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Morphometric Measurements of Zom Lambs

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ABSTRACT

This study aims to determine the weight and certain morphometric traits of Zom lambs raised in the Şanlıurfa Central-Viranşehir-Siverek region during specific growth periods from birth onward, and to evaluate the differences among herds. The study was conducted using lambs born to four different herds (F1, F2, F3, and F4) of Zom sheep raised in different farms. Morphometric measurements were taken at birth and monthly over a five-month period following birth. After testing the data for normality and homogeneity of variances, two-way repeated measures ANOVA was used for statistical analysis. The Tukey HSD test was employed to determine significant differences between groups. The average birth weight was 4.28 ± 0.06 kg for male lambs and 3.56 ± 0.06 kg for female lambs, indicating a statistically significant difference between sexes ($P < 0.001$). Similarly, body measurements such as withers height, rump height, chest girth, and cannon bone circumference were consistently higher in male lambs compared to females across all periods ($P < 0.05$). Significant differences were also observed among the different herds (F1–F4) in many body measurements from birth to the fifth month. In particular, herds F3 and F4 generally exhibited superior growth performance, while herds F1 and F2 had lower values in terms of both weight and morphological measurements. Statistically significant differences in morphometric traits were observed among Zom lamb herds. These differences reflect the influence of environmental conditions and are important for characterizing the morphological features of Zom sheep and for developing herd-based breeding strategies. In addition, there is a need to raise Zom sheep under similar environmental conditions to reveal the effect of genetic structure on these characteristics.

INTRODUCTION

Small ruminant husbandry stands out as a significant production activity in Türkiye, particularly in mountainous and agriculturally unsuitable areas. The country's geographical structure, the extensive distribution of low-yield pastures, and the presence of lands unsuitable for agricultural production such as fallow and stubble fields underscore the indispensability of small ruminant farming (Özyürek et al., 2018). The existing meadows and pastures being more suitable for sheep and goats rather than cattle, combined with the consumption habits of rural populations, have created a favorable environment for the development of sheep farming (Ertuğrul et al., 2010; Ergün and Bayram, 2021). In this context, small ruminant husbandry holds a strategic position in the Turkish economy as an important production form for utilizing marginal lands unsuitable for crop production and various agricultural residues (Gülcan and Öztürk, 2022).

Sheep farming in Türkiye is generally carried out through an extensive production system based on

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grazing with limited inputs. Local sheep breeds are preferred due to their adaptability to harsh climatic and pasture conditions, as well as their resistance to diseases and parasites. Nevertheless, economic and social changes over the past half-century have led to a decline in local breed populations due to the use of high-yield breeds aimed at increasing productivity (Kaymakçı, 2006; Ertuğrul et al., 2010; Gülcan and Öztürk, 2022). The conservation of the genetic resources of local breeds is critically important for sustainable livestock farming and adaptation to environmental changes (Koncagül et al., 2012; Günlü and Mat, 2021).

Small ruminant husbandry constitutes an important source of economic employment in Türkiye's rural areas. This sector directly contributes to family economies, especially in relatively socioeconomically underdeveloped regions such as Southeastern Anatolia (Akça and Bingöl, 2020). In the region, sheep farming represents not only an economic activity but also forms the basis of cultural and social structures. This situation increases the importance of conservation and development efforts for sheep breeds, which are vital not only biologically but also for social sustainability.

The Southeastern Anatolia Region is the main area where sheep farming is intensively practiced in Türkiye, with 22 different sheep breeds raised in this region (Taşkın and Kandemir, 2022). As of 2024, the sheep population in the region has exceeded 8 million, with Şanlıurfa province standing out as the area with the highest number of sheep (Table 1). These data highlight the economic and employment significance of sheep farming in the region and emphasize the necessity of conservation and improvement efforts for local breeds.

The Southeastern Anatolia Region possesses a rich diversity of sheep breeds. Among these, indigenous breeds such as Akkaraman, Awassi, Morkaraman, Hamdani, Karakas, Savak, and Koceri are primarily raised (Koncagül et al., 2012; Akça et al., 2012). This diversity not only enhances the region's potential for sheep farming but also presents significant opportunities for the conservation and improvement of genetic resources. In this context, the Zom sheep, raised mainly around the Karacadağ area and highly adapted to the region's harsh environmental conditions, constitutes an important local genetic resource for regional livestock production (Koncagül et al., 2012). The Zom sheep, as a fat-tailed variety, benefits from its energy-storing tail, which provides an advantage during extended winter feeding periods. Additionally, it is distinguished by its herding and maternal instincts, cold resistance, and adaptability to poor environmental conditions (DAKA, 2012). The population of Zom sheep in the region is estimated to be between 150,000 and 200,000 heads. According to breeders with long-standing experience in sheep farming in the area, the emergence of this breed dates back approximately 200 years. These sources also indicate that the Zom sheep resulted from the hybridization of Awassi, Akkaraman, and Karakas breeds, which over time stabilized through inbreeding (Koncagül, 2012).

