



## EFFECTS OF BREEDING PRACTICES ON REPRODUCTIVE EFFICIENCY OF EWES AND FATTENING PERFORMANCE OF LAMBS

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**Abstract:** In this study, the data obtained by questionnaire from small ruminant farms in Tekkeköy district of Samsun province were evaluated. Among the enterprises in the study, 50% of them breed Karayaka sheep, and 33.4% of them breed Bafra sheep. It was determined that 95.8% of the farmers applied flushing before ram siring, 83.3% of the farmers applied feed supplements to the ewes after birth, 95.8% of the farmers applied additional vitamin supplements to the lambs, and 83.3% of the farmers used salt-containing licking stones for the lambs. In the study, internal and external parasites were applied to the lambs to be fattened in all of the farms, and all of them were not released to pasture until sale. Winter lambs were fattened in 91.7% of the farms. The average age of the breeders is 50, and the number of ram sires per year is 1.08 on the farms. The average age of lambs sent to slaughter is 4 months, and the average carcass weight at slaughter is 19.15 kg. Feed supplementation to the ewes after birth and application of salt-containing licking stones to the lambs had a positive effect on the average carcass weight of the fattened lambs. In this study, it was determined that winter lambs were preferred more than summer lambs. According to this result, by fattening winter lambs in this period when there is no pasture opportunity, both seasonal meat needs can be met, and it provides the opportunity to sell at high prices in the winter period. In this case, the small ruminant farms will earn more income.

**Keywords:** Karayaka sheep, Bafra sheep, Winter lamb, Flushing, Fattening, Profitability

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### 1. Introduction

Nutrition has been one of the most important needs of humanity since its existence. The most important of the building blocks of nutrition is the need for protein. Animal products come first in meeting this need. Sheep have met many needs of mankind with their meat, milk, fleece, and skin in every period of history. Although the importance of sheep breeding varies according to countries, it is practiced in many regions of the world and in all regions of our country. Sheep breeding is a livestock breeding branch based mostly on pasture for structural and economic reasons (Çiçek et al., 2022). Sheep breeding is carried out more widely in regions with large meadows and pastures and arid climatic conditions in large and small flocks to the extent of climatic and natural conditions and technical and economic possibilities. The most economical and income-generating livestock for these regions is sheep breeding. It is resistant to adverse environmental conditions and diseases, easy to manage, low-cost, and safe in terms of production. They make good use of vegetation that cattle cannot utilize (Akçapınar, 2000). Sheep farming enterprises in Türkiye are small family farms, settled

village flocks, highland livestock farming, and nomadic livestock farming enterprises (Kaymakçı, 2006). The most important condition for successful sheep breeding is to determine the direction and type of breeding according to the geographical and economic conditions of the region and to choose the appropriate sheep breed or type for the purpose (Gül et al., 2022).

The total sheep population in the Black Sea region is 2.261.719 heads, and there are 33 sheep breeds in 18 provinces. In the region, Karayaka, Akkaraman, and Merino breeds are the most common, and Tuj, Zom, Hamdani, and Koçeri breeds are the least common. Half-fat sheep breeds have adapted to the climate of the region. Thin-tailed sheep breeds are common in the west of the region, and fat-tailed sheep breeds are common in the eastern provinces (Kandemir and Taşkın, 2022). In Samsun province, 16 sheep breeds have been identified (7 of these breeds are combined: 3 are fertility, 2 are meat, 2 are milk, 1 is fleece, and 1 is a meat-dairy breed). The total sheep population of the province is 246,918 heads and has a share of 10.92% in the region (Kandemir and Taşkın, 2022).

