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Determination of Reproductive and Survival and Growth Characteristics of Lambs in Akkaraman Ewes Reared in Şefaatli District of Yozgat Province

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ABSTRACT
The aim of this study was to determine the factors affecting the reproductive efficiency and the growth characteristics of Akkaraman ewes reared under conditions in Şefaatli district, Yozgat province. The animal materials of this study consisted of 581 head ewes and 643 head lambs obtained from different farms. It was determined lambing rate, infertility rate, single birth rate, twinning birth rate, female birth rate, male birth rate, and litter size at birth, 95.5%, 4.4%, 82.7%, 17.3%, 46.9%, 53.1% and 1.16%i, respectively. The birth weight and weaning weight of lambs were established as 4.16 kg and 21.50 kg, respectively. In general, the survivability rate of lambs until weaning was determined as 95.80 %. These rates were 94.70, 96.77, 98.91, and 88.04% for female, male, single, and twin lambs, respectively. In addition, the survivability rate of lambs born to 2-, 3-, and 4-year-old ewes was 92.59%, 94.33% and 97.35% respectively. As a result, when the obtained data are evaluated, it can be said that the lambing and twinning rates are quite good according to the field conditions, and the infertility rate is at the desired levels.

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Yozgat İli Şefaatli İlçesinde Yetiştirilen Akkaraman Koyunlarında Döl Verimi ve Kuzuların Yaşama ve Büyüme Özelliklerinin Belirlenmesi

ÖZET
Bu çalışmanın amacı, Yozgat ili Şefaatli ilçesi koşullarında yetiştirilen Akkaraman koyunlarının döl verimi ve büyüme özelliklerini etkileyen faktörleri belirlemektir. Bu çalışmanın hayvan materyalini farklı çiftliklerden elde edilen 581 baş koyun ve 643 baş kuzu oluşturmuştur. Kuzulama oranı, kısırlık oranı, tek doğum oranı, ikiz doğum oranı, dişi doğum oranı, erkek doğum oranı ve doğumdaki yavru sayısı sırasıyla %95.5, %4.4, %82.7, %17.3, %46.9, %53.1 ve %1.16 olarak belirlenmiştir. Kuzuların doğum ağırlığı ve sütten kesim ağırlığı sırasıyla 4.16 kg ve 21.50 kg olarak belirlenmiştir. Genel olarak kuzuların sütten kesimine kadarki yaşama gücü değeri %95.80 olarak hesaplanmıştır. Bu oran sırası ile dişi, erkek, tek ve ikiz yavrularda %94.70, 96.77, 98.91 ve 88.04 olarak hesaplanmıştır. Ayrıca çalışmada 2 yaşlı, 3 yaşlı ve 4 ve üzeri yaşlı koyunlardan doğan kuzularda yaşama gücü değerleri ise sırası ile %92.59, %94.33 ve %97.35 olarak hesaplanmıştır. Sonuç olarak elde edilen veriler değerlendirildiğinde kuzulama ve ikizlik oranının saha şartlarına göre oldukça iyi, kısırlık oranının ise istenen seviyelerde olduğu söylenebilir.

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INTRODUCTION
Sheep and goat husbandry have significantly contributed to fulfilling human requirements for meat, milk, leather, and wool for generations. Given the extensive availability of sheep and goats, together with their diversity and

adaptability to the most extreme climates globally, they may be regarded as the animals of the future (Tüfekci & Tozlu Çelik, 2021). Beyond addressing the demand for animal protein in global food security and nutrition, sheep and goat breeding play a significant role in utilizing land unfit for agricultural production and supporting the livelihoods of low-income families, particularly in rural regions (Teixeira et al., 2020; Bertolozzi-Caredio et al., 2021; Simões et al., 2021). Sheep breeding is significant for the utilization of suboptimal pasture and fallow regions globally, impacting nutrition, employment, rural development, and sociology. Moreover, sheep farming constitutes a means of integration for the income of families residing in rural regions (Sakar et al., 2024). The variety of resources supplied by sheep has rendered the species a crucial element of the worldwide agricultural economy. Indigenous sheep breeds possess a diverse array of adaptive qualities that have developed over millennia through natural and artificial selection, serving as foundational elements of food security and sustainable production in numerous nations (Kizilaslan et al., 2022).