Table 1. Sheep Population in the Southeastern Anatolia Region, 2023-2024 (TUIK, 2024)

Location	2023	2024	Change (%)
Şanlıurfa	2,032,032	2,364,954	16.38
Diyarbakır	1,713,175	1,894,610	10.59
Batman	707,494	817,407	15.54
Şırnak	778,766	802,717	3.08
Siirt	702,957	786,415	11.87
Gaziantep	609,288	618,406	1.50
Mardin	581,655	545,379	-6.24
Adıyaman	147,029	116,029	-21.08
Kilis	96,319	91,812	-4.68
Total	**7,368,715**	**8,037,729**	**9.08**

In recent years, genetic improvement programs targeting the Zom sheep have focused on increasing herd milk yield, survival rate, and growth performance (Koncagül et al., 2013). These programs are crucial for the sustainable use and economic enhancement of indigenous breeds. Conservation of local genetic resources plays a vital role in maintaining biodiversity and adapting to climate change (Kaymakçı, 2006; Ertuğrul et al., 2010).

Within this framework, analyzing the morphological measurements of Zom sheep is of great importance for evaluating the animal's adaptability, production performance, and genetic diversity (Akçapınar, 1994; Şen and Uğurlu, 2021). Morphometric parameters enable the quantitative assessment of critical phenotypic traits such as body conformation, growth potential, and energy storage capacity, providing a scientific basis for planning breeding programs (Kutan and Keskin, 2022). Particularly, revealing adaptive traits like the fat-tailed morphology through morphological measurements is essential for understanding the Zom sheep's resilience to environmental stresses and sustainability (DAKA, 2012). Moreover, these data contribute to strategic decision-making for the conservation and improvement of local genetic resources and lay the groundwork for the development of regional livestock policies (Koncagül et al., 2012; Ertuğrul et al., 2010).

This study aims to evaluate certain morphological measurements of lambs belonging to the Zom sheep, one of Türkiye's unique local breeds. The data obtained are significant for determining the growth characteristics of Zom lambs, monitoring early developmental stages, and forming the basis for potential breeding programs. Thus, the study aims to contribute to the sustainable development of sheep farming in the Southeastern Anatolia Region.

MATERIALS AND METHODS

The animal material of this study consisted of a total of 162 Zom lambs from four different herds located in three villages within the Şanlıurfa Central-Siverek-Viranşehir triangle (Üçgöze (2 groups), Konaç, and Tepeköy). The lambs were allowed to develop naturally under traditional care and feeding conditions maintained by rural breeders based on their own knowledge and experience, without any external intervention. The researchers visited the villages at specified intervals to perform measurements and record data.

Data Collection and Measurements

The lambs were monitored for five months from birth, and measurements were taken regularly every month. Live weight was measured using a handheld scale to prevent harm and restrict movement. Morphological measurements were carried out using a measuring tape and measuring stick. The body measurements recorded in this study included: Withers height (WH): The vertical distance from the highest point of the withers to the ground. Rump height (RH): The vertical distance from the highest point of the sacrum (os sacrum) to the ground. Back height (BH): The vertical distance from the spinous process of the last thoracic vertebra to the ground. Body length (BL): The distance between the point of the shoulder (articulus humeri) and the ischial tuberosity (tuber ischii). Heart girth (HG): The circumference of the body measured just behind the scapula. Chest depth (CD): The vertical distance between the withers and the sternum (breastbone). Shoulder width (SW): The horizontal distance between the two scapulae. Metacarpus girth (MG): The circumference measured at the narrowest part of the metacarpus.

Statistical Analysis

Assumptions of normality and homogeneity of variance were assessed using the Shapiro-Wilk and Levene's tests, respectively ($P > 0.05$). Two-way analysis of variance (ANOVA) was applied, and Tukey's multiple comparison test was used to compare pairs of groups where significant differences were found. All statistical analyses were conducted using the open-source R software (v4.4.2), with the significance level set at $P < 0.05$.

RESULTS

Variance analysis based on weight and morphological parameters ($P < 0.05$), followed by Tukey's HSD post-hoc test, revealed statistically significant and consistent differences among the four herds across all monitored periods. Accordingly, the findings related to the growth process from birth to the fifth month are presented in a comprehensive manner along with the data shown in Table 2 and Table 3.

Table 2. Mean ± standard error of body weight and morphometric traits of lambs from different herds (F1–F4)