The biggest potential in sheep meat production is for the



lambs to be fattened. Determining the technical and economic conditions of lamb fattening and putting them into practice will positively affect the required increase in meat production. This situation is closely related to the number of lambs per ewe that can reach marketing age and the meat production abilities of lambs. Measures such as the live weight and live weight gains of lambs at various periods are meat yield measures. Economic meat production per lamb is largely influenced by breed, age, sex, and some environmental factors (Bozgüllü and Macit, 2022; Uğurlu et al., 2022). Among the general reasons that prevent the production of more meat from lambs, studies have shown that malnutrition is the main environmental factor that causes low yield (Bozgüllü and Macit, 2022; Uğurlu et al., 2022). For this reason, intensive fattening is applied in order to reach the desired level of meat yield and quality in butchery animals in a short time and with the least cost.

When it comes to lamb fattening in our country, male lambs are generally used as material. Females are generally not fattened for meat production (Altın et al., 2005). The fattening performance of male animals is always better than that of female animals, and they provide more and faster live weight gain than females. At the same time, the fattening of the live weight of males is higher than that of females. The meat of male animals is darker and less fatty than the meat of female animals. Because of these characteristics, it is recommended to use male animals for fattening (Yılmaz et al., 2007; Mercan et al., 2022). In addition, female lambs fatten faster than males (Yılmaz et al., 2007).

In intensive fattening, which is one of the lamb fattening methods, lambs are fed immediately after weaning. Approximately 20 kg of carcass can be obtained from lambs that are fed with high-energy (65-70% total digestible nutrients, 16-17% crude protein) rations until 4-5 months of age. Considering the research, as the animal ages, its energy requirement increases, and the amount of feed consumed for high live weight gain increases. As the lambs get older, the feed utilization rate deteriorates, the feed cost increases, and the profitability of fattening decreases. Prolonging the fattening period may cause fatty carcasses and the production of fatty carcasses that are undesirable in terms of market demands and may negatively affect the economics of fattening (Tekel et al., 2007).

In the studies conducted in Türkiye in recent years, it has been observed that lambs of both local breeds and crossbred lambs reached 36–40 kg of live weight, i.e., 17–20 kg of carcass, in 4-5-month-old lambs as a result of 2-3 months of fattening after 2-2.5 months of suckling period (Tekel et al., 2007; Uğurlu et al., 2022).

Different lamb-fattening techniques are applied in different regions of our country. The factors that reveal these differences are the climatic factors of the regions, the structure of the genetic material, and meat consumption habits. The lamb fattening techniques include milk lamb fattening, intensive lamb fattening

following weaning, pasture lamb fattening, and lamb fattening (Koçak, 2009).

The first aim of this study was to determine the effects of breeding practices on the reproductive efficiency and lamb fattening performance of ewes. Also second aim of this study was to examine the lamb breeding model in Tekkeköy district of Samsun province and to determine the effects of breeding practices on early lamb production.

## 2. Materials and Methods

Tekkeköy district is 14 km from Samsun city center and 7 km from Samsun Çarşamba international airport. The Black Sea transit road passes through the district, and it is possible to reach Samsun city center by divided road. There are 63 neighborhoods connected to the district. The Tekkeköy population is 53,247, according to the population registration system. There are Çarşamba district in the east and south of the district, Canik district in the west, Black Sea in the north, and Asarcık district in the southwest. The climate of the Central Black Sea is dominant in the district. Summers are hot and humid, winters are mild, and spring and fall are rainy. The hottest month is August, with an average temperature of 25 °C; the coldest month is January, with an average temperature of 7 °C. Agriculture and animal husbandry are among the important sources of income in the district. One-third of the district's territory is the continuation of the fertile delta plain deposited by Yeşilirmak and is suitable for irrigated agriculture.

As seen in Table 1, Tekkeköy district has an important place in the sheep population of Samsun province, with a rate of 10.33%. The sheep breeds in Tekkeköy district are mostly Karayaka and Bafra sheep, with a small amount of Sakız breed sheep. Karayaka breed: It is a local sheep breed with a thin tail, low milk and fertility, and coarse and mixed fleece, which is raised mostly on the coastline in the Black Sea region. Bafra sheep was obtained by crossbreeding (75% Sakız and 25% Karayaka blood) of Sakız and Karayaka breeds with high milk and reproductive efficiency in Amasya Gökhöyük Agricultural Enterprise Directorate in order to produce high quality and a high amount of lamb meat.

