the other study conducted in Hair kids (Atay et al., 2010). The effect of birth type was statically significant on the birth and 360th day of the growth period in Hair and Damascus goats. Single-birth kids showed higher values in terms of body weight than those born twin-birth kids. This finding was incompatible with studiesconducted inother goat breeds,which reported that birth type affected only birth weight inHairkids (Toplu and Altınel, 2008), thebirth weight and 60thday body weight of Hamdani and Hair kids (Alaşahan and Öztürk, 2019), and 60th, 90th, and 120th day body weight of Saanen and Saanen X Hair kids (Akdağ et al., 2011; Akbaş et al., 2013).In other studies, it has been reported that the birth type affects the body weight in all periods of the 120-day growth period in Honamlı, Hair and Honamlı X Hair (F1) goats (Akbaş and Saatçi, 2016), and the 180-day growth period in Angora goats (Erol et al., 2014).In the present study, it was determined that the influence of dam age on body weight was statically significant with different levels at birth, 30th, 60th, 90th, 180th, 240th and 360th days of the growth period. The growth of kids born to dam age group III was higher than in other dam age groups.These findings coincided with the other studies emphasizing that dam age influences body weight of the Hair and Angora kids throughout the growth period (Toplu and Altınel, 2008; Erol et al.,2014). The birth weight of the dam age III group was higher than those other other age groups. This result utterly concordant to Tatar et al. (2019) which emphasizes that the birth weight of goats born from 4-year-old kids were higher than those born from other dam age groups (3 and 5 year-old-age groups) in Damascus goats.

Development

In this study, it was determined that the head length (27.76 cm) and head width (12.47 cm) values obtained from male Hair goats at the 360 days of age were higher in terms of head length (25.70 cm), and lower in terms of head width (13.30) than the values obtained from 1-4 years old male Hair kids raised in extensive conditions in Burdur, Antalya and Fethiye provinces. Ear length values determined for Hair male kids in the same research (18.0 cm) are exactly consistent with the present study (18.40 cm) (Elmaz et al., 2016). The values of chest depth, chest girth, withers height, and body length obtained on the 90th day (19.35, 51.11, 47.08, and 45.76 cm) and 180th day (23.68, 65.33, 51.56, and 55.64 cm) of the growth period in the Hair goats, in general, were consistent with the values reported for the chest depth, chest girth, withers height, and body length on the 90th (20.10, 52.20, 44.70, and 45.10 cm) and 180th day (25.70, 65.70, 52.30, and 53.20 cm) of the growth period in Hair goats raised under semi-intensive conditions in the province of Van (Yılmaz et al., 2013). In the present study, chest girth, withers height and body length values obtained on the 30th day (41.03, 35.66, and 32.13 cm), 90th day (51.11, 47.08, and 45.76 cm), 360th day (68.33, 52.64 and 58.91 cm) of the growth period in Hair goats were lower than the values obtained for 30th day (44.65, 38.20 and 35.67 cm), 90th day (53.53, 45.17 and 43.06 cm), and 360th day (73.26, 59.42 and 60.15 cm) for Hair goats raised under intensive conditions in the province of Elazığ for the same body characteristics (Şimşek and Bayraktar, 2006). We think that the disparity of these two studies in terms of body development is due to the difference between the rearing systems of the enterprises. Also, researchers emphasized that the kids were continuously fed with rearing ration, dried alfalfa, barley straw, and also sometimes fed with corn during the period when they separated from their dams. The number of studies on body development in Damascus goats is so scarce, and these studies are limited to some periods of growth. For this reason, this section was written within the framework of other published studies. The values obtained for chest depth, chest girth, withers height, body length values in male and female Damascus goats on the 360th day of the growth period (26.48 and 26.08 cm, 73.28 and 71.68 cm, 56.47 and 55.29 cm, 61.07 and 59.70 cm) were lower than the values reported 1.5 years old age male and female Shami (Damascus) goats (35.80 and 33.86 cm, 78.73 and 74.13 cm, 64.80 and 65.13 cm, 77.80 and 74.73 cm, respectively) reared under intensive conditions in the subtropical regions of Egypt (Abd-Allah, 2019). Chest depth (26.29 cm), chest width (16.76 cm), chest girth (72.50 cm), withers height (55.86 cm), and body length (60.38 cm) values obtained from 1-year-old Damascus goats in the present study were lower than 3-year-old Damascus (32.11 cm, 19.56 cm, 90.44 cm, 71.89 cm, and 74.89 cm, respectively) and Kilis goats (31.92 cm, 19.50 cm,

