

Some Fertility Traits and Growth Characteristics of Kivircik Sheep Breed in the Extensive Farm Conditions

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Abstract

In this study, fertility traits and growth characteristics of the Kivircik sheep breed have been investigated for two years in the Manisa province of Turkey. Fertility properties such as lambing rate, single birth rate, twinning rate, litter size, survival rate, and growth traits like birth weight, 30th- day, 60th- day, 120th- day weights were calculated and distribution of growth traits according to sex and birth type has analyzed. In the first year of the trial; pregnancy rate, one birth rate, twinning rate, litter size, survival rate (at weaning) has determined respectively 92.20 %, 69.40 %, 30.60 %, 1.32, and 85.10 %. In the same year, the average birth weights of Kivircik male and female lambs are 4.08±0.74 kg and 3.93±0.69 kg, 30th- day weights are 10.57±2.83 kg and 9.83±2.73 kg, 60th- day weights are 21.32±10.36 kg and 19.66±5.46 kg, 120th- day weights are 31.36±7.73 kg and 28.49±6.44 kg. In the second year of the trial; pregnancy rate, one birth rate, twinning rate, litter size, survival rate (at weaning) has determined respectively 94.90 %, 95.80 %, 4.02 %, 1.04, and 88.80 %. In the same year, the average birth weights of Kivircik male and female lambs are 4.22±0.91 kg and 4.00±0.73 kg, 30th-day weights are 11.37±2.25 kg and 10.69±2.09 kg, 60th-day weights are 22.75±4.49 kg and 21.37±4.18 kg, 120th-day weights are 38.40±9.13 kg and 34.37±7.56 kg. At the end of the study, fertility traits except for litter size slightly increased in the second year. This is likely due to higher live weight before mating and better herd management. In both two years, there were significant differences between growth traits (birth weight, 30th-day weights, 60th- day weights, and 120th - day weights) and sex or birth type (P<0.001).

Keywords: Fertility traits, Growth Characteristics, Kivircik, Native Breed.

Introduction

Sheep is one of the first domesticated animals by humans in the historical process. Sheep are always together with humans from the ancient up to this time. Firstly, they hunt wild sheep from the forests and consume their meat, use their sheepskin as clothes, and then after domestication, people have started to breed this animal. Afterward, they use meat, milk, wool, leather, fleece, and manure of sheep for many years. Sheep breeding has been performed concerning big herds, middle and small groups, or two-three heads according to climate and environmental conditions

together with technical and economic conditions. Caring and nutrition of sheep are easy and adaptation capacity is very high. Sheep are usually fed with pasture so that they consume less feed. Sheep is a livestock animal that is economically important for animal production and also for agricultural production. Sheep is easy to care for and feed, and provides so many benefits to humans, has found the chance to spread to almost all countries of the world. It shows itself as the most reliable source and leading production branch of small and family farms, especially in countries with underdeveloped agriculture and poor feeding conditions. ^{1,11}

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According to 2020 data, there is 1.209.467.079 head of sheep in the world. In Turkey, the sheep population has been updated as 42.126.781 as of 2020. It ranks 8th among the world countries in the terms of sheep population.^{11, 17} Sheep meat is considered one of the most popular meats in many parts of the world. The total amount of meat produced in Turkey in 2019 is 1.201.469 tons of which 109.382 tons (9.1%) of this amount are provided from sheep meat.¹⁸ Animal products such as yogurt and high-quality cheeses are obtained from sheep's milk, which is the most valuable and sold in large quantities. The total amount of milk produced in Turkey is 22.960.379 tons of which 1.521.455 tons (6.6%), is sheep milk.¹⁹

There are more than 200 sheep breeds in the world, and so many projects are carefully carried out to obtain new ones every day. In Turkey, 94% of our sheep are domestic, 6% are culture breed and crossbreed. It is possible to combine more than one yield from a sheep. In the selection of the sheep breed, the environmental conditions, market opportunities, and the conditions of the breeder should be taken into consideration together with the yield aspect. Turkey's native sheep breeds show different characteristics from each other in terms of yield and appearance by adapting to the climate, vegetation, geographical structure in different regions. While our fat-tailed breeds are dominant in Central Anatolia, East, and Southeast Anatolia, our thin-tailed breeds are more commonly bred in Aegean, Marmara, and Western Anatolia.^{1, 12}