In the animal information system TURKVET records of the Tekkeköy District Directorate of Agriculture and Forestry, 4522 lambs were registered in January 2022. When the number of small ruminants slaughtered at Tekkeköy Municipality Slaughterhouse in 2021 is examined in the table below, it is seen that the average slaughter carcass weight is 18.8 kg. Almost all of the breeders engaged in ovine breeding in Tekkeköy district utilize or sell their lambs within Tekkeköy.

Data on lambs slaughtered in the Tekkeköy Municipality Slaughterhouse in 2021 are given in Table 2. Also, Tekkeköy District Directorate of Agriculture and Forestry Farmer Registration System 2021 agricultural area data are given in Table 3.

**Table 1.** Small ruminant livestock in Samsun districts (TUIK, 2020)

Districts	Sheep (head)	Goat (head)	Total
Alaçam	16.343	1.064	17.407
Asarcık	2.105	240	2.345
Atakum	8.372	721	9.093
Ayvacı	2.741	300	3.041
Bafra	47.102	11.010	58.112
Canık	8.145	290	8.435
Çarşamba	13.438	0	13.438
Havza	21.660	4.050	25.710
İlkadım	4.990	228	5.218
Kavak	11.798	770	12.568
Ladik	18.435	365	18.800
Ondokuzmayıs	4.08	30	4.113
Salıpazarı	2.212	50	2.262
Tekkeköy	24.025	359	24.384
Terme	3.294	0	3.294
Vezirköprü	36.238	6.225	42.463
Yakakent	7.609	1.495	9.104
Total	232.590	27.197	259.787

**Table 2.** Data on lambs slaughtered in the Tekkeköy Municipality Slaughterhouse in 2021

Features	Data
Lambs slaughtered (n)	5112
Total carcass weight (kg)	96.088
Average carcass weight (kg)	18.8
Female animal (n)	63

**Table 3.** Tekkeköy District Directorate of Agriculture and Forestry Farmer Registration System agricultural area data for 2021 (da)

Land types	Field
Agricultural area (excluding pasture)	160.283
Vegetable	1.675
Fruit	96.194
Lying fallow	2.100
Unused agricultural land	16.035
Permanent grassland-moorland	3.181

### 2.1. Statistical Analysis

In the study, the results of one-to-one surveys conducted with 24 breeders in 15 neighborhoods within the borders of Tekkeköy district and data on 3096 ovine animals were used. The survey was conducted face-to-face with sheep breeders within the borders of Tekkeköy district. The survey results were obtained by asking questions about the issues that will directly or indirectly affect sheep breeding and lamb fattening in Tekkeköy

district. The villages and enterprises included in the survey study breeders who sent the lambs obtained in sheep breeding and lamb fattening to slaughter without sending them to pasture were included in the survey. In the evaluation of the data obtained from the questionnaires, frequency analysis and chi-square independent tests were performed using the OMU-licensed SPSS 20.0 version statistical model.

### 3. Results

#### 3.1. Distribution of Sheep Breeds and Breeding Practices in Enterprises

The results of the survey were statistically evaluated, and the distribution of sheep breeds and the results obtained are given in Table 4. When Table 4 is analyzed, the largest share belongs to the Karayaka breed with a rate of 50%, followed by Bafra sheep with 33.3%. In this respect, it was determined that Karayaka sheep is the breed preferred more by the people in the study area.