The Akkaraman sheep breed, a fat-tailed indigenous breed of Türkiye, is extensively cultivated throughout nearly all regions. The breed is distinguished by its capacity to endure extreme environmental conditions, including infections and parasites, enabling survival and reproduction despite hunger and bad circumstances (Behrem, 2021; Arzik et al., 2023). Akkaraman sheep, utilized for meat and milk production, is a resilient breed adapted to the region's severe climatic circumstances. Sheep often utilize grassland in spring and autumn and stubble in summer for feeding (Sakar & Ünal, 2021). Our nation is conducive to extensive sheep and goat husbandry due to its agricultural framework, environmental conditions, and cultural practices. The geographical and climatic attributes of Yozgat province render it particularly conducive to sheep and goat rearing development. The predominant sheep breed in the area is Akkaraman, and the livestock mostly subsist on meadow-pasture and stubble. The animals' adeptness to regional conditions, including vegetation, climate, and the economic returns from extensive breeding, significantly influences the predominance of domestic breeds in the area (Tüfekci, 2021; Tüfekci, 2020).

Table 1. Number of sheep and goats by districts in Yozgat Province in 2023 (head)
Çizelge 1. Yozgat İli 2023 yılı ilçeler bazında küçükbaş hayvan sayıları (baş)

Districts	Sheep	Goat	Total
Akdağmadeni	24.230	11.570	35.800
Aydıncık	3.646	3.002	6.648
Boğazlıyan	85.029	1.301	86.383
Çandır	7.215	94	7.309
Çayıralan	15.658	680	16.338
Çekerek	5.364	2.668	8.032
Kadışehri	7.618	2.056	9.674
Merkez	56.997	5.801	62.898
Saraykent	4.195	630	4.825
Sarıkaya	37.855	575	38.430
Sorgun	57.107	1.598	58.705
Şefaatli	36.862	1.075	37.937
Yenifakılı	22.426	376	22.802
Yerköy	64.476	4.643	69.219
Total	428.678	36.069	465.000

The agricultural industry in Yozgat province is crucial for employment, as it leverages the region's natural potential in agriculture and animal husbandry, significantly benefiting the local economy and providing jobs for a substantial portion of the population. Analysis of Table 1 reveals that Yozgat province has a total of 465.000 sheep and goats, comprising 428.678 sheep and 36.069 goats (Anonymous, 2023). Almost 90% of the sheep in Yozgat province are raised in 6 of the 14 districts. The quantity and quality of sheep and goat products can vary depending on the genetic structure and environmental effects. In addition to current environmental factors, there are also climate-related effects that cannot be controlled. The aim of this study was to investigate the factors affecting the fertility and growth characteristics of lambs of Akkaraman ewes under breeding conditions in Şefaatli district of Yozgat province.

MATERYAL and METOD

Material

The animal material used in the study consisted of 581 Akkaraman ewes of different ages (2-3-4 and above) and 643 lambs obtained from them in February-March 2024 in 5 different farms in Şefaatli district of Yozgat province.

Study Area

Şefaatli is a district located in the south of Yozgat province, 41 km from the city center, bordering Kırşehir and Nevşehir. It has 833 km area and is 910 m above sea level. Although the climate of the district is continental, as in the whole province, the winters are milder than the provincial center. Summers are hot and dry, winters are cold and harsh in the district, and the rainy season is spring and autumn. Due to its semi-arid climate, the most important sources of income of the district, where steppes occupy a large area, are agriculture and animal husbandry. The total area of cultural land in Şefaatli district is 707.51 ha, of which 125.81 ha is meadow and pasture and 581.70 ha is agricultural land (Anonymous, 2024).

Method

The research was carried out in 2023-2024. It was not intervened were made to the care management and feeding conditions in the farms where the research was conducted. In the farms, sheep were generally fed in the barn in winter and in the pasture in early spring and autumn. In pasture feeding, the animals were sent go out to pasture between March and April and were kept on pasture until November. Pastures were generally of low or medium quality. During the summer period, wheat straw, chickpea straw, and lentil straw were stored at a cost and quantity suitable for pen feeding during the winter, and barley and concentrate feed were used as feed material in addition to roughage. The amount of feed was roughly determined and distributed to the feeders, and the mixing process was carried out in the feeders. In general, hay (1-1.5 kg), barley crushed (250-350 g), and concentrate feed (250-300 g) where fed. Rams were given an additional feeding (500 - 750 g of concentrate feed containing 2700 kcal/kg metabolic energy and 16% crude protein) before ram siring, while ewes were grazed only on pasture. The animals used in the study were treated for internal and external parasites and vaccinated against foot and mouth disease, smallpox, enterotoxaemia, and brucella.

