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## The Effect of Different Feeding on Growth in Morkaraman Male Lambs

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**ABSTRACT:** The purpose of this study is to compare concentrated feeding under intensive conditions with the traditional two feed types applied in the Morkaraman lambs feeding in Ağrı province in Turkey. Three groups were formed, having 15 in each with random sampling after the male lambs were weaned (75<sup>th</sup> day), and each group was fed differently. The first group was subjected to traditional day and night sucking besides grazing on pasture, the second group was subjected to *ad-libitum* concentrated feed and hay-clover under intensive conditions, and the third group was subjected to traditional pasture grazing. The average live weights of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> group of Morkaraman male lambs on the 75<sup>th</sup>-day (beginning of feeding) and 135<sup>th</sup>-day (end of feeding), and the overall average were found as 21.27±0.819, 20.65±0.564, 20.57±0.824, 20.83±0.423kg and 33.43±0.727, 35.88±0.875, 26.95±1.084, 32.08±0.765 kg, respectively. Regarding the 75<sup>th</sup>-day live weights, the differences among the three groups were similar and insignificant, the 135<sup>th</sup>-day live weights were similar in the first and second groups, and the differences with the third group were significant (p<0.01). Daily live weight gains on 75-90<sup>th</sup>-days were similar in the first and second groups; the difference with the third group was significant (p<0.01), regarding the 105-120<sup>th</sup> and 120-135<sup>th</sup> days, the differences among the three groups were found statistically significant (p<0.01). This study revealed not only the insufficiency of the lamb feeding on the low-quality pastures but also the inadequacy of the growth of the lambs sucking dams fed on the low-quality pastures and the lambs grazing on these pastures as well. As a result, it was concluded that the concentrated feed under intensive conditions is more efficient for lamb growth; however, feeding the lamb and dam grazing on pasture should be supported by supplementary feeding.

**Keywords:** Morkaraman, live weight gain, lamb growth, pasture, feeding programs

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## INTRODUCTION

The importance of sheep breeding is quite considerable in Turkey in terms of both economic reasons and fulfillment of animal product needs of people. Sheep can utilize meadow and pasture areas which are our natural sources. Usually, they spend a large part of the year on meadow pastures within the bounds of weather conditions. Nowadays, sheep cannot sufficiently benefit from the pasture areas where the quality deteriorates with early and over-grazing. As a result, obtaining sufficient and high-quality products from sheep is impossible.

The Morkaraman Sheep breed is predominantly and commonly raised in Eastern Anatolia. It is Turkey's fat-tailed, in different brown tones, coarse wool mixed type, heavy size, and low meat quality domestic breed. The meat production capabilities of lambs depend on live weight, weight gain, and vigor (Koyuncu and Akgün, 2018). Among the factors affecting growth in lambs is the amount of milk sucked from their mother. It is known that the milk amount is valuable during the first trimester of the lambs. As the age progresses, the feed given besides the milk is also influential (Bhatt et al., 2018). In Turkey, where traditional breeding is dominant, sheep feeding is usually done in an extensive system. The purpose of meat production in lamb feeding is to obtain the highest yield and quality with minimum cost in a short time. For this purpose, lambs are taken to intensive feeding for 2-3 months after weaning (Aytekin, 2015).

To meet the demand for animal protein and meat, the orientation toward meat production in sheep breeding is gaining importance (Boğa and Seçer, 2015). To increase the meat production in sheep breeding, improvement works regarding the standards such as birth weight, weaning weight, pasture-end weight, and live weight gains between these periods are conducted; therefore, lamb meat production has gained importance. The studies increasing the number of offspring and improving the growth and development characteristics of lambs by enhancing their vigor have furthered (Kaymakçı, 2013; Bingöl and Aygün, 2014; Çulha, 2019).

