

The Effects of Early Age Mating on Some Production Traits of Bafra (Chios X Karayaka B₁) Sheep

Halil AKÇAPINAR, Necmettin ÜNAL*, Fatih ATASOY
Department of Animal Breeding, Faculty of Veterinary Medicine, Ankara University,
06110 Dışkapı, Ankara - TURKEY

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Abstract: The purpose of this study was to investigate the effects of early age mating on reproductive traits and survival rate and lamb growth of Bafra sheep. The animals used in the study were divided into two groups (Group I and Group II) according to age of animals. The animals in Group I, 344 ewe lambs, were about 10 months of age, while the animals in Group II, 174 yearlings, were about 18 months of age. The same feeding and management conditions were practised for both groups during mating season and pregnancy and lactation periods. The pre-mating live weights were 43.53 and 50.31 kg ($P < 0.001$) for Group I and Group II, respectively. The results for reproductive traits were 85.8% and 91.4% for birth rates, and 1.54 and 1.67 for litter size for Group I and Group II, respectively. The survival rates of the lambs from Group I and Group II at weaning (90 days) were 95.4% and 95.1%, respectively. The least squares means for the lambs in the groups were 3.5 and 3.9 kg for birth weight, 18.3 and 21.2 kg for weaning weight and 26.1 and 31.1 kg for 180 days weights ($P < 0.001$), respectively. The study concluded that early age mating in Bafra sheep negatively affected lamb production and growth of lambs while it did not negatively affect birth rates or litter size of sheep, or survival rates of lambs.

Key Words: Sheep, early age mating, fertility, survival rate, growth

Bafra (Sakız X Karayaka G1) Genotipinde Erken Yaşta Damızlıkta Kullanmanın Bazı Verim Özellikleri Üzerine Etkileri

Özet: Bafra genotipinde erken yaşta damızlıkta kullanmanın döl verimi, kuzularda yaşama gücü ve büyüme üzerine etkileri araştırılmıştır. Araştırmanın hayvan materyali yaşa göre iki gruba ayrılmış (Grup I ve Grup II), Grup I ortalama 10 aylık 344 baş dişi kuzu ve Grup II ise ortalama 18 aylık 174 baş dişi tokludan oluşmuştur. Her iki grupta da çiftleştirme, gebelik ve laktasyon dönemlerinde benzer bakım ve besleme şartları uygulanmıştır. Grup I ve Grup II de çiftleştirme öncesi ortalama canlı ağırlık 43,53 ve 50,31 kg ($P < 0,001$), doğum oranı % 85,8 ve 91,4; bir doğuma kuzu sayısı 1,54 ve 1,67 olmuştur. Grup I ve Grup II'den elde edilen kuzularda sütten kesimde (90. gün) yaşama gücü % 95,4 ve 95,1 bulunmuştur. Kuzularda doğum, sütten kesim ve 180. gün en küçük kareler canlı ağırlıkları sırasıyla 3,5 ve 3,9 kg; 18,3 ve 21,2 kg; 26,1 ve 31,1 kg dir ($P < 0,001$). Araştırma sonucunda Bafra genotipinde erken yaşta damızlıkta kullanmanın etkisi, kuzu verimi ve kuzularda büyüme üzerine olumsuz olurken; doğum oranı, bir doğuma kuzu sayısı ve kuzularda yaşama gücü üzerine olumsuz olmamıştır.

Anahtar Sözcükler: Koyun, erken yaşta damızlıkta kullanma, döl verimi, yaşama gücü, büyüme

Introduction

Sheep breeding has always been of great importance in the economy of Turkey and in the nutrition of people. It occupies a unique role in the utilisation of the vast areas of grazing land throughout Turkey. In 2003, 25.2 million sheep in the country yielded 267 thousand tons of meat and 770 thousand tons of milk (1).

There are a lot of local sheep breeds in Turkey. Many breeds are double or triple purpose breeds unspecialised

for any one type of production. Exceptions are the Chios breed noted for a high reproductive performance and milk yield, and Kıvrıkcık breed noted for good meat quality.

The Chios breed is raised in the western coastal regions of Turkey. It is poorly adapted in other parts of the country. It is well known for its high milk yield, early sexual maturity and outstanding prolificacy. The Karayaka is an indigenous breed of Black Sea Region.

* unal@veterinary.ankara.edu.tr

Productive performances of the breed are generally low except meat quality (2,3).

The Chios breed as an improver has been used for developing new prolific types in commercial crossbreeding system. The breed was crossed with some local breeds such as Dağlıç (4), İvesi (5), Karayaka (6-9), Kivırcık (10,11), and Akkaraman (12,13). It was reported that the crossbreeds between Chios and local breeds had generally high reproductive performance and milk yield (4,5,8,14).

Age at first mating of local sheep breeds is normally 18 months for both males and females. Early age mating reduces the unproductive phase of the sheep's life and may, therefore, increase income. It is known that early age mating increases lifetime production in sheep. Longevity, defined as the productive life in a sheep herd, is important in Turkey since animals reach sexual maturity later in life, and therefore the longer ewes remain productive, the higher they supply products per year in their productive life.

A crossbred genotype of sheep (Chios x Karayaka B₁), called Bafra, was developed to increase lamb yield. It was determined that the live weights for Karayaka and Bafra were 48.4 and 55.0 kg for yearlings, and 51.1 and 61.3 kg for breeding ewes, respectively (9). A study by Ünal et al. (8) investigated some production traits of Karayaka and Bafra genotype. The results were 92.3% and 93.7% for birth rates, 1.08 and 1.78 for litter size, 93.6% and 91.9% for survival rates of lambs at weaning (90 days), 19.5 and 22.5 kg for weaning weight, and 29.6 and 32.6 kg for 180th day weight, respectively.

