Reproductive and productive characteristics in Bafra (Chios × Karayaka) ewes, growth, carcass performance and survivability of lambs

Características reproductivas y productivas en ovejas Bafra (Chios × Karayaka), crecimiento, rendimiento de la canal y supervivencia de los corderos

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ABSTRACT

This study was carried out on Bafra (Chios × Karayaka) breed to determine the fertility characteristics of sheep, growth performance, survivability and carcass weights of lambs. For this purpose, the reproductive characteristics of 600 sheep aged 2–5 years and the survivability of 1,150 lambs born from these sheep were determined. In addition, the growth performance characteristics, slaughter, and carcass weights of 65 lambs born from 38 randomly selected ewes 3–4 years old were determined. In the study, the pregnancy rate was 90.00%, the birth rate was 87.16%, singleness 15.00%, twins 80.00%, and triplet 5.00%, lamb yield per ewe 1.90, number of lambs per birth 2.20 was calculated. Birth and weaning (90th d) weights as well as 61–90th d of live weight gains of male and female lambs were found as 4.26 and 3.57 kg, 24.15 and 21.32 kg, 265.75 and 231.72 g, respectively. The 120th d survivability, slaughter and carcass weights and carcass yields of lambs were determined as 97.74%, 47.10 kg, 21.61 kg and 45.92%, respectively. As a result, although the Bafra sheep is a breed that can be recommended to be raised in terms of the characteristics discussed, more scientific research is needed on it.

Key words: Bafra sheep; growth performance; reproductive characteristics; lamb; survivability

RESUMEN

Este estudio se llevó a cabo en la raza Bafra (Chios × Karayaka) para determinar las características de fertilidad de las ovejas, el rendimiento del crecimiento, la supervivencia y los pesos de las canales de los corderos. Para ello, se determinaron las características reproductivas de 600 ovejas de 2 a 5 años y la supervivencia de 1.150 corderos nacidos de estas ovejas. Además, se determinaron las características de rendimiento de crecimiento, sacrificio y peso en canal de 65 corderos nacidos de 38 ovejas de 3–4 años seleccionadas al azar. En el estudio, la tasa de preñez fue del 90,00%, la tasa de natalidad fue del 87,16%, los partos unicos del 15,00%, partos dobles del 80,00% y partos triples del 5,00%, la producción de corderos por oveja fue de 1,90, el número de corderos por nacimiento se calculó 2,20. Los pesos al nacer y al destete (día 90), así como las ganancias de peso vivo a los días 61–90 de los corderos machos y hembras correspondieron a 4,26 y 3,57 kg; 24,15 y 21,32 kg; 265,75 y 231,72 g, respectivamente. La supereficiencia del cordero a los 120 días, el peso de la canal y el sacrificio y al rendimiento de la canal de los corderos fueron de 97,74 %, 47,10 kg, 21,61 kg y 45,92 %, respectivamente. Como resultado, aunque la oveja Bafra es una raza que se puede recomendar para ser criada en términos de las características discutidas, se necesita más investigación científica al respecto.

Palabras clave: Ovejas Bafra; rendimiento de crecimiento; características reproductivas; cordero; supervivencia

INTRODUCTION

Sheep (*Ovis aries*) breeding is the most important source of income and nutritional safety for the majority of the rural population, especially in developing Countries[1]. Sheep meat is one of the most important yields obtained from farm animals for human health and consumption[2].

Reproductive performance and survivability of the lambs are among the most important factors that affect the income of sheep breeding. The number of lambs born per ewe is an economically important feature in a farm. Therefore, a lot of effort should be made to care for pregnant sheep and lambs before, during and after breeding. Some of the main factors affecting the viability of lambs are birth type, gender and birth weight. High lamb mortality rates are observed, until weaning in particular[3].

Sheep productivity, ie; the total number or weight of weaned lambs per breeding sheep is an important indicator of lamb production efficiency[4]. Since the profit from lambs depends on the number of lambs growing and developing and their live weight, the lower the number of lamb losses observed until the weaning period, the higher the numbers of fertility criteria in the rearing period become effective economically[5].