Kivircik sheep breed is mostly located in Turkey, Bulgaria, and Greece. In Turkey, it is mostly grown in Thrace region, the provinces in the south and east of Marmara (Bursa, Balıkesir, Çanakkale, Sakarya, Kocaeli, İstanbul) and some provinces of the North Aegean Region (Manisa, İzmir, Aydın). The body is covered with white-colored coarse wool. Rarely, there are black marks on the head and feet. These are called 'Belka Kivircik'. There are also black and brown colored Kivircik sheep which are called 'Karbonat Kivircik' and mostly breed in Bulgaria. Males have spiral white-colored horns, females are hornless. Head, neck, abdomen, legs are without wool. Headlong, ears short, neck long and narrow, body long and narrow, rump low and narrow, legs long. The tail is long and thin and extends to the tarsus joint. The body is medium-sized and the live weight is 40-42 kg. Kivircik breed ranks first among Turkey's native breeds in terms of meat quality. Meat quality and taste are very good as the fat is well dispersed between the meat fibers. Lambs that are fattened after weaning grow very quickly, so their lambs are considered suckling lambs.

It can give 17- 18 kg carcass with intensive feeding for two months after weaning.¹

Although there are many studies about fertility traits and growing characteristics for different breeds all over the world, there is limited information in extensive farm conditions. Therefore, this study was carried out to evaluate the fertility and growth characteristics of Kivircik sheep under extensive farm conditions in Manisa province.

Materials and Methods

The research was carried out in Kivircik herds registered to the Sheep and Goat Breeders Association in Manisa province. The material of this study consisted of two-year yield (2013-2014) records of Kivircik sheep and their lambs. Mating in herds was carried out by the free mating method in the period of May- September every year. The father records of the lamb couldn't be obtained but the mother and lamb information was recorded. To follow the growth performance of lambs, at least two live weights were weighed in different months apart from the birth weight. Breeding rams in herds have been used for a maximum of 2 years. Lambs' birth weight was recorded within the first 6 hours of parturition with a 50 g precision scale. In the following period, 2 different weights were taken, one weighing until weaning and one weighing until the marketing period. The 30th, 60th, and 120th- day weights were calculated by interpolation method. In this calculation, using the live weights obtained from weighing the lambs' weights on the 30th, 60th, and 120th-day weights were calculated with the linear interpolation formula given below.¹³

$$A = A1 + [(A2-A1)(Y3-Y1)]/(Y2-Y1)$$

In this formulation;

A= Live weight on the day to be calculated (kg)

A1= Live weight determined of previous weighing (kg)

A2= Live weight determined of next weighing (kg)

Y1= A1 days of age (days)

Y2= A2 days of age (days)

Y3= A days of age (days)

Lambs were separated from their mothers twelve hours before weighing day. Feeders were closed twelve hours before weighing and they were prevented from consuming feed. During the research, fertility traits such as lambing rate, single birth rate, twinning rate, litter size, survival rate were examined by using the birth information of the sheep. 7, 16 In this study, environmental factors whose effects can be measured birth type and gender in terms of weight of lambs in various periods were emphasized and the effects of these factors were determined.

The statistical analysis was performed using the 'General Linear Model (GLM)'. The GLM procedure was used in the SPSS 20.01 package program to investigate the effects of sex (male/ female), type of birth (single/ twin) on the live weight of lambs at different growth periods. Differences between groups were determined by the 'Tukey' test.⁷

Results

Fertility traits such as lambing rate, single birth rate, twinning rate, litter size, the survival rate at weaning of I and II years of the research are shown in Table 1.

Table 1. Fertility Traits of Lambs in I. Year and II. Year

Fertility Traits	I. Year		II. Year	
	N	Rate	N	Rate
Lambing Rate (%)	5007	92.20	4335	94.90
Single Birth Rate (%)	3473	69.40	4154	95.80
Twinning Rate (%)	1534	30.60	181	4.20
Litter Size	6595	1.32	4516	1.04
Survival Rate at Weaning (%)	4259	85.10	4150	88.80

Growth traits like birth weight, 30th-day weight, 60th-day weight, 120th-day weight, average weights, and standard errors are presented in Table 2 and Table 3.

Table 2. Least Mean Squares of Kivircik Lambs Live Weights at Various Period of Growth in I Year

Factor	Birth Weight		30 th -day Weight		60 th -day Weight		120 th -day Weight	
	N	$\bar{X} \pm S\bar{X}$	N	$\bar{X} \pm S\bar{X}$	N	$\bar{X} \pm S\bar{X}$	N	$\bar{X} \pm S\bar{X}$
Birth Type	Single	3473 4.11±0.72 ^a	3381 10.43±2.87 ^a	3240 21.00±9.36 ^a	2964 30.20±7.19 ^a			
	Twin	1480 3.80±0.68 ^b	1380 9.68±2.61 ^b	1292 19.36±5.22 ^b	1248 29.38±7.48 ^b			
	Triplet	54 3.53±0.55 ^c	49 9.74±2.01 ^c	49 19.49±4.02 ^c	47 28.50±5.05 ^c			
Sex	Male	2527 4.08±0.74 ^a	2437 10.57±2.83 ^a	2334 21.32±10.36 ^a	2163 31.36±7.73 ^a			
	Female	2480 3.93±0.69 ^b	2373 9.83±2.73 ^b	2247 19.66±5.46 ^b	2096 28.49±6.44 ^b			
GENERAL	5007	3.89±0.68	4810	10.05±2.61	46581	20.17±6.88	4259	29.59±6.78

a, b, c; Letters in the same column and same traits indicate statistical significance (P<0.001)