Traits	Herds	N	Birth	1st Month	2nd Month	3rd Month	4th Month	5th Month
			X±SE	X±SE	X±SE	X±SE	X±SE	X±SE
BW	F1	40	3.56±0.101^{c}	7.08±0.167^{c}	13.43±0.147^{c}	20.83±0.180^{d}	24.67±0.350^{b}	27.85±0.457^{c}
	F2	40	3.64±0.082^{c}	8.12±0.147^{b}	14.29±0.126^{b}	21.53±0.152^{c}	24.72±0.323^{b}	27.88±0.409^{c}
	F3	40	4.40±0.085^{a}	8.80±0.151^{a}	15.05±0.142^{a}	22.53±0.166^{a}	26.06±0.326^{a}	30.68±0.418^{a}
	F4	42	4.12±0.086^{b}	8.72±0.151^{a}	14.93±0.136^{a}	22.15±0.149^{b}	25.63±0.295^{a}	29.71±0.435^{b}
WH	F1	40	28.19±0.410^{b}	35.95±0.257^{b}	38.86±0.288^{c}	45.14±0.375^{b}	52.43±0.371^{c}	57.46±0.343^{c}
	F2	40	29.21±0.347^{b}	37.69±0.216^{a}	39.60±0.251^{b}	47.13±0.344^{ab}	53.49±0.335^{b}	58.21±0.309^{bc}
	F3	40	31.25±0.428^{a}	38.18±0.301^{a}	41.54±0.298^{a}	48.66±0.374^{a}	56.83±0.384^{a}	61.11±0.375^{a}
	F4	42	31.19±0.354^{a}	37.48±0.216^{a}	40.99±0.230^{a}	45.59±1.046^{b}	54.24±0.334^{b}	58.98±0.337^{b}
RH	F1	40	28.61±0.37^{b}	35.48±0.186^{b}	39.96±0.190	44.48±0.341	51.59±0.361^{b}	55.96±0.338^{b}
	F2	40	29.83±0.382^{a}	35.51±0.380^{b}	39.79±0.248	44.51±0.399	51.63±0.489^{b}	56.68±0.420^{b}
	F3	40	29.55±0.390^{ab}	36.89±0.285^{a}	40.34±0.277	45.20±0.412	53.96±0.395^{a}	58.01±0.361^{a}
	F4	42	29.54±0.330^{ab}	36.79±0.226^{a}	40.43±0.235	44.86±0.327	52.93±0.354^{a}	57.92±0.345^{a}
BH	F1	40	31.13±0.310^{b}	37.64±0.426^{b}	40.69±0.300^{c}	45.54±0.409^{b}	54.83±0.355	61.10±0.243^{a}
	F2	40	31.88±0.252^{ab}	38.65±0.300^{ab}	41.83±0.205^{ab}	45.51±0.278^{b}	55.35±0.325	60.20±0.278^{ab}
	F3	40	32.21±0.386^{a}	39.48±0.327^{a}	42.49±0.244^{a}	46.34±0.292^{ab}	55.86±0.355	60.91±0.288^{a}
	F4	42	32.01±0.317^{a}	39.00±0.271^{a}	41.21±0.209^{bc}	46.75±0.303^{a}	55.06±0.361	59.54±0.361^{b}
BL	F1	40	35.28±0.399	41.36±0.365^{ab}	49.14±0.187^{ab}	54.38±0.291	59.09±0.381	60.64±0.417^{b}
	F2	40	35.088±0.373	40.84±0.306^{b}	48.56±0.160^{b}	55.06±0.252	58.82±0.281	60.50±0.267^{b}
	F3	40	36.33±0.498	42.14±0.405^{a}	49.56±0.222^{a}	55.03±0.293	59.38±0.390	61.80±0.306^{a}
	F4	42	36.02±0.451	41.71±0.392^{ab}	49.13±0.192^{ab}	54.69±0.273	59.60±0.368	62.27±0.315^{a}
HG	F1	40	39.19±0.267^{c}	51.04±0.202^{b}	59.09±0.226	63.40±0.213	73.29±0.636	76.86±0.619^{b}
	F2	40	40.19±0.276^{b}	50.86±0.205^{b}	58.91±0.225	64.16±0.236	73.30±0.642	77.57±0.607^{ab}
	F3	40	41.18±0.250^{a}	51.41±0.236^{ab}	59.14±0.253	64.28±0.280	74.45±0.680	79.44±0.593^{a}
	F4	42	40.27±0.292^{b}	51.86±0.241^{a}	59.51±0.256	63.55±0.270	73.76±0.677	78.19±0.647^{ab}
CD	F1	40	17.30±0.180^{b}	19.20±0.274^{c}	23.45±0.200^{b}	25.80±0.261^{b}	26.53±0.351^{c}	29.99±0.358^{b}
	F2	40	17.16±0.199^{b}	18.59±0.285^{c}	22.61±0.201^{c}	24.81±0.247^{c}	26.95±0.341^{c}	29.47±0.383^{b}
	F3	40	17.95±0.189^{a}	20.89±0.255^{a}	25.41±0.189^{a}	27.66±0.219^{a}	29.90±0.316^{a}	31.90±0.338^{a}
	F4	42	17.12±0.179^{b}	20.06±0.227^{b}	23.99±0.178^{b}	26.22±0.203^{b}	28.23±0.294^{b}	30.43±0.334^{b}
SW	F1	40	8.51±0.119^{a}	10.26±0.186	12.21±0.190	14.38±0.194^{a}	16.95±0.148^{ab}	18.75±0.160^{a}
	F2	40	8.14±0.128^{b}	10.16±0.196	11.83±0.196	14.23±0.200^{ab}	17.15±0.164^{ab}	18.22±0.183^{ab}
	F3	40	7.21±0.119^{c}	10.08±0.198	11.98±0.199	13.68±0.208^{b}	16.74±0.184^{b}	17.74±0.197^{b}
	F4	42	8.00±0.095^{b}	10.55±0.167	12.19±0.182	14.84±0.185^{a}	17.37±0.186^{a}	18.53±0.207^{a}
MG	F1	40	5,23±0.065	5,46±0.053	5.81±0.064	6.32±0.063	7.51±0.070	8.36±0.062
	F2	40	5,18±0.058	5,47±0.052	5.91±0.066	6.37±0.069	7.53±0.076	8.33±0.067
	F3	40	5,08±0.056	5.53±0.048	6.01±0.062	6.42±0.064	7.70±0.080	8.38±0.063
	F4	42	5,15±0.050	5.55±0.045	5.92±0.056	6.44±0.056	7.61±0.069	8.43±0.063

$^{a, b, c, d}$ *Means with different letter shows the difference between herds for a trait in the same column (P <0.05).* BH: Back height, BL: Body length, BW: Body weight, CD: Chest depth, HG: Heart girth, MG: Metacarpus girth, RH: Rump height, SW: Shoulder width, WH: Withers height, F1–F4: Different herds representing local breeders.