Ram siring was carried out by the free mating method between 15 September - 15 October in 2023 and continued for one month. In order to determine the reproductive characteristics of the ewes during the study, number of ewes bred, number of ewes lambing, number of infertile ewes, number of single-birth ewes, number of twin-birth ewes, number of lambs born female, number of lambs born male, total number of lambs born, number of weaned lambs, infertility rate, lambing rate, single lamb rate, twinning lamb rate, female birth rate, male birth rate, fecundity, litter size. Reproduction traits of the ewes were calculated according to the method reported by Kaymakçı (2006).

The births took place in February-March 2024. Newborn lambs were provided with enough colostrum. Lambs were weighed within 24 hours after birth, and their birth weights were determined. In addition, sex, type of birth, date of birth age of dam were recorded and numbered. In addition to birth weight, weaning weight (75th-day) was also determined by weighing the lambs up to 50g with a precision balance in order to determine the growth and development characteristics of the lambs. Weaning weights of lambs were corrected by the interpolation method according to the weighing results taken at the end of each month.

Data Analyses

The data were analyzed using SPSS Statistical Package Program (SPSS, 2016). In the evaluation of the data, the Kolmogorov-Smirnov test was applied for a normality test, and it was determined that the characteristics were suitable for normal distribution (P>0.05). According to the results of the Levene test, variances were homogenous (P>0.05). Farm, type of birth, sex, and age of dam were included in the model as effective factors on live weight, and Duncan multiple comparison test was applied in groups with more than two differences (SPSS, 2016). The chi-square (χ^2) test was used in the evaluation of fertility characteristics. The effect of the factors on the growth performance of lambs was calculated using the following mathematical model.

$$Yijklm=\mu+ai+bj+ck+dl+e_{ijklm} \quad (1)$$

Y_{ijklm}: Live weight of lamb (birth, 75th-day)

μ: Expected average

a_i: Effect of the farm

b_j: Effect of type of birth (single, twin)

c_k: Effect of sex (female, male)

d_l: Effect of age of dam (2, 3, 4, and above)

e_{ijklm}: Margin of error.

RESULTS and DISCUSSION

The rates related to the reproductive characteristics of the flocks obtained from 5 different farms in Şefaatli district of Yozgat province, where the research was conducted, are given in

Table 2. Reproductive characteristics of Akkaraman ewes
Çizelge 2. Akkaraman koyunlarında döl verim özellikleri

	Farm code						
Farm	**1**	**2**	**3**	**4**	**5**	**Overall**	**P**
Number of mated ewes	102	138	103	112	126	581	
Number of lambing ewes	95	134	98	108	120	555	
Number of infertile ewes	7	4	5	4	6	26	
Number of single-birth ewes	69	126	71	99	94	459	
Number of twin-birth ewes	26	8	23	9	26	92	
Number of born female	53	75	48	60	66	302	
Number of born male	68	67	69	57	80	341	
Number of total lambs	121	142	117	117	146	643	
Number of weaned lambs	111	139	115	111	140	616	
Lambing rate %	93.2	97.1	95.2	96.4	95.3	95.6	0,656
Infertility rate %	6.8	2.9	4.8	3.6	4.7	4.4	
Single lamb rate %	72.6	94	76.5	91.7	78.3	82.7	0,000
Twinning lamb rate %	27.4	6	23.5	8.3	21.7	17.3	
Female birth rate %	43.8	52.8	41.1	51.3	45.2	46.9	0,573
Male birth rate %	56.2	47.2	58.9	48.7	54.8	53.1	
Fecundity (head)	1.18	1.03	1.13	1.04	1.15	1.11	
Litter size (head)	1.27	1.06	1.20	1.08	1.22	1.16	

High reproduction traits are the first condition for successful and sustainable ewe breeding (Öziş Altınçekiç & Koyuncu, 2017; Öztürk & Tölü, 2025). However, reproduction characteristics may vary under the influence of many factors. The factors affecting reproductive efficiency can be expressed as reproductive activities of ewes at certain time intervals and the number and weight of the lambs obtained at these time intervals (Koyun, 2019)

