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BREEDING OF AKKARAMAN SHEEP IN TOKAT

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Abstract: This study was carried out in Akkaraman sheep breed in Tokat province, which is within the scope of The National Sheep and Goat Breeding Project. In this study, some reproductive traits of Akkaraman sheep and live weights of lambs were determined. In this study, the data of 28797 sheep and 25983 lambs between the years 2017-2021 were used. The average birth weight was 4.14 kg in the 5-year period. The birth weight according to the years was determined as 4.31, 3.85, 4.13, 3.92 and 4.25 kg, respectively. Mean birth weights vary according to year, maternal age, birth type and sex (P<0.01). The average weaning weight was determined as 30.85 kg. Average weaning weights vary according to year, maternal age, birth type and sex (P<0.01). Lambing rate was found to be 85% on average. Litter size is 0.89. Fecudity was 1.05. Infertility rate was determined as 15 %. The average survival rate was determined as 93%. As a result, it has been revealed that there have been improvements in terms of live weight and fertility in herds over the years.

1. Introduction

Sheep is one of the first domesticated animals and the domestication process took place in Central Anatolia (Zeder, 2008). Sheep breeding is carried out in a wide area in the world (Zeder, 2008). There are 40 sheep breeds in our country (FAO, 2017) and there are 31 million sheep (TUIK, 2017). It has been revealed that native breeds adapted to their region are resistant to diseases and can high production in poor environmental conditions (Hoffmann, 2013). Although there are local sheep breeds in different regions of Türkiye (FAO, 2017), Akkaraman breed constitutes about half of the total sheep population (Akçapınar, 2000). Akkaraman sheep is a fat-tailed domestic breed that is resistant to diseases and has a high adaptation to bad environmental conditions (Akcapinar, 2000). There are types named as Kangal, Şavak and Karakaş in Akkaraman breed.

Until recently, there was no systematically applied breeding program in the Akkaraman breed. For this reason, selection was made according to morphological characteristics (Ceyhan et al., 2019). Sheep is generally carried out under poor pasture conditions in Türkiye. For this reason, the genetic potential of animals is insufficient (Biçer et al., 2019). The inclusion of the Akkaraman breed in the national breeding program initiated a selection practice based on yield records.

Birth weight is one of the parameters that determine the survival rate of lambs. Weaning weight affects the fattening performance. Birth and infertility rates in Akkaraman sheep was 86% (Başpınar, 1985) and 4.7% (Güney, 1979), respectively. Fecundity in Akkaraman breed was 1.95 (Güney, 1979). Birth and weaning weight in Akkaraman sheep was 4.71 and 23.69 kg, respectively (Özbey et al., 2000). It was aimed to determine the some fertility traits in Akkaraman sheep and live weights of lambs from birth to weaning within the scope of the breeding project carried out in Tokat.

2. Materials and Methods

In this study, data belonging to the national sheep and goat breeding project supported by General Directorate of Agricultural Research and Policies (TAGEM) were used. In this context were kept yield records of 28870 sheep and 25603 lambs between the years 2017-2021 in Tokat province. Sex, maternal number, maternal age, date of birth, type of birth, weaning weight (90th day) and birth weight of the lambs were recorded. The numbers of the animal material used within the scope of the project are given in Table 1.

The formulas below were used to determine fertility levels;

Lambing rate: (ewes lambed/ ewes mated) × 100

Infertility rate: infertile ewes/ ewes exposed × 100

Fecundity: lambs born/ ewes mated

Litter size: lambs born/ number of lambing ewes

Survival rate (%) (90th day): number of living lambs/number of lambs born x 100

Lambs were weaned at 90 days of age. Estimation of weaning weights;

Estimate weight (90th): Lamb live weight – b x (lamb's age at weigh– 90)

b: regression co-efficient

The data were subjected to analysis of variance in Minitab 13.0 program. Means were subjected to the Tukey multiple comparison test.

3. Results

Birth weight, weaning weight and daily live weight gain by year, maternal age, birth type and sex are given in Table 2. The highest birth weight was reached in 2017 and 2021 (P<0.01). It was determined that lambs obtained from 2-year-old mothers who gave their first birth had the lowest birth weight (P<0.01). It was determined that single lambs had higher birth weights than twin lambs (P<0.01). Male lambs have higher birth weights than female lambs (P<0.01).

Weaning weight was determined as 30.85 kg on average. In terms of weaning weight, single were higher than twins and males were higher than females (P<0.01). The daily live weight gain reached the highest level as 227.9 kg in 2021 (P<0.01). It has been determined that the daily live weight gain is higher in males than females and single than twin (P<0.01).

Some reproductive traits and survival rate in Akkaraman sheep are given in Table 3. The highest lambing rate was determined as 89 %. In this study, fecundity was 0.89. In this study, litter size was 1.05. The survival rate of the lambs on the 90th day was determined as 93 %.