**Table 4.** Distribution of sheep breeds in the enterprises included in the survey in Tekkeköy district

Breeds	Frequency (n)	%
Karayaka	12	50.0
Karayaka other breed hybrids	2	8.3
Bafra	8	33.4
Sakız	2	8.3
Total	24	100.0

In the study, it was determined that the average age of the breeders was 50 years (Table 5). As can be seen in Table 5, the average number of ewes used in the holdings was 129, the average number of ram sires per year was 1.08, the number of lambs fattened was 11, the age at which lambs started to eat concentrate feed was 30 days, and the amount of concentrate feed consumed by lambs until slaughter was 11,187.5 kg. In addition, the average age at slaughter was 4 months, and the average carcass weight of lambs sent to slaughter was 19.15 kg. The carcass weight findings obtained in the study were similar to those found in different literatures (Duman and Ulutaş, 2018 (14.10 kg); Akçapınar et al., 2002 (18.55 kg)).

**Table 5.** Some data on breeding practices

Features	n	Med.	Min.	Max.	Mean	St. Deviation
Age of grower	24	48	23	82	50.00	12.36
Number of breeding sheep	24	110	50	265	129.00	61.82
Number of ram sires per year	24	1	1	2	1.08	0.28
Number of lambs fattened	24	100	30	250	11.88	63.19
Age/day of lambs starting to eat concentrate feed	24	30	20	45	30.42	5.30
The amount of concentrate feed consumed by lambs until slaughter/kg	24	9250	2000	25.000	11.187.5	6575.4
Age at slaughter of lambs (months)	24	4.25	4	5	4.48	0.50
Average carcass weight/kg of lambs sent to slaughter	24	19.25	17	22	19.15	1.43

**3.2. Flushing Practice in Flocks and Postpartum Feed Supplementation for Mother Ewes**

The results of the questionnaire data evaluated in terms of feed supplementation for ewes after birth are given in Table 6. When Table 6 is analyzed, it is seen that 83.3% of the breeders give supplementary feed to their ewes after birth. When Table 6 is analyzed, 95.8% of the surveyed breeders apply flushing to their flocks before ram siring.

This has a positive effect on the pregnancy rate and lamb yield in flocks.

The results of the questionnaire data evaluated in terms of the application of additional vitamin supplements for lambs are given in Table 6. It was found that 95.8% (23 farms) and 4.2% (1 farm) of the lambs were supplemented with vitamin supplements.

**Table 6.** Data on sheep breeding and lamb feeding practices

Flushing application before ram siring	n	%	Supplementary vitamin supplementation to lambs	n	%
Yes	23	95.8	Yes	23	95.8
No	1	4.2	No	1	4.2
Supplementary feed supplementation to ewes after birth			Supplementary salt supplementation to lambs		
Yes	20	83.3	Yes	20	83.3
No	4	16.7	No	4	16.7
Internal and external parasite application to lambs			Release of lambs to pasture during fattening		
Yes	24	100.00	Yes	0	0.00
No	0	0.00	No	24	100.00
Preference of winter-summer lambs					
Winter lambs	22	91.7			
Summer lambs	2	8.3			

When the reflection of this practice is analyzed in Table 7, lambs with a carcass weight between 18 and 22 kg were obtained with supplementary feed supplementation for the ewes after birth. This practice had positive effects on lamb development. In addition, supplementary feeding to the ewe ewes ensured that the lambs were well fed during the lactation period and improved the carcass weight. As can be seen in Table 6, 23 out of 24 respondents take vitamin supplements. This shows that the lambs received adequate amounts of various vitamins needed during the development period, and as a result, they continued their lives without any negative effects on their growth and development. In the next stage, it is seen that the lambs showed good development in the fattening period and gave satisfactory results in terms of

live weight gain.

According to the answers given to the question about the use of licking stones, 20 out of 24 producers (83.3%) stated that they gave licking stones to their lambs. As shown in Table 7, where the effects of licking stone supplementation on the carcass weight of lambs were evaluated, positive effects of additional mineral supplementation for lambs were observed on the average carcass yield between 18 and 22 kg.

The internal-external parasite control practices applied to the fattened lambs are shown in Table 6. In Table 6, it is seen that all of the breeders who participated in the questionnaire paid attention to internal-external parasite control. It shows that the positive effects of this control method on both feed utilization rate and carcass yield are

adopted by the breeders.