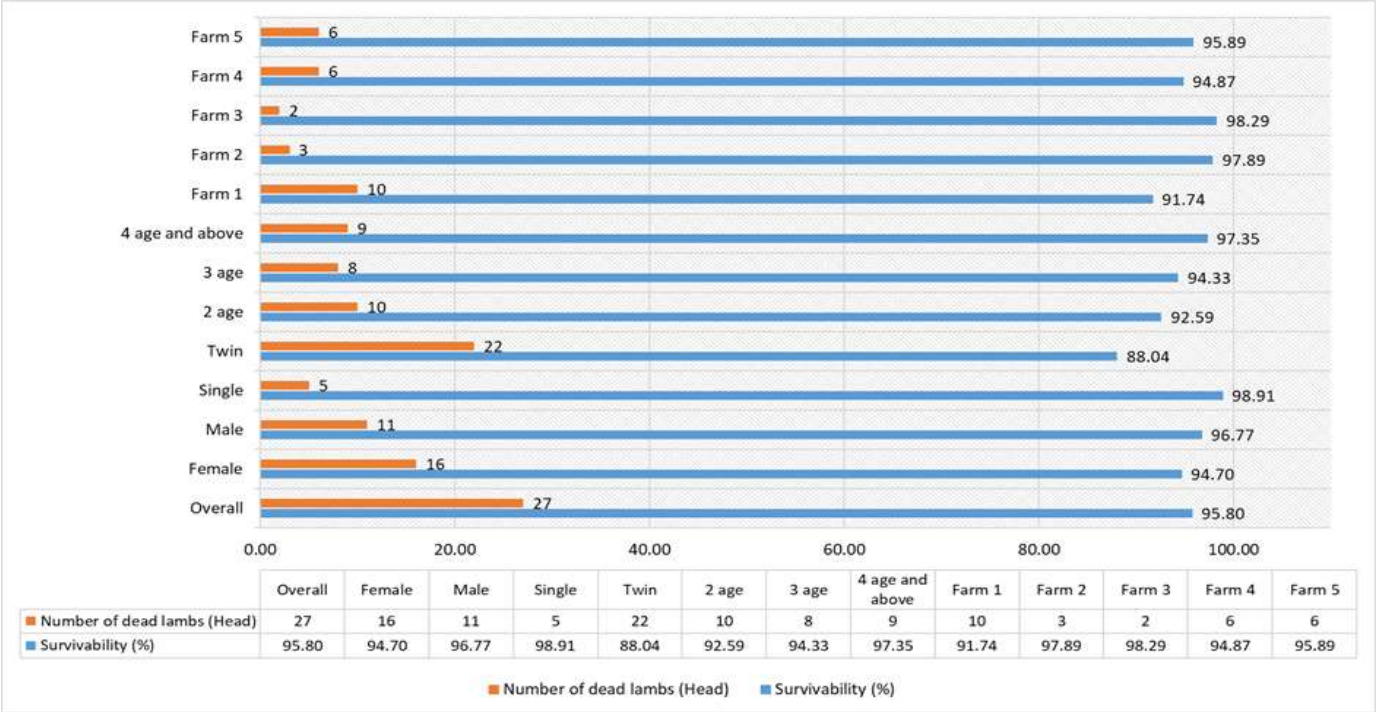
In the study, lambing rates of Akkaraman ewes were 93.2%, 97.1%, 95.2%, 96.4%, 95.3% and 95.6% in five farms, respectively. Infertility rates were determined as 6.8%, 2.9%, 4.8%, 3.6%, 4.7% and 4.4% in the same order. Reproduction in ewes is important in order to perform selection and culling procedures effectively and to ensure flock size. Many factors, such as breed, age, body weight, condition, care, nutrition, and the effect of the ram, are effective on reproduction (Kaymakçı & Sönmez, 1992). In this study, the lambing rate obtained in Akkaraman ewes (95.6%) was in accordance with the results reported by Özmen et al. (2015); Akçapınar et al. (2000); Tüfekci (2023); Özten & Tüfekci (2024), Tüfekci et al. (2024) (94. 5%; 94.0%; 95.8%; 94.8%; 94.1%), and higher than the values reported by Şirin (2023) (85%) and Şirin et al. (2017) (91%). The infertility rate (4.4%) obtained in Akkaraman ewes in this study was similar to the values reported by Yavuz (2015), Koyun (2019), Elçi (2022) (2.86%, 3.1%, and 2.65%, respectively) and lower than the values reported by Türkmen (2018); Büyüktekin (2023), and Şirin (2023) (8.86%, 8.73%, 15%, respectively).