Live weight is one of the most practical parameters in monitoring the health and welfare of sheep. Low live weight significantly reflects poor health conditions in sheep as well (Richmond et al., 2017). In Turkey, various lamb feeding techniques (suckling lamb feeding intensive lamb feeding following wean-

ing, pasture lamb feeding, and yearling lamb feeding) are applied, and the emerging differences are caused by factors such as regional climate factors, the structure of the genetic material and meat consumption habits (Koçak, 2009; Pala and Gülşen, 2021). Intensive lamb feeding is a feeding system made primarily of concentrated feed. The lambs, after weaning, are taken for feeding at 15-20 kg live weight. At the end of this feeding, the live weight varies according to the breeds, and while it is 38-40 kg for the local breeds, it may reach 40-45 kg in crossbreed genotypes (Kor et al., 2009; Pala and Gülşen, 2021). Growth, as a yield trait, is determined by birth weight and the level of live weights at various periods. Birth weight affects survival and growth rate in the early stages of life. Fattening studies are carried out to reach the highest live weight, which is financially advantageous and suitable for the genetic structures of animals (Çulha, 2019). For this reason, there is a need to study on whether supplementary feeding will be made to lambs breeding on pastures, which is practiced widely in the country.

Esenbuğa and Dayıoğlu (2002) found the general averages of birth weight, weaning weight, daily live weight gain until weaning, pasture-end weight, daily live weight gain in pasture 4.10 kg, 16.64 kg, 134 g, 34.39 kg, and 136 g respectively, in their study with Awasi and Morkaraman lambs. In the same study, they also reported that the values related to the same parameters were 4.03 kg, 17.61 kg, 145 g, 35.31 kg, and 143 g for Morkaraman lambs in the same order.

Kopuzlu et al. (2014), in a study they carried out with Morkaraman lambs, determined the birth weight, live weight at pasture, live weight at pasture-end, daily live weight gain until pasture, and daily live weight gain in the pasture as 3.5 kg, 21.4 kg, 37.4 kg, 239 g, and 201 g, respectively.

Birth, pasture, pasture-end weights, and daily live weight gains at pasture-beginning, pasture-end, and pasture of Morkaraman lambs grazing in the pasture were determined as 3.97 kg, 21.63 kg, 39.45 kg, 230.3 g, 226.2 g and 216.0 g, respectively. The effect of the year on pasture-end weight was found to be significant (Kopuzlu & Sezgin, 2017).

To provide correct and conscious feeding in lamb breeding, there is a need for scientific studies on the subject. This study was carried out to determine whether the traditional pasture and pasture + milk feeding types or the concentrated feed under the

intensive conditions applied to Morkaraman breed lambs have more contribution to growth in the butchery lamb breeding.

## MATERIALS AND METHODS

The animal material of the study consisted of 45 male lambs that were born as singletons between 13-17 March 2018 in an enterprise within the scope of the “National Project for Small Ruminant Farming Run by Public” initiated in 2013 in Ağrı province. The lambs were weighed at the 75<sup>th</sup>-day age and weaned and then they were separated into three groups having 15 heads each (Overall  $20.83 \pm 0.423$  kg). The first group was fed with grazing on pasture beside *ad-libitum* sucking in the morning. The evening after the 75<sup>th</sup>-day (feed beginning) age, the second group was fed with *ad-libitum* lamb grower feed (%16 crude protein, 2500 Kcal ME/kg energy, %9.5 crude cellulose, % 6 crude ash) + hay-clover under intensive conditions after the 75<sup>th</sup>-day age, and the third group was fed only with *ad-libitum* grazing on pasture at 75<sup>th</sup>-day (feed beginning) age. The weights of the lambs in each of the three groups were taken every two weeks on an empty stomach (24 hours). All three groups were given water three times a day. At the 135<sup>th</sup>-day (feeding end) age, each of the three groups was sent for slaughter. The dams of the sucker lambs were fed merely with *ad-libitum* grazing on pasture and given water three times a day.

All calculations were done in accordance with the Least Squares Method by using SPSS (2012) package program. In comparing the subgroups' averages, Duncan's multiple comparison tests were applied.

## RESULTS AND DISCUSSION

### Live weights of the lambs in various periods according to different feeding systems

Regarding the different feeding systems on the Morkaraman lambs, the average live weights (kg) re-

lated to the 75<sup>th</sup> (weaning-beginning of feeding), 90<sup>th</sup>, 105<sup>th</sup>, 120<sup>th</sup>, and 135<sup>th</sup> days (end of feeding) are shown in Table 1.