Table 1. Number of animals by year

Year	Number of sheep	Number of lambing sheep	Number of lambs born	Number of lambs at weaning
2017	5900	4374	5042	4308
2018	5670	4986	4308	4273
2019	5670	4944	5679	5397
2020	5815	5178	5660	5206
2021	5815	5025	4914	4596
Total	28870	24507	25603	23708

Table 2. Birth, weaning weights and average daily weight gain by year, maternal age, birth type and sex

	Birth Weight (kg)		Weaning weight (kg)		Average Daily Weight Gain (gr)	
	n	$\bar{X}\pm Sx$	n	$\bar{X}\pm Sx$	n	$\bar{X}\pm Sx$
Avarage	28797	4,14±0,03	25983	30,85±0,6	25983	239,3±6,04
Year	**		**		**	
2017	6790	4,31±0,02[a]	4240	30,05±0,7[a]	4240	242,7±8,9[a]
2018	5779	3,85±0,04[b]	5315	31,12±0,8[b]	5315	243,1±7,4[a]
2019	5679	4,13±0,03[c]	5397	31,60±0,9[b]	5397	215,8±6,9[b]
2020	5635	3,92±0,02[d]	5435	27,52±0,6[c]	5435	215,6±8,1[b]
2021	4914	4,25±0,04[a]	4596	31,05±06[b]	4596	227,9±6,7[c]
Maternal Age	**		**		**	
2	5530	3,92±0,02[a]	4234	31,39±0,6[a]	4234	232,1±5,2[a]
3	6396	4,21±0,04[b]	6181	32,87±0,6[b]	6181	218,8±6,1[b]
4	6947	4,39±0,03[b]	6745	30,05±0.7[c]	6745	256,7±7,9[c]
5	6919	4,37±0,05[b]	5754	30,99±0,8[a]	5754	260,3±7,5[c]
6	3005	4,18±0,05[b]	3069	31,37±0,6[a]	3069	217,8±6,6[b]
Birth type	**		**		**	
Single	14464	4,21±0,02[a]	20800	30,27±0,2[a]	20800	239,55±6,9[a]
Twin	5369	3,60±0,03[b]	5113	29,05±0,3[b]	5113	228,10±6,5[b]
Sex	**		**		**	
Male	14464	4,10±0,04[a]	13541	30,98±0,4[a]	13541	231,24±5,3[a]
Female	14333	3,38±0,04[b]	12442	28,15±0,6[b]	12442	210,6±5,1[b]

** The differences between the averages shown with different letters in the same column are very significant (P<0.01).

Table 3. Some reproductive traits and survival rates.

Year	Lambing Rate (%)	Fecundity	Litter Size	Infertility Rate (%)	Survival Rate (90th) (%)
2017	74	0.85	1.15	26	85
2018	87	0.76	0.86	13	99
2019	88	1.00	1.15	12	95
2020	89	0.97	1.09	11	92
2021	86	0.85	0.98	14	94

4. Discussion

Environmental factors such as maternal age, birth type, sex and gestational feeding period also affect birth weight (Akçapınar, 2000). In a study, it was determined that the birth weight of Akkaraman lambs was 4.71 kg (Özbey et al., 2000). The birth weight obtained in the study by Özbey et al., (2000) is similar to the birth weight obtained in this study.

There is also the effect of the mother on the weaning weight along with the feeding. In a study, it was determined that the weaning weight (90th day) of Akkaraman lambs was 23.69 kg (Özbey et al., 2000). The weaning weight obtained in the study by Özbey et al., (2000) was lower to the weaning weight obtained in this study. In the study conducted in Akkaraman breed determined that the average daily weight gain was determined 0.220 kg (Mis ve Öztürk, 2018). This result is similar to the daily weight gain obtained in our study. In another study, the average weight gain in male lambs was found to be 0,171 kg (Turkmen ve Cak, 2021).

In the study conducted determined that the survival rate ranged between 80 % and 100 % in Akkaraman sheep (Tekerli et al., 2002). The 90th day survival rates obtained in this study are an acceptable range for Akkaraman breed. Acceptable values for infertility rate are between 5 % and 8 % (Kaymakçı and Taşkın, 1997). The infertility rate was above the expected values. It is thought that the high infertility rate is due to environmental factors. In the study conducted by Demiral and İşcan (2012) was determined between 1.00 and 1.29. The low fertility rate is due to the high infertility rate.

In another study, litter size was determined as 1.33 (Tekerli et. al., 2002). The reason for this low rate is due to the lower rate of twin births. In order to increase this rate, it is necessary to perform flushing before mating. It can be said that the survival rate determined in this study is above the average survival rate rates determined in other studies (Tekerli et al., 2022) for Akkaraman lambs. High survival rate indicates that the maintenance and feeding conditions are sufficient for lambs until the 90th day.

5. Conclusion

It has been determined that the birth weight and daily weight gain have varied over the years with the applied breeding program. However, there was variation in weaning weight. It is seen that the infertility rate is well above the accepted value. The reason for this situation is thought to be due to environmental conditions. Therefore, environmental factors (especially pasture) should be improved on a herd basis in order to reduce the infertility rate.

Author Contributions

The percentage of the author contributions is presented below. The author reviewed and approved the final version of the manuscript.

	E.Ş.
C	100
D	100
S	100
DCP	100
DAI	100
L	100
W	100
CR	100
SR	100
PM	100
FA	100

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 author declared that there is no conflict of interest.

Ethical Consideration

Ethics committee approval was not required for this study because of there was no study on animals or humans. The data used in the study were obtained from the "National Project of Ovine Breeding in Public" courtesy of TAGEM.

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