According to the reproductive characteristics of Akkaraman ewes, single and twinning lamb rates were determined as 72.6% and 27.4%, 94% and 6%, 76.5% and 23.5%, 91.7% and 8.3%, 78.3% and 21.7% in five farms, respectively. The single lamb rate (82.7%) among the fertility traits of Akkaraman ewes obtained in this study was similar to the single lamb rate findings of Yavuz (2015) (88.8%) and Elçi (2022) (85.18%), lower than the single lamb rate findings of Türkmen (2018) (96.25%) and Koyun (2019) (92.8%) and higher than the value reported by Karabacak et al. (2012) (78.15%). When compared with the findings of this study, twinning lamb rate (17.3%) was higher than the values reported by Yavuz (2015); Türkmen (2018); Koyun (2019); Elçi (2022) (9.63%; 3.75%; 7.2%; 4.81%, respectively), but lower than the value reported by Karabacak et al. (2012) (21.85%) and Ceyhan et al. (2019) (20.8%).

According to the obtained reproductive characteristics, the female and male birth rates of Akkaraman ewes were determined as 43.8% and 56.2%, 52.8% and 47.2%, 41.1% and 58.9%, 51.3% and 48.7%, 45.2% and 54.8% in five farms, respectively, and 46.9% and 53.1% in general. Among the findings of the study, the findings of female and male birth rates in Akkaraman ewes (46.9% and 53.1%) were found to be similar with the values of Tüfekci et al. (2024) female lamb rate 52.1% and male lamb rate 47.9%; Yavuz (2015) female lamb rate 54.89% and male lamb rate 45.11%; Ceyhan et al. (2019) female lamb rate 54.3% and male lamb rate 45.7%.

Fecundity from the reproductive characteristics obtained in Akkaraman ewes was calculated as 1.18, 1.03, 1.13, 1.04,

1.15, 1.18, 1.03, 1.13, 1.04, 1.15 in five farms, respectively, and 1.11 in general. Litter size was calculated as 1.27, 1.06, 1.20, 1.08, 1.22, and 1.16 in the same order. An important part of the income in sheep breeding is obtained from the sale of lambs; therefore, the higher the litter size, the better the economic dimension of sheep breeding. Litter size obtained in this study (1.16) is similar to the values reported by Şirin et al. (2017); Ceyhan et al. (2019); Türkmen (2018); Yakan et al. (2012); Elçi (2022); Tüfekci (2023); Tüfekci et al. (2024); Türkmen (2018); Uçan, (2016); Koyun (2019) (1.05; 1.12; 1.03; 1.19; 1.14; 1.22; 1.20; 1.03; 1.05; 1.07). Fecundity obtained in Akkaraman ewes (1.11) is similar to the results of Şirin et al. (2017); Ceyhan et al. (2019) and Koyun (2019) (0.95, 1.01; 1.04).



	Overall	Female	Male	Single	Twin	2 age	3 age	4 age and above	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5
Number of dead lambs (Head)	27	16	11	5	22	10	8	9	10	3	2	6	6
Survivability (%)	95.80	94.70	96.77	98.91	88.04	92.59	94.33	97.35	91.74	97.89	98.29	94.87	95.89

Figure 1. 75th day survivability rate of lambs
Şekil 1. Kuzulara ait 75. gün yaşama gücü değerleri

Survivability, which is an important factor in sheep breeding, refers to the ability of the animal to survive. It is also used in the evaluation of reproduction in farms and determines profitability in animal husbandry (Tekin, 1991). Among the survivability rates, lamb survival at weaning is a very important criterion. (Karakuş, 2007). Knowing the main factors affecting the survival of lambs is extremely important in terms of preventing unnecessary lamb losses (Koyun, 2019). Keeping animal losses in flocks at the lowest possible level is the most effective and important factor in keeping production economical in all farm animals and sheep breeding. These losses are more common in young animals than in adult animals. Survival is defined as the ability to survive from birth to a certain age and is an important indicator of adaptation to environmental conditions. In addition, one of the most important measures of reproduction is the survival of lambs at weaning. Factors such as age of dam, feeding, care, genotype, birth weight, type of birth, sex, and season of birth have an effect on survival (Özsoy et al., 1992; Abegaz et al., 2000; Özbey et al., 2000; Gürsoy, 2005; Demirel et al., 2004; Boujenane et al., 2005).