Table 3. Least Mean Squares of Kivircik Lambs Live Weights at Various Period of Growth in II Year

Factor	Birth Weight		30 th -day Weight		60 th -day Weight		120 th -day Weight	
	N	$\bar{X} \pm S\bar{X}$	N	$\bar{X} \pm S\bar{X}$	N	$\bar{X} \pm S\bar{X}$	N	$\bar{X} \pm S\bar{X}$
Birth Type	Single	4154 4.11±0.84 ^a	3933 11.04±2.20 ^a	3899 22.10±4.40 ^a	3736 36.43±8.60 ^a			
	Twin	181 4.03±0.70 ^b	153 10.60±2.10 ^b	153 21.21±4.19 ^b	135 35.37±8.90 ^b			
	Male	2176 4.22±0.91 ^a	2046 11.37±2.25 ^a	2029 22.75±4.49 ^a	1940 38.40±9.13 ^a			
Sex	Female	2159 4.00±0.73 ^b	2040 10.69±2.09 ^b	2023 21.37±4.18 ^b	1931 34.37±7.56 ^b			
	General	4335 4.09±0.80	4086 10.93±2.16	4052 21.86±4.32	3871 36.14±8.55			

a, b; Letters in the same column and same traits indicate statistical significance (P<0.001)

In this study, fertility traits except for litter size slightly increased in the second year. In addition, there is a statistically significant difference between groups according to birth and gender type in terms of 30th- day, 60th- day, 120th-day weights both in two years (P< 0.001).

Discussion

In this study, fertility traits have been determined to be

higher in II years than I year except for twinning rate and litter size. This may be due to the introduction of breeding conditions, more effective culling before breed selection, and better herd management. In addition, the herd replacement rate is higher than 20.00% in this study. So the average animal age in the second year is lower than the first year. The number of animals in the second year is less than in the first year. The main reason for this is that effective culling and takes out those who don't morphologically represent the Kivircik breed. In the second year, farmers are more experienced and early intervention of the breeders to health problems during the research make the survival rate higher than the first year.

In the literature; lambing rate has reported 87.00 % Özbey et al.¹⁴ in Kivircik x Morkaraman sheep, 74.63 % Altinel et al.³, 91.94% Demir et al.⁸, 75.00 % Özcan et al.¹⁵, 79.80 % Ceyhan et al.⁵ in Kivircik sheep. If we compare these results with our research we can see that it is mostly lower and similar. Single birth rate has calculated 80.40 % Yilmaz et al.²¹, 50.00 % Özbey et al.¹⁴, 58.00 % Altinel et al.⁴, 66.66 % Özcan et al.¹⁵ in Kivircik sheep. Similarly, it is higher than our results in the 1st year but lower than the 2nd year. The weaning age for survival rates was reported to be 96.70 % at 90th day by Yilmaz et al.²¹, 89.51 % by Altinel et al.³, 92.96 % at 75th day by Demir et al.⁸, 97.00 % by Ceyhan et al.⁵ and it is similar for both two years with our study.

Regarding growth characteristics; birth weight was calculated 4.49 kg Alarslan et al.², 4.09 kg Ceyhan et al.⁵, 4.34 kg Yakan et al.²⁰ higher and 4.08 kg Ekiz et al.⁹ similar with and 3.45 kg Ceyhan et al.⁶ lower than our research; 30th-day weights were 10.20 kg Altinel et al.⁴ and similar with our study, 60th-day weights were 17.38 kg Altinel et al.⁴, 13.94 kg Alarslan et al.² and lower than our study, 120th-day weights were 28.58 kg Alarslan et al.² and lower than our research in Kivircik sheep.

Conclusion

This study is considered as a starting point to evaluate fertility traits and growth performances in extensive conditions of our native sheep breeds. This will be a source for other researches in the following years. In terms of all the yield characteristics examined in our study, it was determined that Kivircik performed a similar performance in Manisa as well as it showed in other regions. It has been shown that the Kivircik sheep breed has good adaptability, is resistant to climate conditions, and successfully breeds in the provinces of the Aegean Region as in other native sheep breeds.

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