The release of lambs to pasture during the period until sale is shown in Table 6. All of the breeders who participated in the survey stated that lambs were not released to pasture when they were fattened. The reason for this is the concern that the lambs going to the pasture will consume extra energy in the pasture, which will negatively affect the carcass yield. Another important factor in the success of sheep breeders in Tekkeköy is this practice. Lambs gain live weight rapidly in the pen by both sucking their mothers and consuming fattening feed. With this practice, fattening is completed in a shorter time, and better live carcass weights are obtained. The preference of the breeders for winter or summer lambs in the selection of female lambs for breeding is shown in Table 6. While 22 (91.7%) of the 24

respondents preferred winter lambs, 2 (8.3%) preferred summer lambs. The general reason for this situation is that summer lambs are more affected by the heat, and most of the births coincide with the winter months.

### 3.3. The Effect of Feed Supplementation for Ewes and Licking Stone (containing salt) Supplementation for Lambs on Average Carcass Weight After Birth

The carcass averages obtained by the breeders who did and did not make postpartum feed supplementation in ewes and who did and did not make licking stone application to lambs are given in Table 7. When Table 7 is analyzed, it is seen that there are 20 breeders who reported that these practices affected the carcass weight and 4 breeders who reported that they did not.

**Table 7.** The effect of feed supplementation for ewes and licking stone (containing salt) supplementation for lambs on average carcass weight after birth

Average carcass weight/kg	Yes		No	
	n	%	n	%
17.00	0	-	3	100.00
18.00	6	85.7	1	14.3
19.00	2	100.00	0	-
19.50	1	100.00	0	-
20.00	7	100.00	0	-
21.00	3	100.00	0	-
22.00	1	100.00	0	-
Total	20		4	

## 4. Discussion

Karayaka sheep are resistant to the harsh climate and poor pasture conditions of the hills and plateaus in the Black Sea region and local diseases (Cam and Kuran, 2004). It has an important place among domestic sheep in terms of meat production and meat quality (Sen et al., 2011). Karayaka lambs have high meat quality due to the mosaic distribution of fat between muscle fibers (Ulutas et al., 2010). As a result of the study, it can be said that Karayaka sheep is more preferred in terms of meat quality and meeting the meat needs of the region.

Feeding before and during pregnancy in ewes is important for the development of the offspring. Maternal mineral status in ewes, including manganese (Mn), is critical for both fetal growth and newborn lamb health. Adequate levels of minerals should be provided to the pregnant animal to support embryonic and fetal development and prevent losses during pregnancy (Toghdory et al., 2023). In the study, it can be said that sheep breeders in Tekkeköy are more conscious in terms of postnatal feed supplementation and vitamin and mineral applications to lambs.

Breeding practices and environmental effects have important effects on reproductive efficiency and offspring development in sheep breeding. It has been reported in many studies that, especially in pre-shearing body conditions, supplementary feeding and flushing

practices have a positive effect on the concentration of estrus, ovulation rate, fertility rate, early embryo mortality, and lamb survival rate (Hafez et al., 2011; Naqvi et al., 2011; Scaramuzzi et al., 2006). In Yozgat province, it was reported that 8% of the breeders practiced flushing before vaccination (Tüfekci, 2020). It has been reported that flushing application in Kivırcık ewes aggregates estrus and increases lamb yield (Öziş Altınçekiç et al., 2018). In this study, the rate of flushing was high (95.8%). This result was similar to the results of many studies (Hafez et al., 2011; Naqvi et al., 2011; Öziş Altınçekiç et al., 2018; Scaramuzzi et al., 2006).

Vitamins play an important role in the regularity of vital activities in living organisms. It is recommended to be added to feeds for the activity of the female reproductive system, the functions of hormones and enzymes, and the prevention of fouling, early lamb mortality, and lamb development (Yeşil and Sariözkan, 2017). It has been reported that organic Mn consumption during pregnancy in ewes causes a significant increase in plasma Mn concentration in ewes and lambs. It was also reported to significantly increase glucose, insulin, and superoxide dismutase levels and total protein and albumin concentrations in both ewes and lambs. In general, organic Mn nutrition has been reported to improve blood biochemical and hematological factors in ewes and newborn lambs (Toghdory et al., 2023). In this study, it

was determined that the rate of vitamin supplementation in lambs was high.