In this study, the survivability rate of Akkaraman lambs from weaning to slaughter is given in Figure 1. In general, the survivability rate was calculated as 95.80%. This rate was calculated as 94.70%, 96.77%, 98.91%, and 88.04% for female, male, single, and twin lambs, respectively. In addition, the survival rates of lambs born to 2, 3, 4, and more than 4-year-old dam were calculated as 92.59%, 94.33% and 97.35%, respectively. The survivability rate of lambs from weaning to weaning (95.80%) was similar to the values reported by Koyun (2019), Yavuz (2015), Türkmen (2018), Öztürk and Pembeci (2016), Gül (2012), Elçi (2022), Tüfekci (2023), Tüfekci et al. (2024), Duman et al. (2024), Yağcı et al. (2019) (96.6%; 97.00%; 96.38%; 95.14%; 95.08%; 96.50%; 97.6%; 94%; 96.2%; 97.26, respectively); Uçan (2016), Aktaş et al. (2014) was found to be higher than the values reported by Oğrak (2020) (88.0%; 91.4%; 91.3%, respectively). The fact that the survivability rate obtained is higher than the values determined in some other studies conducted on the same breed can be considered a sign that the conditions of the examined farms are better and that the breeders take better care of their animals.

In terms of yield characteristics, growth is determined by birth weight and live weights at various periods. In this sense, birth weight affects the survivability and growth rate in the early stages of life (Çelik, 2006). The degree of

growth differs in various tissues of the body (Öztürk, 1998). Although growth and development are known as different concepts, they should not be considered separately in terms of an organism. Growth is the change that the organism undergoes from zygote to adult body weight, and the weight increase it shows. Development, on the other hand, is the changes in body structure and shape that the organism undergoes to become capable of performing various tasks (Çulha, 2019). In this study, the effects of farm, type of birth, sex, and age of dam on birth and weaning live weight are given in Table 3.

Table 3. The effect of farm, type of birth, sex, and age of dam on birth and weaning weight
Çizelge 3. İşletme, doğum tipi, cinsiyet, ana yaşının doğum ve sütten kesim ağırlığa etkisi

Factors	n	Birth weight (kg) $\bar{x}$± SX	n	Weaning weight (kg) $\bar{x}$± SX
Overall	643	4.16±0.26	616	21.50±0.30
Farm				
1	121	3.99±0.12 [b]	111	21.92±0.17 [b]
2	142	4.25±0.57 [a]	139	21.91±0.47 [b]
3	117	4.08±0.22 [b]	115	21.80±0.64 [b]
4	117	4.38±0.28 [a]	111	20.80±0.13 [a]
5	146	4.10±0.13 [b]	140	21.09±0.12 [a]
p		<0.001		<0.001
Birth type				
Single	459	4.35±0.55	454	21.63±0.42
Twin	184	3.57±0.14	162	20.99±0.21
p		<0.001		<0.001
Sex				
Female	302	4.07±0.11	286	21.28±0.10
Male	341	4.24±0.48	330	21.70±0.32
p		<0.001		<0.001
Age				
2	135	4.04±0.33[a]	125	21.24±0.23 [a]
3	141	4.11±0.67[a]	133	21.30±0.21 [a]
4 and above	340	4.23±0.42[b]	331	21.66±0.12 [b]
p		<0.001		<0.001

[a, b:] Values in the same column with different letters indicate statistical difference.

Birth weight is one of the leading factors affecting later growth and development characteristics in farm animals (Tüfekci, 2023). The birth weight of Akkaraman lambs obtained in the study was found to be 3.99 kg, 4.25 kg, 4.08 kg, 4.38 kg, and 4.16 kg in the first, second, third, fourth, and fifth farms, respectively. Weaning weights were found to be 21.92 kg, 21.91 kg, 21.80 kg, 20.80 kg, 21.09 kg, and 21.50 kg in the same order (Figure 2). Birth weights of Akkaraman lambs were found as 4.35 kg and 3.47 kg for single and twin, 4.07 kg and 4.24 kg for female and male, 4.04 kg, 4.11 kg, and 4.23 kg for age of dam 2, 3, 4, and above. Weaning weights were determined as 21.63 kg, 20.99 kg, 21.28 kg, 21.70 kg, 21.24 kg, 21.30 kg, 21.66 kg in the same order.