The characteristics that determine growth are birth weight and live weight at various periods. Birth weight is important both in terms of its effect on the growth rate of lambs in the postpartum period and in terms of expressing the production power of the mother. Birth weight is higher in the male gender compared to the female gender, and in singlets compared to twins. In addition, birth type plays a more active role in birth weight than gender[6, 7].

Bafra sheep is a breed obtained by crossbreeding the Chios and Karayaka breeds, and this was registered in 2010. In these crossbreeding studies, it was aimed to obtain a new breed by combining the meat quality, high fertility and milk yield characteristics of the Chios breed, and the ability of the Karayaka breed to adapt to the conditions of the Black Sea Region in Türkiye. One of the important features of this breed is that it was obtained using two different indigenous breeds. It is cultivated in the Black Sea, Central Anatolia, Eastern Anatolia, and Aegean and Mediterranean Regions in Türkiye[8].

It was observed in a study that Bafra genotype was generally similar to domestic breeds in terms of fattening performance and carcass characteristics. It has been reported that this genotype is an important contribution to increasing lamb meat production since the fertility of the Bafra genotype is high and the milk yield is at a level that can feed the lambs[9].

Although some studies have been carried out in different regions and places related to Bafra sheep in Türkiye, have not detected sufficient studies to determine the reproductive characteristics, survival power, growth performance and carcass weights under Eastern Anatolia conditions.

This research was conducted to determine the reproductive and productive characteristics of Bafra (Chios × Karayaka) breed sheep and the viability, growth performance, slaughter and carcass weights of the lambs.

MATERIALS AND METHODS

Materials

The animals of the study consisted of Bafra breed sheep and lambs. In the study, the progeny yield characteristics of 600 sheep in the farm with a total of 1,600 animals were determined in the 2020–2021 breeding period. The age range of the ewes was 2–5 years, the number of rams was 40 heads, the age range of rams was 3–7 years, and the frequency of ram change of the farm was 3 years. The ram participation period was between mid–August to the end of October and free overtaking was applied as an overshoot method.

In order to determine the performances birth weight, live weight, growth and survival ability of the lambs in the 120–d growth period, 65 lambs born in the very close period (within 1–2 d) from 38 mothers aged 3–4 years were randomly selected. In addition, 20 lambs were used to determine the slaughter, carcass weight and carcass yields of male lambs aged 180 d.

Methods

Care and feeding of animals

The maintenance and feeding of the sheep were carried out in semi–intensive conditions. Ewes and rams were gradually fed with 500 g of barley and corn mix concentrate feed per animal in addition to pasture (*Medicago sativa*, *Agropyron* spp., *Poa pratensis*, *Trifolium repens*, *Festuca ovina* among others, mix) about two months before the study period. Mating of ewes was carried out by the method of free selection from mid–August to the end of October in 2020. Ewes began to give birth in mid–January 2021, and births continued until mid–March. The lambs were kept with their mothers for 3–4 d after birth, and then separated from their mothers and breastfed twice a d in the morning and evening.

The roughage needs of the ewes were met within the scope of their operating opportunities and the forage needs were met with feed containing 2.600 kcal·kg^{-1} ME (Metabolic Energy) and 16% HP (Crude Protein). From the third week on, the lambs were given dry clover and lamb growth feed containing 2.800 kcal·kg^{-1} ME and 18% HP as incisive feed.

Determination of reproductive characteristics in ewes

The fertility criteria discussed in the study were calculated using the following formulas: Akçapınar[10].

○ *Birth rate in sheep = (number of ewe giving birth / number of ewe under ram),*

○ *Single birth rate = (number of ewe giving birth / number of ewe giving birth),*

○ *Twin birth rate = (number of ewe giving birth to twins / number of ewe giving birth),*

○ *Triple birth rate = (number of ewe giving birth to triplets / number of ewe giving birth),*

○ *Number of lambs to a birth = (number of lambs born / number of ewe giving birth),*

○ *Lamb productivity = (number of lambs born / number of ewe under rams)*

Determination of survivability in lambs

In this study, the survivability of the lambs (number of living lambs / number of lambs born alive) within the weaning period (120th d) were determined.