When examining the average values for BW, the highest weight was observed in the F3 group, while the lowest weights were recorded in the F1 and F2 groups, respectively. ANOVA results indicated statistically significant differences among the herds in terms of BW (P <0.001), and the Tukey HSD test revealed that this difference was primarily due to the separation of the F3 group from the F1 and F2 groups. Regarding WH during the same period, the F3 and F4 groups showed similar levels; however, both groups exhibited significantly higher WH compared to the F1 and F2 groups. The F2 group stood out in terms of RH, whereas the F3 group displayed higher average values than the other groups for BH, HG, and CD. These differences in morphological parameters were found to be significant based on multiple comparisons using the Tukey test (P <0.05) and were supported by letter groupings (a-b-c-d). On the other hand, in terms of SW, the F1 group had significantly higher values compared to the other three groups.

Table 3. Monthly average body weight (kg) and morphometric measurements (cm) of Zom lambs presented as mean ± standard error

Traits	Sex	Birth	1st Month	2nd Month	3rd Month	4th Month	5th Month
		X±SE	X±SE	X±SE	X±SE	X±SE	X±SE
BW	Female	3.56±0.059[b]	7.43±0.100[b]	13.77±0.086[b]	20.90±0.101[b]	23.58±0.156[b]	26.78±0.224[b]
	Male	4.28±0.063[a]	8.89±0.108[a]	15.05±0.106[a]	22.57±0.093[a]	26.85±0.145[a]	31.14±0.224[a]
WH	Female	28.34±0.232[b]	36.30±0.129[b]	39.03±0.159[b]	45.37±0.246[b]	52.77±0.247[b]	57.68±0.259[b]
	Male	31.49±0.269[a]	38.28±0.189[a]	41.40±0.193[a]	47.78±0.564[a]	55.61±0.278[a]	60.11±0.240[a]
RH	Female	27.95±0.187[b]	35.71±0.202[b]	39.37±0.137	43.53±0.219	51.06±0.266[b]	55.86±0.236[b]
	Male	30.71±0.235[a]	36.60±0.204[a]	40.85±0.159	45.91±0.232	53.89±0.252[a]	58.35±0.238[a]
BH	Female	30.83±0.179[b]	37.99±0.267[b]	40.99±0.189[b]	45.19±0.241[b]	55.03±0.101	59.53±0.225[b]
	Male	32.71±0.223[a]	39.35±0.202[a]	42.07±0.163[a]	46.83±0.193[a]	56.09±0.213	61.26±0.172[a]
BL	Female	34.45±0.186	40.47±0.201[b]	48.54±0.094[b]	53.56±0.143	57.67±0.145	59.69±0.152[b]
	Male	36.83±0.340	42.47±0.269[a]	49.62±0.149[a]	55.92±0.150	60.67±0.222	62.82±0.192[a]
HG	Female	39.22±0.158[b]	51.09±0.133	58.81±0.170	63.49±0.192[b]	71.44±0.261	76.09±0.316[b]
	Male	41.12±0.193[a]	51.49±0.180	59.49±0.163	64.17±0.164[a]	75.80±0.486	79.81±0.452[a]
CD	Female	16.94±0.135[b]	18.56±0.182[b]	23.43±0.182[b]	25.49±0.199[b]	26.83±0.254[b]	29.12±0.232[b]
	Male	17.79±0.122[a]	20.73±0.154[a]	24.27±0.158[a]	26.72±0.176[a]	28.90±0.237[a]	31.68±0.221[a]
SW	Female	7.58±0.096[b]	9.39±0.085	11.40±0.114	13.72±0.148[b]	16.45±0.100[b]	17.55±0.092[b]
	Male	8.32±0.079[a]	11.08±0.099	12.66±0.117	14.81±0.118[a]	17.62±0.109[a]	19.02±0.127[a]
MG	Female	5,00±0.040	5,36±0.034	5.87±0.053	6.33±0.054	7.40±0.051	8.12±0.036
	Male	5,33±0.036	5.63±0.029	5.95±0.034	6.44±0.034	7.76±0.045	8.61±0.035

[a, b] *Means with different letter shows the difference between males and females for a trait in the same column (P <0.05).*
BH: Back height, BL: Body length, BW: Birth weight, CD: Chest depth, HG: Heart girth, MG: Metacarpus girth, RH: Rump height, SW: Shoulder width, WH: Withers height.

When examining the average values for BW, the highest weight was observed in the F3 group, while the lowest weights were recorded in the F1 and F2 groups, respectively. ANOVA results indicated statistically significant differences among the herds in terms of BW (P <0.001), and the Tukey HSD test revealed that this difference was primarily due to the separation of the F3 group from the F1 and F2 groups. Regarding WH during the same period, the F3 and F4 groups showed similar levels; however, both groups exhibited significantly higher WH compared to the F1 and F2 groups. The F2 group stood out in terms of RH, whereas the F3 group displayed higher average values than the other groups for BH, HG, and CD. These differences in morphological parameters were found to be significant based on multiple comparisons using the Tukey test (P <0.05) and were supported by letter groupings (a-b-c-d). On the other hand, in terms of SW, the F1 group had significantly higher values compared to the other three groups.