Lambs fed with organic or inorganic trace mineral supplementation showed higher dry matter intake and growth rate and better feed conversion efficiency ( $P<0.05$ ). It was also reported that the triglyceride ( $P<0.01$ ) concentration was lower and the vitamin B12 concentration was higher in the mineral-supplemented groups. It was stated that feeding with organic trace elements improved growth performance (Samarin et al., 2022). In cases of low growth performance in lambs, deficiencies of several minerals, especially Co, Cu, and Se, should be considered (Helmer et al., 2021). In another study, the rate of oral vitamin and mineral administration as a health protection practice in the flock was found to be 20.2% (Şahin and Olfaz, 2019). In this study, vitamin administration was 95.8% (Table 6). It is seen that vitamin and mineral supplementation is adopted by breeders for the development of lambs and their resistance to diseases.

Tüfekci (2020) reported that all of the breeders in Yozgat province used salt-containing licking stones. In another study, 79.80% used licking stones as health protection practices in the herd (Şahin and Olfaz, 2019). In a study conducted in Elazığ province, 73.1% of the breeders' added salt and minerals to the feed (Köseman et al., 2022). Weakening, growth retardation, anemia, wool discoloration, disease, and mortality were observed in four- and six-month-old lambs due to mineral deficiencies (Helmer et al., 2021). The findings obtained in this study are consistent with those reported in the literature (Şahin and Olfaz, 2019; Tüfekci, 2020; Köseman et al., 2022). The widespread use of licking stones in enterprises shows that the awareness of breeders about feeding has increased.

In a study, Tuj male lambs were vaccinated against internal and external parasites, followed by a one-week feed acclimatization period, and then divided into three groups with 13 lambs in each group. These groups were given ad libitum concentrate feed and 300 g of medium-quality dry meadow grass daily for each lamb, and clean water was kept in front of them during the experiment. At the end of the study, the difference between the groups was found to be significant ( $P<0.05$ ) in terms of anterior shank circumference measured at the middle and end of the experiment in the sixty-day fattening group (Adıgüzel Işık et al., 2023). In ovine animals, internal and external parasites can negatively affect feed utilization and reduce meat yield. For this reason, internal and external parasite treatment should be performed before fattening. In many fattening studies, internal and external parasite applications were performed (Alshamiry et al., 2023; Güngör et al., 2023; Ölmez et al., 2023). The disease rate due to external parasites in Ordu province was 15.9% (Alkan and Türkmen, 2021). Diseases due to internal and external parasites can be seen in different provinces in the Black Sea region. The effect of internal and external parasite

control in the fight against disease agents is important. In this respect, according to the results of the research, it is seen that the breeders in Tekkeköy district adopt internal and external parasite control practices to protect herd health.

In another study, it was reported that lambs were put up for sale in the first 6 months and fed on pasture (Çiçek et al., 2022). In Karayaka ewes, the intensive fattening method is preferred more than semi-intensive and extensive fattening methods in 2-3-month-old lambs (Pala and Gülşen, 2021). Natural lamb rearing is applied in 89.9% of the holdings in Elazığ province (Köseman et al., 2022) and 96.77% in Malatya province (Şeker et al., 2021). In Yozgat province, 24.5% of the holdings gave supplementary feeding to lambs (Tüfekci, 2020). The results of the study are similar to those reported in the literature (Köseman et al., 2022; Şeker et al., 2021; Tüfekci, 2020). In the study, fattened lambs were not released to pasture, and both natural rearing and supplementary feeding were performed.