Determination of growth in lambs

The lambs were weighed and numbered within the first 24 h after birth. Birth weight, birth type, gender of the lambs and the numbers given to the mothers they were born from were recorded. From the second week on, the lambs were given lamb rearing feed starting with 50 g per d, which was gradually increased, as well as dry clover to get used to roughage. The lambs were begun to be taken out to pasture by 90 d and were completely weaned by 120 d.

In the study, the birth weights of the lambs were recorded on Asus Notebook (X542UR–GQ436T Intel® Core i5–8250U, Asus, Taipei) in order to follow the growth characteristics of lambs for 120 d following birth and then their live weights were determined once a month by fasting 12 h prior to weighing. The slaughter weights were determined on the 120th d; a 50 g precision scale (CAS DB II, CAS, Türkiye) was used for weighing.

Determination of slaughter weight and carcass yield of lambs

Some of the male lambs of 180 d of age, raised in the farm, are sold as butchery due to market conditions. For this purpose, 20 lambs that had reached the age of 180 d were randomly selected and the slaughter weights and hot carcass yield values were also determined.

○ *Hot carcass yield = hot carcass weight (kg) / slaughter weight (kg) × 100*

Statistical analysis

Within the scope of the research, the descriptive statistics of the features examined were calculated. For each character, data compliance with the normal distribution analysis was performed. It was evaluated whether they complied with the parametric test assumptions or not. The ewe's reproductive characteristics, lambs' viability, mortality rates, slaughter and carcass weights and carcass yields were calculated.

In the study, the effects of birth type and gender on the birth weight average live weight at various periods and the mean live weight gains of lambs were analyzed using the General Linear Model (GLM) procedure and the two–way variance analysis utilizing the following mathematical model [11]:

Mathematical model:

$y_{ijk} = \mu + a_i + b_j + (ab)_{ij} + e_{ijk}$,

- ♦ y = the observational value of the property under consideration,
- ♦ μ = Mean value among the population
- ♦ a = effect of gender (1: male, 2: female),
- ♦ b = effect of birth type (1: single birth, 2: twin birth, 3: triplet birth),
- ♦ (a*b) = effect of the interaction between gender and birth type,
- ♦ e = random error N, (O, σ2)

The Duncan multiple comparison test was used for multiple groups' comparisons between birth types for the parameters where significance was determined [12]. The SPSS [13] program package was used in all statistical calculations and tests. The significance level was accepted as *P*<0.05

RESULTS AND DISCUSSION

Characteristics of reproductive in ewes

In the study, the pregnancy rate in Bafra ewes was calculated as 90.00%, and the birth rate was calculated as 87.16%. According to the findings obtained, single birth among Bafra ewes was 15.00%, twin birth was 80.00%, triplet birth was 5.00%, lamb productivity per ewe was 1.90 and the number of lambs per birth was 2.20. Some of the fertility characteristics of Bafra ewes identified in the study have been presented in TABLE I.

TABLE I
Reproductive characteristics in Bafra ewes

Variable	n	%
Ewe under ram	600	–
Pregnant ewe	540	–
Conception rate	–	90.00
Sheep giving birth	523	–
Abort rate	17	3.15
Birth rate	–	87.16
Lambs born	1,150	–
Male lamb	603	52.43
Female lamb	547	47.57
Single birth rate	–	15.00
Twin birth rate	–	80.00
Triplet birth rate	–	5.00
Lamb yield	–	190.00
Lambs per birth	2.20	–

In the studies conducted by Adıgüzel Işık and Aksoy [14] and Güngör and Akçapınar [15] in Bafra ewes, the birth rates were determined as 75.24 and 93.1%, respectively. In these studies, single, twin and triplet birth rates were observed to be 37.66, 57.28 and 4.75% in the study of Adıgüzel Işık and Aksoy [14], and as 48.3, 38.3 and 13.4 % by Güngör and Akçapnar [15], respectively. In addition, the lamb yield in Bafra ewes was calculated to be 125.24 and 155.6% by Adıgüzel Işık and Aksoy [14], and Güngör and Akçapınar [15], respectively. On the other hand, the viability in weaning was determined to be 80.0% by Adıgüzel Işık and Aksoy [14].