In the subsequent first-month measurements, the F3 and F4 groups exhibited similarly high average body weights, while the lowest value was observed in the F1 group.

Regarding WH, the F2, F3, and F4 groups showed statistically significant differences compared to the F1 group (P <0.01). RH was significantly higher in the F3 and F4 groups compared to the F1 and F2 groups. For BH, the F3 and F4 groups were measured at similar levels; however, the mean value of the F1 group was statistically lower than both groups (P <0.05). In terms of BL, the F3 group exhibited significantly higher values than the F1 group. The highest HG measurements belonged to the F4 group, and the F1 and F2 groups were statistically distinct from the other groups. Regarding CD, the F3 group was measured significantly higher than all other groups (Tukey, P <0.05).

According to the second-month data, the F3 and F4 groups reached significantly higher live weights, while the F1 group exhibited the lowest average. ANOVA analyses confirmed that this difference was statistically significant (P <0.05). WH showed that the F3 and F4 groups differed significantly from the other groups (P <0.01), while significant differences in BH were observed among the F3, F1, and F4 groups, supported by Tukey's test with a-b-c letter groupings. Regarding BL, a significant difference was found between the F3 and F2 groups (P <0.05), and the F3 group had significantly higher CD measurements than all other groups (Tukey, P <0.05).

According to the fifth-month data, the F3 group maintained its lead in live weight, while the F1 and F2 groups showed similarly low performance. WH was significantly higher in the F3 group than in all other groups. RH values were significantly greater in the F3 and F4 groups compared to the F1 and F2 groups. BH averages were similar between the F3 and F1 groups, whereas BL values showed a significant difference, with the F3 and F4 groups outperforming the F1 and F2 groups. A significant difference in HG was observed between the F3 and F1 groups (P <0.01), and the F3 group achieved the highest CD values by a clear margin. In SW measurements, the F1 and F4 groups recorded significantly higher values compared to the F3 group.

These findings, supported by ANOVA and Tukey HSD analyses, clearly demonstrate the effects of environmental and management factors such as temperature, feed quality, and genetic structure on herd-based growth parameters. The general trend indicates that the F3 and F4 herds exhibited superior growth performance in most morphological and weight parameters, whereas the F1 and F2 groups lagged noticeably behind. This highlights the importance of farm-based optimization strategies in small ruminant husbandry.

Comparative findings on nine key growth parameters of male and female lambs over five periods from birth to the fifth month are presented within a comprehensive narrative. Sex-related differences for all periods were evaluated using repeated measures analysis of variance (ANOVA) (P <0.05) and Tukey's HSD test.

At birth, the average birth weight of male lambs was 4.28 kg, while female lambs averaged 3.56 kg, indicating that males had significantly higher birth weights. In the same period, WH measured 31.49 cm in males and 28.34 cm in females; RH was 30.71 cm in males and 27.95 cm in females; BH was 32.71 cm in males and 30.83 cm in females; HG was 41.12 cm in males and 39.22 cm in females; CD was 17.79 cm in males and 16.94 cm in females; and SW was 8.32 cm in males and 7.58 cm in females.

In the first month, live weight was 8.89 kg for males and 7.43 kg for females; WH was 38.28 cm in males and 36.30 cm in females; RH was 36.60 cm in males and 35.71 cm in females; BH was 39.15 cm in males and 38.56 cm in females; HG was 48.71 cm in males and 46.44 cm in females; CD was 20.45 cm in males and 19.86 cm in females; and SW was 9.51 cm in males and 8.55 cm in females.

At the second month, live weight was 12.32 kg for males and 10.29 kg for females; WH was 42.18 cm in males and 39.79 cm in females; RH was 40.48 cm in males and 38.83 cm in females; BH was 43.64 cm in males and 42.54 cm in females; HG was 55.77 cm in males and 51.64 cm in females; CD was 22.50 cm in males and 21.20 cm in females; and SW was 10.64 cm in males and 9.56 cm in females.

In the third month, live weight was 15.77 kg for males and 13.25 kg for females; WH was 45.57 cm in males and 43.52 cm in females; RH was 44.00 cm in males and 42.24 cm in females; BH was 46.89 cm in males and 45.78 cm in females; HG was 60.61 cm in males and 56.34 cm in females; CD was 23.89 cm in males and 22.30 cm in females; and SW was 11.39 cm in males and 10.33 cm in females.

At the fourth month, live weight was 20.03 kg for males and 16.75 kg for females; WH was 47.73 cm in males and 45.21 cm in females; RH was 46.76 cm in males and 44.47 cm in females; BH was 49.65 cm in males and 48.13 cm in females; HG was 63.87 cm in males and 60.38 cm in females; CD was 25.13 cm in males and 23.82 cm in females; and SW was 11.83 cm in males and 10.75 cm in females.

By the fifth month, live weight was 24.44 kg in males and 20.28 kg in females; WH was 50.03 cm in males and 47.13 cm in females; RH was 48.62 cm in males and 46.69 cm in females; BH was 52.23 cm in males and 50.45 cm in females; HG was 66.60 cm in males and 62.75 cm in females; CD was 26.12 cm in males and 24.67 cm in females; and SW was 12.16 cm in males and 10.98 cm in females.