In a study conducted in Karayaka ewes, it was reported that birth and slaughter performances of lambs born in winter and autumn were similar, but the weaning weight of lambs born in autumn was higher ( $P\leq 0.05$ ) (Sen et al., 2013). In a study investigating the effect of breeding season on meat quality, it was reported that winter lambs had higher carcass quality than lambs born in spring, summer, and autumn (Yalcintan et al., 2017). The fact that live weight gain and meat quality are better in winter lambs, as reported in the literature (Sen et al., 2013; Yalcintan et al., 2017), may cause breeders to prefer winter lamb fattening.

Lambing season (winter and summer) has a significant ( $P\leq 0.005$ ) effect on birth and weaning weights (Ürüşan and Emsen, 2010). In a study on the fattening performance of Kivırcık and Karya ewes, fattening age was determined as the 4th week after birth, fattening period as 10 weeks, and daily live weight gain during fattening was 246 g for males and 185 g for females (Altın et al., 2005). In another study, in terms of fattening performance, the live weights of lambs fed on pasture (33 kg) were higher than those fed in a confined environment (28 kg) from the 15th week to the 32nd week after weaning. Rations supplemented with rumen-protected conjugated linoleic acid are recommended for indoor feeding (Bittante et al., 2021). It has been reported that slaughtering Karayaka lambs or crossbred male lambs in winter may have a positive effect on hot carcass weight without affecting fattening performance (Çam et al., 2007). According to the reports in the literature, it is seen that additional supplements and winter fattening are preferred in closed-system fattening. The age of starting fattening, vitamin and licking stone applications, and winter lamb fattening applied in this study are similar to the literature (Altın et al., 2005; Çam et al., 2007).

It was reported that 90.86% of the farms in Malatya province did not make supplementary feeding but added additional salt and minerals to the feed (Şeker et al.,

2021). In this study, the finding that supplementary feed supplementation to broodstock affected the average carcass weight of lambs was different from that reported by Şeker et al. (2021). This situation shows that the importance of feed supplementation in terms of mother body reserves and offspring nutrition is recognized by breeders.

Minerals have an important place in body functioning. Especially in the bone and skeletal systems, many minerals influence the activation of enzymes. The positive effects of licking stones and mineral supplements are reported in sheep farms where pasture-dependent feeding is done (Tuncer, 2018). The result reported in the study is like that reported by Tuncer (2018).

## 5. Conclusion

As a result of the study, it was determined that approximately 96.0% of the breeders practiced flushing. This practice had a positive effect on reproductive efficiency, birth weight of lambs, and carcass weight obtained because of fattening. Supplementary feed, vitamins, and licking stone supplementation for ewes after birth had a positive effect on the development and live weight gain of lambs and had a positive effect on carcass weights. While 3 of the holdings that obtained 17 kg of carcass weight did not supplement feed, all 7 holdings that obtained 20 kg of carcass weight supplemented feed. Similar results were observed in the enterprises that added licking stones. When the results obtained were evaluated in general, lamb carcass weight was positively affected in the enterprises applying flushing, giving additional feed, vitamins, and licking stones to the broodstock. Most of the farms in the Tekkeköy region do not send their lambs to pasture until slaughter, but they bring their lambs to slaughter in the early winter period and market them with high carcasses and high prices by adding the previously reported positive practices.

## Author Contributions

The percentage of the author(s) contributions is present below. All authors reviewed and approved final version of the manuscript.

	H.T.Ç.	M.O.	T.D.
C	100		
D	100		
S	50	50	
DCP		50	50
DAI	50	30	20
L	50	20	30
W	50	20	30
CR	50	50	
SR	100		
PM	20	50	30
FA		50	50

C=Concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management, FA= funding acquisition.

## Conflict of Interest

The authors declared that there is no conflict of interest.

## Ethical Consideration

The authors confirm that the ethical policies of the journal, as noted on the journal's author guidelines page, have been adhered to. Permission to conduct the study was obtained with the decision of the Ondokuz Mayıs University Social Sciences and Humanities Research Ethics Committee (approval date: August 26, 2022, protocol code: 2022-707).

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