When Table 1 is evaluated, the 75<sup>th</sup>-day age average live weights in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> groups are found as  $21.27 \pm 0.819$ ,  $20.65 \pm 0.564$ , and  $20.57 \pm 0.824$  kg, respectively. The differences among them are insignificant ( $P > 0.05$ ). The 75<sup>th</sup>-day weights, when compared with the results of the other studies conducted with the Morkaraman breed, are seen to be higher (12.85-18.73 kg) than the value reported by Özbey and Akcan (2001 and 2003), Esenbuğa and Dayıoğlu (2002), Arslan et al. (2003), Laçın and Aksoy (2003), Aksakal and Macit (2008), and Kopuzlu et al. (2014), lower (22.49-25.94 kg) than the values reported by Odabaşıoğlu et al. (1996), Küçük et al. (2002) and Bozgüllü and Macit (2022), and similar (20.17 kg) to the value reported by Öztürk et al. (2012).

The average live weights of the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> groups and overall average are found for the 90<sup>th</sup> day as  $25.91 \pm 0.677$ ,  $25.37 \pm 0.471$ ,  $23.12 \pm 0.912$ ,  $24.80 \pm 0.440$  kg, and they are higher (15-23.21 kg) than the values reported for lambs by Şireli et al. (2015), Kopuzlu and Sezgin (2017) (87<sup>th</sup> day), and lower (25.41-27.13 kg) than the values reported by Küçük et al. (2002), Sezenler et al. (2013), Üstüner and Oğan, (2013). The values  $28.51 \pm 0.677$ ,  $28.63 \pm 0.447$ ,  $24.50 \pm 0.984$ ,  $27.21 \pm 0.506$  found for the 105<sup>th</sup> day are higher (17.71-26.40 kg) than the values reported by Odabaşıoğlu et al. (1996), Öztürk et al. (2012). The values  $30.89 \pm 0.682$ ,  $32.06 \pm 0.615$ ,  $25.75 \pm 1.039$ ,  $29.57 \pm 0.612$  found for the 120<sup>th</sup> day are (28.08-28.71 kg) higher than the values reported by Odabaşıoğlu et al. (1996), but similar to the ones reported by Öztürk et al. (2012) and Çulha (2019). The 135<sup>th</sup>-day live weights are similar to the value (32.79 kg) determined by Öztürk et al. (2012), and for the 135<sup>th</sup> day, the values found as  $33.43 \pm 0.727$ ,  $35.88 \pm 0.875$ ,  $26.95 \pm 1.084$  and  $32.08 \pm 0.765$  kg is higher than the live weight

**Table 1.** The Live Weights of the Lambs in Various Periods, kg

Periods	Group 1 $\bar{X} \pm S_x$	Group 2 $\bar{X} \pm S_x$	Group 3 $\bar{X} \pm S_x$	Overall $\bar{X} \pm S_x$	
75 days	$21.27 \pm 0.819$	$20.65 \pm 0.564$	$20.57 \pm 0.824$	$20.83 \pm 0.423$	ns
90 days	$25.91 \pm 0.677^a$	$25.37 \pm 0.471^a$	$23.12 \pm 0.912^b$	$24.80 \pm 0.440$	*
105 days	$28.51 \pm 0.677^a$	$28.63 \pm 0.447^a$	$24.50 \pm 0.984^b$	$27.21 \pm 0.506$	**
120 days	$30.89 \pm 0.682^a$	$32.06 \pm 0.615^a$	$25.75 \pm 1.039^b$	$29.57 \pm 0.612$	**
135 days	$33.43 \pm 0.727^a$	$35.88 \pm 0.875^a$	$26.95 \pm 1.084^b$	$32.08 \pm 0.765$	**

\*\* $P < 0.01$ ; \* $P < 0.05$ ; ns: not significant; a,b,c: Differences between the averages bearing the different letters in the same row are statistically significant.