In a study conducted by Özarslan [16] on Bafra ewes, the birth rate was calculated as 86.70%; the single birth rate was 15.40%, the twin birth rate was 50.00%, and the birth rate of triplets and above was 34.60%.

The birth rate was determined by Ünal *et al.* [17] as 92.3 and 93.7% in Karayaka and Bafra ewes, and 87.0, 77.0 and 31.0% by Notter *et al.* [4] in Romanov–White Dorper × Rambouillet, Polypay and Rambouillet breeds, respectively.

The number of lambs obtained in the Bafra ewes was reported to be 1.66, 2.31 and 1.67 lambs heads by Adıgüzel Işık and Aksoy [14], Özarslan [16] and Güngör and Akçapınar, [15], respectively; it was determined by Ünal *et al.* [17] to be 1.08 and 1.78 heads in Karayaka and Bafra breeds, respectively.

The birth rate determined in this study conducted by us was higher compared to the findings observed in the studies of Adıgüzel Işık ve Aksoy [14], Notter *et al.* [4] and Özarslan [16], and lower compared to the findings observed in the studies of Güngör and Akçapınar [15] and Ünal *et al.* [17].

The single birth rate determined in this study was lower than that determined by Özarslan [16], Adıgüzel Işık and Aksoy [14], Güngör and Akçapınar [15], the twin birth rate was higher than those of all three studies, and the triplet birth rate was higher than that obtained by Adıgüzel Işık and Aksoy [14], and lower than that determined by Güngör and Akçapınar [15] and Özarslan [16].

The lamb productivity and the number of lambs per birth determined in our research were higher compared to some of the literature reports [14, 15, 17], but lower than the value reported by Özarslan [16] for the number of lambs at one birth.

It is thought that the differences determined in the reproductive characteristics between the research material, Bafra ewes and the animal materials of other studies are due to environmental factors such as age, care and feeding and genetic differences. In particular, genetic differences play an important role in the differences with Karayaka, Romanov–White Dorper × Rambouillet, Polypay and Rambouillet breeds.

Survivability in lambs

In the study, the 120th d survivability of Bafra lambs was 97.74% and the mortality levels were 0.43, 1.83 and 2.26% in the 90th, 91st–120th and birth–120th d, respectively. The viability and mortality levels in different periods of Bafra lambs have been presented in TABLE II.

TABLE II
Survivability and mortality levels of Bafra lambs at different periods

Survivability	Mortality					
120th day	90th day		91th–120th day		Birth–120th day	
%	n	%	n	%	N	%
97.74	5	0.43	21	1.83	26	2.26

In the study conducted by Ünal *et al.* [17], the viability of Karayaka and Bafra lambs in weaning (90th d) was 93.6% and 91.9%, respectively, and in the study conducted by Güngör and Akçapınar [15], the Bafra breed was found to have a survivability rate of 86.20 and 84.10% on the 30th and 90th d, respectively.

The 56th d survivability rate of Bafra lambs raised by Yerlikaya [18] in the Elmalı Village of Niğde Province in Turkey was 94.26% in males and 94.17% in females; on the 140th d, it was calculated as 88.52% in male lambs and 93.20% in female lambs, and according to the birth type, the 56th d survival power was 82.50% in single born lambs and 98.04% in twin lambs; the 140th d survival power was 90.00% in single born lambs and 93.13% in twin lambs.

Leeds *et al.* [19] calculated the viability of Columbia, USMARC–Composite, Suffolk and Texel lambs produced from Rambouillet sheep as 87.00, 89.00, 93.00, and 86%, respectively.