Birth weight has a significant effect on the survivability and growth performance of lambs. The birth weight of Akkaraman lambs obtained in this study (4.16); Aktaş et al. (2014), Yavuz (2015), Türkmen (2018); Noyan & Ceyhan (2021), Elçi (2022), Tüfekci et al. (2024) found similar to the birth weight findings of Akkaraman lambs (4.15 kg, 4.10 kg, 4.29 kg, 4.07 kg, 4.02 kg, 4.15 kg); Koyun (2019), Tüfekci (2023), Özmen et al. (2015), Sakar & Ünal (2021), Şirin et al. (2017), Yağcı et al. (2019) (3.95 kg, 3.71 kg, 3.74 kg, 3.87 kg, 3.43 kg, 3.43 kg) and lower than the birth weight results (4.8 kg, 5.82 kg, 4.55 kg) of Akkaraman lambs obtained in the studies conducted by Akçapınar et al. (2000), Uçan (2016), Gül (2012) on Akkaraman ewes. The weaning weight (21.50 kg) obtained in the study was similar to the weaning weight (75th day) 21.12 kg, obtained by Akçapınar et al. (2000), and higher than the weaning weight (75th day) 19.58 kg, obtained by Tüfekci et al. (2024) in their study on Akkaraman lambs. In addition, the effects of age of dam, sex, and type of birth on weaning age were found to be significant in this study. Similar to the results of the study, Suarez et al. (2000) reported that sex, age of the dam, and birth type were effective on weaning weight in lambs. Sezgin (2019) also reported that the age of the dam, type of birth, and sex had significant effects on weaning live weight in Akkaraman lambs.

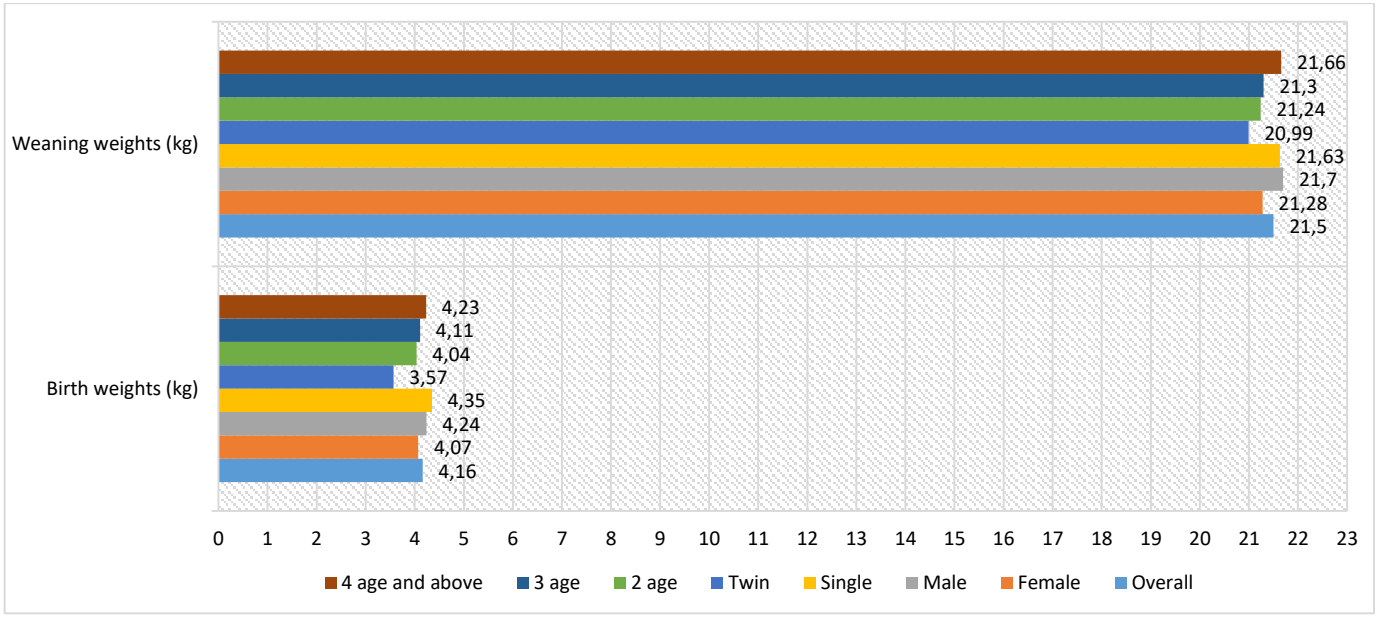
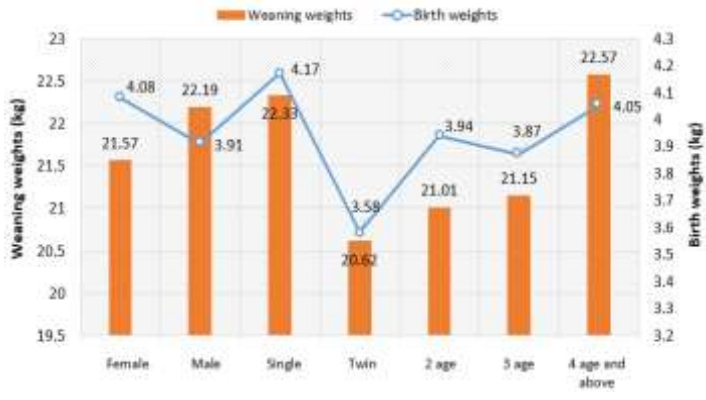