DISCUSSION AND CONCLUSION

In this study, weight and body measurements of Zom lambs raised in the Şanlıurfa-Viranşehir-Siverek region were evaluated. It is known that Akkaraman, Awassi, and Karakas sheep breeds are commonly raised around this area, and based on information obtained from local breeders, it is believed that Zom lambs have genetic interactions with these three native breeds (Koncagül, 2012). Generally, studies on Zom sheep are quite limited. In this context, the study first examined the morphological similarities and differences of Zom sheep with these three breeds, and then included comparative analyses with other sheep breeds raised in Türkiye.

The least squares means and standard error values of all body measurements by sex and herds are presented in Table 2 and Table 3. Regarding birth weight, the average of male lambs was determined as 4.28 kg, and female lambs as 3.56 kg, with a statistically significant difference between sexes ($P < 0.05$). The overall average was calculated as 3.93 kg. In a study conducted by Koncagül et al. (2013) on Zom sheep, the birth weight was reported as 4.2 kg for males, 3.8 kg for females, and 4.0 kg overall. These results are compatible with our study in terms of male birth weight and overall average but differ in female birth weight. The same study reported an average live weight of 22.1 kg at 3 months, which is close to the results of our analysis. However, in their study, Çelik et al. (2012) reported average birth weights of 4.75 kg, 12.86 kg at the first month, and 18.7 kg at the second month, which are considerably higher than the findings in our study. Another study reported the average birth weight of Zom lambs as 3.30 kg and the average weight at 3 months as 19.06 kg, which aligns with our findings (Güloğlu, 2024). The differences in birth weight observed in the mentioned studies are thought to be due to variations in dam age, live weight, breeder conditions, or feeding practices.

On the other hand, Sakar and Ünal (2021) reported that the overall birth weight average of Akkaraman lambs, 3.87 kg, was consistent with our study. Although Çetin et al. (2021) reported lower birth weights than our findings in Akkaraman-Savak lambs, their 1st, 2nd, and 3rd month live weights were considerably higher than our results. Gül and Ekici (2020) reported that the birth weights of Awassi breed lambs were lower than in our study, but their 2nd and 3rd month live weights were higher. When examining values reported by different researchers; for Akkaraman breed, birth weights of 4.5 kg, for Awassi 4.4 kg (Yakan vd., 2012), in another study Akkaraman 3.71 kg (Tüfekçi, 2023), Morkaraman 4.03 kg, Kıvırcık x Morkaraman genotype 4.13 kg (Küçük et al., 2002), Akkaraman 4.23 kg (Ceyhan et al., 2019), Hamdani x Akkaraman crossbreed (Hırik) 3.05 kg (Demir and Aygün, 2021), Savak Akkaraman 3.43 kg (Yağcı et al., 2018), Awassi breed 3.9 kg (Gül and Oflaz, 2021) were reported.

Due to the limited number of studies on Zom lambs and most existing studies focusing on adult Zom sheep, comparisons with data from other related breeds were made in evaluating the morphological measurements of the lambs. Akçapınar et al. (2001) reported the 3rd month values for Akkaraman, Sakız x Akkaraman and Kıvırcık x Akkaraman phenotypes as follows; WH 52.13, 52.34, and 50.47 cm; BL 50.56, 51.44, and 51.19 cm; HG 64.84, 64.76, and 64.80 cm; CD 23.67, 23.89, and 23.32 cm; and MG 7.01, 7.00, and 6.83 cm, respectively. According to these results, WH and MG values were higher than our findings, BL and CD values were lower, and HG was compatible with our results. In another study, the morphological measurements of Akkaraman lambs at birth were reported as WH 37.48 cm, RH 37.93 cm, BL 39.91 cm, HG 46.18 cm, and CD 17.94 cm. Compared to our findings, these values were higher for WH, RH, B Land HG, while CD was compatible (Yavuz, 2015).

Khadre (2019), in a study with Akkaraman and Awassi breeds, reported that birth and 2nd month measurement values for WH, RH, BL, HG, CD, and MG were considerably higher than those found in our study. Şıtıl (2015), in a study with Karakas Akkaraman lambs, reported that RH, BH, and MG values from birth to the 5th month were higher than our findings, while CD was lower. SW values at birth and 1st month were compatible, whereas values at the 2nd, 3rd, 4th, and 5th months were lower than ours. WH values were higher at birth, 1st, and 2nd months, compatible at the 3rd month, and lower at the 4th and 5th months. BL values were compatible at birth and 1st month, but lower from the 2nd to the 5th month. HG values were higher at birth and 1st month, compatible at 2nd and 3rd months, and lower at 4th and 5th months.

İpek (2012), in her study on Awassi lambs, reported that WH values during the first three months were higher than those in our study. Additionally, CD values at the 1st and 3rd months were lower than ours, while the 2nd month value was compatible. Regarding HG, values were reported as low at the 1st month, compatible at the 2nd month, and low at the 3rd month. In the study by Çulha (2019), data on Awassi lambs showed that RH values at birth, 2nd, and 4th months were higher than our findings; BL and HG values were lower at birth, compatible at the 2nd month, and higher at the 4th month. In the same study, WH at birth was compatible, while values at the 2nd and 4th months were lower than ours.

Öter (2000), in his study on Karakas lambs' body measurements, reported that WH values were compatible with ours, except that they were higher at the 1st, 2nd, 3rd, and 4th months. CD and BL measurements at 5 months were found to be lower than our results. SW measurements were lower at the 1st, 4th, and 5th months, higher at the 2nd month, and compatible at the 3rd month. HG values were higher in the first three months but decreased at the 4th and 5th months.