The viability determined in the research had a very high rate; it was higher than the viability power detected in the lambs considered in all studies (except for the one identified in twin lambs by Yerlikaya [18]).

In the current research, the mortality rate observed in Bafra lambs on the 91–120th d was higher than the rate in birth–90th d, compared to the mortality rate per d. This period, in which the mortality rate was higher in lambs in the farm indicates a period when lambs began to be taken out to pasture and were close to weaning. It is thought that the deficiencies that probably emerged in terms of herd management may have led to this situation.

According to other breeds and studies that were compared, the low mortality rate and high viability detected in Bafra lambs, which was the animal material of this research, were due to the breed features, as well as to the suitability of the care, feeding and health conditions of the farm and the high interest shown by the mothers to their offspring.

Growth in lambs

In the study, the mean live weights of the lambs at birth and on the 30th, 60th, 90th and the 120th d were determined as 3.93, 9.17, 15.57, 22.80 and 28.40 kg, respectively. The birth weights of male and female lambs were determined as 4.26 and 3.57 kg, respectively. The live weight differences between the male and female lambs were statistically significant ($P<0.05$, $P<0.01$) on d 60, 90 and 120. In the study, the mean birth weight of single–born, twin and triplet lambs were calculated as 4.86, 4.07 and 1.83 kg, respectively. It was found that the effect of birth type on the birth weight of the lambs and their live weight on the 30th, 60th, 90th and 120th d during the breastfeeding period was significant ($P<0.01$). The effect of the interaction between gender and birth type was significant only on live weight values on the 120th d ($P<0.01$).

The effect of gender on live weight gains between birth and days 30, 60, 90 and 120 in lambs was significant ($P<0.05$, $P<0.01$), and it was insignificant on live weight increases between birth and the 30th d ($P>0.05$). The effect of the birth type was statistically significant ($P<0.05$, $P<0.01$) for all periods except for live weight increases between the d of birth and the 60th d. The interaction effect between gender and birth type was also significant only on live weight gains between birth and the 120th d ($P<0.01$).

When the effect of gender on average daily live weight increases in lambs during certain periods was examined, significance was determined only for the increases between d 61–90 ($P<0.01$). In this period, the live weight increases of male and female lambs were determined as 265.75 and 213.72 g, respectively. The effect of birth type has been presented in TABLE V, which was found to be important on live weight increases on birth–30th d and the 61– 90th d ($P<0.05$, $P<0.01$). The mean daily live weight gains of lambs born as single, twin and triplets for d of birth–30th d were 181.55, 175.71 and 157.78 g, respectively, and 287.52, 238.24 and 181.07 g between d 61 and 90, respectively.

The average live weights of Bafra breed lambs according to gender and birth type on d 30, 60, 90 and 120 have been presented in TABLE III, the average live weights gained between birth and d 30, 60, 90 and 120 have been presented in TABLE IV, and the average daily live weight increases on d birth–30, 31–60, 61–90 and 91–120 have been displayed in TABLE V.

TABLE III
Live weights of Bafra lambs according to gender and birth type (kg, mean±standard error)

Factors	n	Birth	30th day	60th day	90th day	120th day
Gender		ns	ns	*	**	**
Male	34	4.26±0.19	9.70±0.26	16.18±0.24	24.15±0.37	29.93±0.65
Female	31	3.57±0.21	8.58±0.24	14.91±0.27	21.32±0.42	26.72±0.38
Birth type		**	**	**	**	**
Single birth	14	4.86±0.30[c]	10.31±0.30[c]	16.53±0.28[b]	25.15±0.55[c]	32.49±1.04[c]
Twin birth	42	4.07±0.12[b]	9.34±0.17[b]	15.77±0.20[b]	22.92±0.28[b]	28.09±0.26[b]
Triplet birth	9	1.83±0.07[a]	6.57±0.18[a]	13.15±0.28[a]	18.58±0.42[a]	23.49±0.30[a]
General	65	3.93±0.15	9.17±0.19	15.57±0.20	22.80±0.33	28.40±0.43
Effect of interaction between gender × type of birth		ns	ns	ns	ns	**

ns: not significative, *: $P<0.05$, **: $P<0.01$, [a, b, c]: Differences between means with different letters in the same column are significant ($P<0.05$)