Figure 2. Live weights of lambs at birth and weaning
Şekil 2. Kuzuların doğum ve sütten kesimdeki canlı ağırlıkları

In the results of the study, it was observed that males were heavier than females, singletons were heavier than twins, and lambs born to age of dams aged 4 and over were heavier than lambs born to age of dams aged 2 and 3 (Figure 3). Kutlu et al. (2022) reported that males had higher birth weight than females and singletons had higher birth weight than twins in their study on Akkaraman lambs. Kutlu et al. (2022) found that the effects of age, birth type, sex, and age-birth type-sex interaction on body weight were significant in Akkaraman lambs.



Farm 1

Farm 2

Farm 3

Farm 4

Farm 5

Figure 3. Growth graph of lambs by farm

Şekil 3. İşletmelere göre kuzuların büyüme grafiği

Environmental factors such as age of dam, type of birth, sex, and farm were found to be significant (P<0.001) on birth and weaning weights of lambs obtained in the study. Among the studies conducted on the same breed, Noyan & Ceyhan (2021) found that environmental factors such as age of dam, type of birth, sex, and farm were significant on birth and weaning weights of lambs. Similarly, Tüfekci et al. (2024) found environmental factors such as type of birth, sex and farm to be important on birth and weaning weights of lambs; Ceyhan et al. (2019) found environmental factors such as type of birth, sex and age of dam to be important on birth and weaning weights of lambs. Türkmen & Çak (2021) found that environmental factors such as birth type and sex on birth and weaning weights of lambs were significant, but unlike the results of the same study, the effect of farm factor on birth and weaning live weight was found to be insignificant.

CONCLUSION

As a result, when the obtained data are evaluated, it can be said that the lambing and twinning rates are quite good according to the field conditions, and the infertility rate is at the desired levels. However, as seen in the data of this study, it is seen that flock productivity may vary according to the sensitivity of the farms. Considering the effect of environmental factors on reproductive efficiency and growth, and survivability rate of lambs, improving breeder conditions, being more sensitive about care, feeding, flock management, and animal welfare will provide better results for breeders. Ewes breeding is an indispensable production branch both for our country and for Yozgat province and Şefaatli district. In order to provide optimum level of profit from our domestic breeds that can adapt to the regions where they are located in the best way, it is thought that improving the conditions in the farms, increasing the level of yield per animal, as well as providing trainings to inform and raise awareness of the breeders will contribute to increasing the total amount and quality of production.

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Contribution of Authors

The authors declare that they have contributed equally to the article.

Conflict of Interest

The authors of the article declare that there is no conflict of interest between them.

Ethical Statement

All researchers declared it that "all animal procedures were conducted in accordance with EU Directive for animal experiments (European Union, 2010), ARRIVE guidelines (Kilkenny et al., 2010) and national regulation on the protection of experimental animals used for experimental ".

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