Yavuz (2015), in his morphological study on Akkaraman lambs, found that BL, WH, HG, RH and BH values measured from birth to 5 months were higher compared to our findings; SW was lower, MG and CD values were compatible. Gul and Oflaz (2021), in their study on the Awassi breed, reported that WH and RH values at birth and 2 months were higher than our findings. CD values were higher at birth but lower at 2 months; HG at birth and 2 months was compatible with our results.

The findings indicate that the weight and body measurements of Zom lambs show certain similarities and differences when compared with local breeds such as Akkaraman, Awassi, and Karakas. Additionally, significant variations in growth parameters were observed between herds and sexes. Particularly, the F3 and F4 groups generally exhibited superior growth performance, whereas the F1 and F2 groups had lower weight and morphological measurements.

Compared with the literature on Akkaraman, Awassi, and Karakas breeds, Zom lambs had higher values in some morphological parameters and lower in others. These differences reflect the influence of genetic makeup, environmental factors, nutrition, and breeder management. Furthermore, sex-related measurements confirmed that male lambs generally exhibited higher values than females.

In conclusion, it is important to develop herd-based management strategies to improve the growth performance and morphological characteristics of Zom lambs. Comprehensive breeding programs that consider region-specific environmental factors will contribute to the sustainability of small ruminant livestock. Moreover, increasing the limited number of studies on Zom sheep in the literature is of great importance for the conservation and development of this local breed. In addition, there is a need to raise Zom sheep under similar environmental conditions to reveal the effect of genetic structure on these characteristics.

REFERENCES

Akça N, Bingöl B. Diyarbakır ili koyunculuğun mevcut durumu. OKU Fen Bilimleri Enstitüsü Dergisi. 2020;3(2):213-218.

Akça N, Vural ME, Karataş A, et al. Halk elinde yetiştirilen Karacadağ Zom koyununun döl ve süt verimi ile büyüme, gelişme ve dış yapı özelliklerinin belirlenmesi. Sonuç Raporu. TAGEM/ HAYSÜD/ 10/08/01/04, Diyarbakır; 2012.

Akçapınar H. Koyun yetiştiriciliği. 1. Baskı. Ankara: Medisan yayın serisi; 1994. ISBN: 975-7774-05-7.

Akçapınar H, Ünal N, Özbeyaz C. (The possibilities of developing dam and sire lines using Akkaraman, Sakız (Chios) and Kıvırcık sheep breeds for lamb production II. Some body measurements in lambs and some production traits in yearling females). Lalahan Hayvancılık Araştırma Enstitüsü Dergisi. 2001;41(1):25-33.

Ceyhan A, Şekeroğlu A, Duman M. Some reproductive traits and lambs growth performance of Akkaraman sheep raised in Niğde Province. Turkish Journal of Agriculture - Food Science and Technology. 2019;7(10):1509-1514.

Çelik R, Arserim NB, Durak MH. Some production characteristics of Zom sheep types. Asian Journal of Animal and Veterinary Advances. 2012;7(10):1035-1040.

Çetin H, Bayrıl T, Tez Ş. Yetiştirici koşullarında Akkaraman-Şavak kuzularının büyüme, doğum tipi ve cinsiyet oranı özelliklerinin araştırılması. Dicle Üniversitesi Veteriner Fakültesi Dergisi. 2021;14(2):126-130.

Çulha E. Ekstansif koşullarda İvesi, Merinos ve Sakız ırkı kuzularda bazı büyüme özelliklerinin belirlenmesi. Yüksek Lisans Tezi, Mehmet Akif Ersoy Üniversitesi, Sağlık Bilimleri Enstitüsü, Veterinerlik Zootekni ABD, Burdur; 2019.

DAKA. Küçükbaş Hayvancılık Çalıştay Raporu. Doğu Anadolu Kalkınma Ajansı; 2012. 167 s.

Demir E, Aygün T. Halk elinde yetiştirilen Hırik (Hamdani x Akkaraman Melezi) koyunlarının döl, süt ve yapağı verimi özellikleri. Hayvansal Üretim. 2021;62(1):35-44.

Ergün OF, Bayram B. Türkiye'de hayvancılık sektöründe yaşanan değişimler. Bahri Dağdaş Hayvancılık Araştırma Dergisi. 2021;10(2):158-175.

Ertuğrul M, Dellal G, Elmacı C, et al. Hayvan genetik kaynaklarının muhafazası ve sürdürülebilir kullanımı. Ziraat Mühendisleri Odası VII. Teknik Kongresi; 2010. 11-15 Ocak, s.179-198.

Gül S, Ekici H. İvesi koyunlarında farklı yaşta sütten kesimin kuzularda büyüme ve süt verimi üzerine etkisi. Hayvan Bilimi ve Ürünleri Dergisi. 2020;3(2):95-103.

Gül S, Oflaz N. Gaziantep ve Kilis illerinde yetiştirilen İvesi koyunlarının bazı morfolojik ve fizyolojik özellikleri bakımından karşılaştırılması. Tekirdağ Ziraat Fakültesi Dergisi. 2021;18(1):146-156.

Gülcan H, Öztürk A. TÜRKİYE KOYUN ISLAH ÇALIŞMALARI. 1st International Conference on Sustainable Ecological Agriculture (1st ICSEA); 2022 Mar 8-10; Konya, Türkiye. p. 238-247.