TABLE IV
Live weight gains of Bafra lambs between birth and certain days according to gender and birth type (kg, mean ± standard error)

Factors	n	Birth–30th day	Birth–60th day	Birth–90th day	Birth–120th day
Gender		ns	*	**	**
Male	34	5.44±0.13	11.92±0.13	19.89±0.27	25.48±0.52
Female	31	5.01±0.05	11.34±0.16	17.75±0.26	23.26±0.25
Birth type		*	ns	**	**
Single birth	14	5.45±0.10[b]	11.67±0.16	20.29±0.48[c]	27.63±0.94[b]
Twin birth	42	5.27±0.10[b]	11.70±0.15	18.85±0.24[b]	23.74±0.22[a]
Triplet birth	9	4.73±0.15[a]	11.32±0.23	16.75±0.37[a]	22.61±0.28[a]
General	65	5.23±0.08	11.64±0.11	18.87±0.23	24.42±0.33
Effect of interaction between gender × type of birth		ns	ns	ns	**

ns: not significative, *: $P<0.05$, **: $P<0.01$, [a, b, c]: Differences between means with different letters in the same column are significant ($P<0.05$)

TABLE V
Daily live weight gains of Bafra lambs according to gender and birth type (g, mean ± standard error)

Factors	n	Birth–30th day	Birth–60th day	Birth–90th day	Birth–120th day
Gender		ns	ns	*	ns
Male	34	181.02±4.34	216.01±3.14	265.75±6.64	192.40±16.52
Female	31	167.09±1.52	210.83±5.34	213.72±9.48	180.24±9.01
Birth type		*	ns	**	ns
Single birth	14	181.55±3.34[b]	207.36±4.23	287.52±11.78[a]	244.57±29.53
Twin birth	42	175.71±3.36[b]	214.33±4.22	238.24±6.99[b]	172.22±9.06
Triplet birth	9	157.78±4.94[a]	219.44±6.78	181.07±7.75[a]	163.52±15.04
General	65	174.49±2.52	213.54±3.02	240.94±6.52	182.60±9.52
Effect of interaction between gender × type of birth		ns	ns	ns	**

ns: not significative, *: $P<0.05$, **: $P<0.01$, [a, b, c]: Differences between means with different letters in the same column are significant ($P<0.05$)

In the study conducted by Yerlikaya [18], the average live weights of Bafra lambs at birth, 56th day and 140th d of age were determined as 3.18±0.05 kg, 12.71±0.22 kg and 24.90±0.35 kg, respectively.

In the study conducted by Adıgüzel Işık and Aksoy [14], the live weight of Bafra lambs on the 30th, 60th, 75th, 120th and 180th d of birth was determined as 3.22±0.06, 6.45±0.13, 9.58±0.23, 12.28±0.28, 15.93±0.47, 22.32±0.67 kg, respectively.

In the study conducted by Ünal et al. [17], the birth, weaning and adjusted live weights on the 180th d in Karayaka and Bafra lambs were determined as 3.10 and 3.70 kg; 19.50 and 22.50 kg; 29.60 and 32.60 kg, respectively.

In this study, the effects of gender and birth type on live weight and live weight increases in the growth period of lambs were generally found to be consistent with the literature reports. However, the live weight of Bafra lambs on different days and periods was found to be higher than those observed in studies conducted on Bafra breed [14, 17, 18]. This situation was found to be quite positive and remarkable. Although the higher live weights detected in the Bafra lambs are thought to have arisen due to the genetic capacity of the breed, it is also known that care, feeding, and the suitability of the conditions may have been effective in the outcome.

Slaughter and carcass weights of lambs, carcass yields

The slaughter and carcass weights and carcass yields of the Bafra lambs on the 180th d have been presented in TABLE VI.