(32.85 kg) determined by Aksakal and Macit (2008) for the 165<sup>th</sup> day. The 150<sup>th</sup>-day live weight (23.93) was determined by Kopuzlu et al. (2014), and the live weight (23.93 kg) for the 155<sup>th</sup> day was determined by Türkyılmaz (2014). Bozgüllü and Macit (2022), concluded that considering the performance characteristics of merino calves in the pasture, it would be more appropriate not to wean the lambs but to graze on the pasture with their mothers during the pasture. It is thought that the difference in the 135<sup>th</sup>-day lamb live weight values in the research from the other studies might stem from the pasture quality, feeding, and Morkaraman breed variety differences. The differences between the current study and the studies on this subject might occur due to the weaning age, breed or genotype of the animal, the capacity and quality of the pasture grazed, the time the animal stayed in the pasture, and the rearing method or method applied in the pasture.

#### Daily average live weight gains of lambs under the different feeding systems

The different feeding systems on Morkaraman lambs, the least mean squares, and standard error results regarding the daily live weight gains are illustrated in Table 2.

It was found that the live weight (g) gains of the 1<sup>st</sup> and 2<sup>nd</sup> groups between the days of 75-90 and 90-105 were similar and not significant but the difference with the 3<sup>rd</sup> group was significant ( $P < 0.01$ ). Especially in these three groups, the differences between the values of the daily live weight gains found for the day periods 105-120 days, 120-135 days, 75-105 days, 75-120 days, and 75-135 days were determined to be significant ( $P < 0.01$ ). The lambs of the 1<sup>st</sup> and 2<sup>nd</sup> groups differ considerably ( $p < 0.01$ ) from the lambs of the 3<sup>rd</sup> group fed only by grazing on pasture. Regarding

ing their daily live weight gains after the 90<sup>th</sup> day, the difference between the 1<sup>st</sup> group suckling in addition to the pasture and the 2<sup>nd</sup> group fed with the intensive, concentrated feed was significant ( $P < 0.01$ ). This is thought because the feeding of the mothers lactating the lambs depends on the pasture, and the decrease of the nutritive value of the pasture grass in the 7<sup>th</sup> month of the year following the season causes the milk production of the mothers to decrease, and thus the daily milk consumption of the lambs reduces. This situation can be put forward as proof regarding the decrease in the pasture grass production when the 3<sup>rd</sup> group is examined as the daily live weight gain, which was  $170.27 \pm 16.135$  g between 75-90<sup>th</sup> days, decreased to  $79.53 \pm 7.511$  g between 120-135<sup>th</sup> days.

In the study, it is determined that the live weight gains (264.8 g) between 75-90<sup>th</sup> days are higher than the findings (152-217 g) of the studies by Odabaşoğlu et al. (1996), Özbeyve Akcan (2001), Arslan et al. (2003). The live weight gains (160.8 g) between 90-105<sup>th</sup> days is higher than the value (66 g) reported by Odabaşoğlu et al. (1996) and (230.47 g) reported by Özbey and Akcan (2001). The live weight gains between 105-120<sup>th</sup> days are found to be higher (157.24 g) than the value (112 g) reported by Odabaşoğlu et al. (1996).

The 75-135<sup>th</sup> day general live weight gain (187 g) of the lambs is higher than the values of the 75-135<sup>th</sup> day live weight gain (167 g) of Aksakal and Macit (2008), the 75-150<sup>th</sup> day live weight gain (165 g) of Kopuzlu et al. (2014) and 65-155<sup>th</sup> day live weight gain (93 g) of Türkyılmaz (2014) but is lower than the 87-174<sup>th</sup> day live weight gain value (215 g) of Kopuzlu and Sezgin (2017). It is thought that the pasture quality and plant chemical composition discrepancy besides the milk feeding in addition to the pasture might be the reason for the difference in the values in