Güloğlu N. Akkaraman tiplerinin morfolojik ve bazı verim özelliklerinin incelenmesi. Doktora Tezi, Ankara Üniversitesi, Sağlık Bilimleri Enstitüsü, Veterinerlik Zootekni ABD, Ankara; 2024.

Günlü A, Mat B. Türkiye ekonomisinde koyun keçi yetiştiriciliğinin yeri ve önemi. Kuzu ve Oğlak Kayıplarının Önlenmesinde Koyun Keçi Sağlığı ve Yetiştiriciliği, Akademisyen Kitabevi A. Ş, Yenişehir, Ankara; 2021. p. 3-14.

İpek P. Farklı sürelerde sütten kesilen İvesi kuzularda büyüme, yaşama gücü ve vücut ölçüleri. Yüksek Lisans Tezi, Fırat Üniversitesi, Sağlık Bilimleri Enstitüsü, Zootekni ABD, Elazığ; 2012.

Kaymakçı M. İleri Koyun Yetiştiriciliği. İzmir İli Damızlık Koyun Yetiştiricileri Birliği Yayınları; 2006. s. 90-194, 315. Bornova – İzmir.

Khadre ABA. Akkaraman ve İvesi erkek kuzularının besi performansı ve karkas özelliklerinin karşılaştırılması. Yüksek Lisans Tezi, Selçuk Üniversitesi, Fen Bilimleri Enstitüsü, Zootekni ABD, Konya; 2019.

Koncagul S, Vural ME, Karatas A, et al. Reproductive performance of ewes and growth characteristics of lambs in Zom Sheep reared in Karacadag District. Kafkas Univ Vet Fak Derg. 2013;19(1):63-68.

Koncagul S, Akça N, Vural ME, et al. Zom koyunlarının morfolojik özellikleri. Kafkas Üniversitesi Veteriner Fakültesi Dergisi, Kafkas Univ Vet Fak Derg. 2012;18(5):829-837.

Kutan P, Keskin M. Lamb development traits and phenotypic correlations between different body measurements and fattening performance characteristics in Awassi sheep. MKU Journal of Agriculture Sciences. 2022;27:109-114.

Küçük M, Bayram D, Yılmaz O. Morkaraman ve Kıvırcık X Morkaraman (G1) Melezi kuzularda büyüme, besi performansı, kesim ve karkas özelliklerinin araştırılması. Turk J Vet Anim Sci. 2002;26:1321-1327.

Öter MS. Karakaş kuzularında büyüme ve gelişme özellikleri. Yüksek Lisans Tezi, Yüzüncü Yıl Üniversitesi, Fen Bilimleri Enstitüsü, Zootekni ABD, Van; 2000.

Özyürek S, Türkyilmaz D, Dağdelen Ü, et al. Erzincan ili koyunculuk işletmelerinin yapısal özellikleri ve sorunlarının işletme büyüklüğüne göre incelenmesi. Akademik Ziraat Dergisi. 2018;7:219-226.

Sakar ÇM, Ünal İ. Çankırı ilinde yetiştirilen Akkaraman ırkı kuzuların büyüme özelliklerinin belirlenmesi. Journal of Animal Production. 2021;62(1):61-66.

Şen M, Uğurlu M. Romanov koyun ırkında döl verimi özellikleri, yaşama gücü, büyüme performansı ve bazı vücut ölçüleri. Atatürk Üniversitesi Veteriner Bilimler Dergisi. 2021;16:155-163.

Şıtıl S. Karakaş Akkaraman kuzularında yaşama gücü, büyüme ve vücut ölçüleri. Yüksek Lisans Tezi, Harran Üniversitesi, Fen Bilimleri Enstitüsü, Zootekni ABD, Şanlıurfa; 2015.

Taşkın T, Kandemir C. Türkiye'de koyun ırklarının mevcut durumu ve geleceği: Güneydoğu Anadolu Bölgesi. Kadirli Uygulamalı Bilimler Fakültesi Dergisi. 2022;2(1):93-105.

Tüfekci H. Yetiştirici Koşullarında Akkaraman Irkı Koyunlarda Döl Verimi ile Kuzularda Büyüme ve Yaşama Gücü Özelliklerinin Belirlenmesi. Akademik Ziraat Dergisi. 2023;12(1):139-144.

TÜİK. Hayvansal üretim istatistikleri [Internet]. 2024 [alıntı tarihi 7 Ağustos 2025]. Şuradan edinilebilir: https://www.tuik.gov.tr/

Yağcı S, Baş S, Tatlıyer A. Şavak Akkaraman kuzuların yetiştirici koşullarında büyüme ve yaşama gücü özellikleri. Lalahan Hayvancılık Araştırma Enstitüsü Dergisi. 2018;58(2):81-88.

Yakan A, Ünal N, Dalcı MT. Ankara şartlarında Akkaraman, İvesi ve Kıvırcık ırklarında döl verimi, büyüme ve yaşama gücü. Lalahan Hayvancılık Araştırma Enstitüsü Dergisi. 2012;52(1):1-10.

Yavuz Hİ. Akkaraman kuzularında yaşama gücü, büyüme ve vücut ölçüleri. Yüksek Lisans Tezi, Harran Üniversitesi, Fen Bilimleri Enstitüsü, Zootekni ABD, Şanlıurfa; 2015.