89.92 cm, 68.75 cm, and 73.58 cm, respectively), in which some yield characteristics were compared in Damascus and Kilis goats raised under intensive conditions in the province of Diyarbakır (Tatar et al., 2019). The data obtained in these studies were taken from animals of different age groups, raised in different provinces, and under different management conditions. Therefore, we think that the differences with other studies in terms of body measurement values of Damascus goats were due to age, management, and region differences. The difference between the two breeds was statistically significant in terms of head length on the 90th and 360th days, and in terms of head width on the 180th and 360th days of the growth period. Ear length, on the other hand, was significantly different between breeds during the entire growth period. Head length and head width were influenced by sex, however, ear length was not influenced by sex in the entire growth period. This finding is partially similar to the study emphasizing that the effect of sex difference is statistically significant in terms of head length, head width and ear length in Hair goats reared under extensive conditions in the provinces of Burdur, Antalya, and Muğla (Elmaz et al., 2016). Chest depth, chest width, and chest girth were affected by breed on the 120th day and 360th day of the growth period. Damascus goats had higher values than Hair goats in terms of chest depth, chest width, and chest girth. Sex significantly affected chest depth, chest width, and chest girth especially on the 90th day and later phases of the growth period. Abd-Allah et al. (2019) reported that sex affects chest width and chest girth, and male kids had higher values than females in a study conducted on Shami (Damascus) goats reared under intensive conditions in subtropical regions of Egypt. Males kids were higher values than females kids for these traits in the entire growth period. These findings were consistent with the other study conducted on Hair and Saanen X Hair goats reared under extensive conditions in terms of withers height and cannon circumference characteristics (Çelik and Olfaz, 2018), and it's also consistent with the research conducted on Honamlı, Hair and Honamlı X Hair goats reared under extensive conditions in terms of body length and rump height characteristics (Akbaş and Saatçi, 2016). Mavrogenis et al. (1984) reported that "There is evidence that considerable variation exists among and within animals concerning body weight and growth rate." About the findings of this study, our opinion is that it is possible to generalize this information in terms of body development in goats. According to many studies development in animals is regulated by an intricate relationship among physical factors, genetic-environmental interactions, as well as feeding and management practices, and combined effect of these factors may promote or retard the development process, which in turn can affect body development in adult age (Al-Dawood et

al., 2020; , Steinheim et al., 2008, Koritiaki et al., 2013; Teixeira et al., 2017).

When the research was evaluated in general, the values related to growth and development obtained in this study were lower than other studies. As we observed during the research, forage quality in the region decreases in both dry and cold seasons, which is insufficient for growth and development. Since the feeding of goats in the region is based only on grazing, malnutrition especially in terms of energy and protein may negatively affect growth and development. Fontaneli et al.(2005) stated that "During both the dry and cold seasons, forage and feedstuff quality is frequently decreased being inadequate for the high nutritional demands observed during growth, gestation, and lactation; all of themare physiological processes that demand high-quality supplements regarding protein and energy content"

CONCLUSIONS

Our results demonstrate that a comparison of body weights of Hair and Damascus goats, in terms of their sex, birth type, and dam age, approved that body weights of Damascus goats were significantly higher than those Hair goats. The body weight of kids born in dam age group III was higher than that of kids born in the other dam age groups (dam age II and IV). The growth and development traits of the kids were considerably affected by breed and sex diversity. In terms of their development characteristics, Damascus kids had higher values than the Hair kids. During the growth period in both breeds, body weight and development characteristics of male kidsgot higher values than female kids. It can be suggested that comparative studies containing the entire growth period should be conducted on other indigenous goat breeds (Angora, Honamlı, Kilis, and Norduz goat breeds) and to demonstrate the growth and development characteristics of these breeds.

Ethics Committee Information: This study is not subject to HADYEK's permission in accordance with Article 8 (k) of the "Regulation on Working Procedures and Principles of Animal Experiments Ethics Committees".

Conflict of Interest: The authors declared that there is no conflict of interest.

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