**Table 2.** The Live Weight Gains of the Lambs in Various Periods, g

Periods	Group 1 $\bar{X} \pm S_x$	Group 2 $\bar{X} \pm S_x$	Group 3 $\bar{X} \pm S_x$	Overall $\bar{X} \pm S_x$	
75-90 days	309.33 $\pm$ 27.927 <sup>a</sup>	314.80 $\pm$ 22.039 <sup>a</sup>	170.27 $\pm$ 16.135 <sup>b</sup>	264.80 $\pm$ 16.233	**
90-105 days	173.40 $\pm$ 19.986 <sup>a</sup>	216.93 $\pm$ 19.701 <sup>a</sup>	92.07 $\pm$ 9.091 <sup>b</sup>	160.80 $\pm$ 12.376	**
105-120 days	159.20 $\pm$ 18.685 <sup>b</sup>	228.93 $\pm$ 19.018 <sup>a</sup>	83.60 $\pm$ 7.415 <sup>c</sup>	157.24 $\pm$ 12.699	**
120-135 days	169.00 $\pm$ 22.748 <sup>b</sup>	254.67 $\pm$ 21.011 <sup>a</sup>	79.53 $\pm$ 7.511 <sup>c</sup>	167.73 $\pm$ 14.963	**
75-90 days	309.33 $\pm$ 27.927 <sup>a</sup>	314.80 $\pm$ 22.039 <sup>a</sup>	170.27 $\pm$ 16.135 <sup>b</sup>	264.80 $\pm$ 16.233	**
75-105 days	279.93 $\pm$ 25.820 <sup>b</sup>	354.27 $\pm$ 25.753 <sup>a</sup>	157.67 $\pm$ 13.209 <sup>c</sup>	263.96 $\pm$ 17.574	**
75-120 days	214.00 $\pm$ 19.015 <sup>a</sup>	253.47 $\pm$ 18.155 <sup>a</sup>	115.33 $\pm$ 9.239 <sup>b</sup>	194.27 $\pm$ 12.612	**
75-135 days	202.73 $\pm$ 18.201 <sup>b</sup>	253.93 $\pm$ 18.243 <sup>a</sup>	106.27 $\pm$ 8.014 <sup>c</sup>	187.64 $\pm$ 12.745	**

\*\* $P < 0.01$ ; \* $P < 0.05$ ; a.b.c: Differences between the averages bearing the different letters in the same row are statistically significant.

the 75-135<sup>th</sup> day live weight gain from the values of the other studies. The reason why these values are determined differently from the other study values; may be due to pasture quality, feeding, and Morkaraman breed varietal differences.

## CONCLUSION

As a result, while the live weights of lambs from the 75<sup>th</sup> day (beginning of the feeding regime) to the 135<sup>th</sup> day (end of the feeding regime) are similar in the 1<sup>st</sup> and 2<sup>nd</sup> groups, it is determined that the live weight of the 2<sup>nd</sup> group lambs are higher than the 1<sup>st</sup> group lambs and the 3<sup>rd</sup> group has lower rise ( $p < 0.01$ ) than the 1<sup>st</sup> and 2<sup>nd</sup> groups. The daily live weight gains of the 1<sup>st</sup> and 2<sup>nd</sup> groups show similarity between 75-105<sup>th</sup> days, the differences regarding the 90-105<sup>th</sup> days between 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> groups, and the differences regarding the 105-120<sup>th</sup> and 120-135<sup>th</sup> periods among 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> groups are found significant ( $p < 0.01$ ).

In the light of these data, it is defined that the lambs of the 2<sup>nd</sup> group fed with the concentrated feed under intensive conditions grew (live weight, daily live weight gains) better than the lambs of the 1<sup>st</sup> group fed by grazing on the low-quality pastures + with milk and the lambs of the 3<sup>rd</sup> group fed only by grazing on the pastures. This study revealed not only the insufficiency of the lamb feeding on the low-quality pastures but also the inadequacy of the growth of the lambs suckling mothers fed on the low-quality pastures and the lambs grazing on these pastures as well. As a result, it is concluded that the concentrated feed under intensive conditions is more efficient for lamb growth; however, feeding the lamb and dam grazing on pasture should be supported by supplementary feeding.

## CONFLICT OF INTEREST

There is no declared conflict of interest.

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