TABLE VI
Slaughter and carcass weights and carcass yields of Bafra lambs (n=20; mean±standard error)

Slaughter weight (kg)	Hot carcass weight (kg)	Hot carcass yield (%)
47.10±0.68	21.61±0.37	45.92±0.56

In a study conducted by Yaranoğlu and Özbeyaz [20], based on 34 and 42 kg slaughter weights, the slaughter weights of Bafra, Akkaraman and Bafra × Akkaraman F1 lambs, where the average live weights were 34 kg, were 33.83±0.06, 34.08±0.10 and 34.20±0.14 kg, respectively. The hot carcass weights of these lambs were 15.14±0.18, 14.99±0.16 and 15.97±0.17 kg, respectively. In the same study, the slaughter weights of Bafra, Akkaraman and Bafra × Akkaraman F1 lambs, whose average weight was 42 kg, were 42.38±0.30, 43.00±0.18 and 43.25±0.10 kg, respectively. The hot carcass weights of these lambs were also 20.34±0.32, 21.08±0.27 and 21.20±0.30 kg, respectively.

In a study conducted by Yakan and Ünal [21], the hot carcass weights in 30, 35, 40 and 45 kg slaughter weight groups in Bafra ewes were 13.57±0.14, 1621±0.16, 18.78±0.33 and 21.50±0.27 kg, respectively, and the hot carcass yields were 44.19, 45.41, 47.16 and 46.90%, respectively.

In another study conducted by Akçapınar et al. [9], the live weights of Bafra male lambs before slaughter were 40.40±0.17 kg, the hot carcass weight was 19.18±0.33 kg, and the hot carcass yield was 47.48±0.17%. Mckibben et al. [22] calculated the hot carcass weights in lambs with Suffolk and Siremax genotypes as 32.31 and 30.57 kg, respectively.

In the current research, the slaughter weight and hot carcass weights of Bafra lambs were found to be higher compared to those observed in the studies of Yaranoğlu and Özbeyaz [20], Yakan and Ünal [21] and Akçapınar *et al*. [9]. However, the hot carcass weights of Bafra lambs found in this research were found to be lower than that observed in the study of Mckibben *et al*. [22] and higher than the values reported by Yakan and Ünal [21] for lambs with a slaughter weight of 30 and 35 kg. However, for lambs with a slaughter weight of 40 and 45 kg, Yakan and Ünal [21] and Akçapınar *et al*. [9] obtained higher hot carcass yield values. The differences observed between the literature reports and the current study results in terms of slaughter and carcass weights and carcass yields of Bafra lambs were suggested to be due to the differences in gender, slaughter age, maternal age, number of lambs, care and feeding, and the differences resulting from the values reported for Suffolk and Siremax lambs were suggested to be due to the effects of environmental factors, as well as the significant genetic factors.

The differences between the slaughter and carcass weights of this research material, Bafra lambs and Akkaraman and Bafra × Akkaraman F1 lambs, which were the materials of the other study, may have been caused by differences in environmental factors such as gender, slaughter age, birth type, mother age, care and feeding and differences in the genotypes.

CONCLUSIONS

It was determined the reproductive characteristics (birt rate, lamb yield, number of lambs per birth) and productive characteristics (the survival power, growth performance and carcass weights) of the Bafra sheep in this study. In terms of the parameters considered, it may be concluded that the Bafra genotype performs well in general, in the conditions of the Eastern Anatolia Region in Türkiye, which is a region different from the original geographical breeding Regions of the parent genotypes of the Sakız and Karayaka breeds. Afterall, although Bafra ewes were brought to the region and the farm only a few years ago, it could be adapted and easily grown in the Malatya Province, and they could be recommended to growers in terms of the characteristics considered and in terms of the sustainability of mutton production.

Ethical statement

In order to carry out the study within the scope of this article, Project Based Ethical Permission No. 2020/73919507–280.01.01–E.907632 was obtained from the Malatya Provincial Directorate of Agriculture and Forestry in Türkiye.

Conflict of interest

The authors declare there is no conflict of interest.

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