The purpose of the study was to investigate the effects of early age mating on reproductive traits, survival rate and lamb growth of Bafra genotype.

Materials and Methods

The study was carried out at the Gökhöyük State Farm in the Middle – Black Sea Region of Turkey in 2001 and 2002. The farm has a mixture of Black Sea and semiarid continental climate conditions. The animals in the study consisted of Bafra (Chios x Karayaka B₁) rams, ewe lambs, yearlings and their lambs.

The breeding animals of the study were divided into two groups (Group I and Group II) according to age of animals. The animals in Group I, 344 ewe lambs, were

about 10 months of age while the animals in Group II, 174 yearlings, were about 18 months of age. A total of 21 mature rams were introduced into Group I and II from October 1 to November 15 in 2001, and 25 females were allocated to one ram in both groups. The rams were kept in the groups during the mating season. The groups were kept indoors during the winter and they were fed alfalfa hay ad libitum. When the weather conditions improved, they were taken to pasture. Before the mating season, about 500 g/head of concentrate feed was given daily to Groups I and II. A similar feeding was also carried out to prepare the animals for parturition while about 750 g/head of concentrate feed was given daily in lactation period. The concentrate feed included 65% of Barley, 12.5% of Wheat Bran, 20% of Sunflower Meal, 1.5% of Limestone, 0.5% of Salt and 0.5% of Vitamins – Minerals Premix.

Lambing took place in March and April. The lambs remained with their dams in individual boxes for three days after birth. Then a flock of suckling lambs and a flock of their dams were formed. The lambs were allowed to suckle their mothers twice a day. Starting at 2 weeks of age, good quality alfalfa hay and lamb starter were given to the lambs ad libitum for 2 months. After this period, the roughage was provided ad libitum, but the concentrate feed was about 200 g per lamb per day. The lambs were weaned at 90 days of age. After weaning, male and female lambs were reared separately.

The live weights of the breeding animals were taken before mating season. The fertility traits of the animals were determined for each group. The survival rates of the lambs were evaluated until the weaning age because some of the lambs were sold after weaning.

The birth weights of the lambs were taken within 12 hours of birth with a scale sensitive to 50 g. The live weights of the lambs were taken monthly with a scale sensitive to 100 g until the lambs were 6 months of age. The absolute 45th, 90th and 180th day live weights of the lambs were calculated by the interpolation method.

The differences of the live weights at pre-mating season between Group I and II were tested by Student's t test. Some fertility characteristics and survival rate were tested by chi-square test while lamb production and litter size were tested by Mann-Whitney U test. The effects of some environmental factors which affect the growth of the lambs were determined by using the least squares

means method and the significances between the groups were determined with Duncan's multiple test (15). SPSS was used for statistical analysis of the data (16).

Results

Live weights

The average live weights at pre-mating season in Groups I and II were 43.53 and 50.31 kg, respectively (Table 1). The difference between Groups I and II was highly significant ($P < 0.001$).

Table 1. Mean live weights (\pm SE) of the ewe lambs (Group I) and yearlings (Group II) at pre-mating season (kg).

Mating Groups	n	Pre-mating live weights $\bar{X} \pm S\bar{x}$
Group I	344	43.53 \pm 0.35
Group II	174	50.31 \pm 0.79
t Test		***

*** : $P < 0.001$

Reproductive Traits

The results of the reproductive traits obtained from the study are presented in Table 2. The results were

85.8% and 91.4% for birth rates, 52.2% and 44.7% for single birth rates, 47.8% and 55.4% for multiple birth rates, 1.32 and 1.52 for lamb production ($P < 0.01$), and 1.54 and 1.67 for litter size for Groups I and II, respectively.

Survival of the Lambs

The survival rates of 720 live born lambs are given in Table 3. The survival rates of the lambs of Groups I and II ewes at weaning (90th day) were 95.4% and 95.1%, respectively. Triple born lambs had the lowest survival rates and differences among the birth type groups were highly significant ($P < 0.001$) at 30th day and weaning ages.

Growth of the Lambs

The least squares means of the live weights of the lambs at birth, 45th, 90th and 180th days of age are shown in Table 4. The live weights of lambs in Group I and II ewes were 3.5 and 3.9 kg for birth weight, 18.3 and 21.2 kg for weaning weight and 26.1 and 31.1 kg for 180th day weight, respectively. The live weights of the lambs in Group II at all ages were higher than those in Group I and differences between the Group I and Group II were highly significant ($P < 0.001$). Sex and birth type had also significant effects on live weights at all ages ($P < 0.001$).

Table 2. Reproductive traits in the Group I and Group II.

Traits	Group I		Group II		Chi – Square Test
	n	%	n	%	
Animals exposed to rams	344	-	174	-	
Ewes lambing	295	85.8	159	91.4	NS
Ewes single lambing	154	52.2	71	44.7	NS
Ewes twin lambing	122	41.4	70	44.0	NS
Ewes triple lambing	19	6.4	18	11.3	NS
Ewes multiple (twin+triple) lambing	141	47.8	88	55.4	NS
					Mann-Whitney U Test
Lamb production	1.32		1.52		**
Litter size	1.54		1.67		NS

NS: Non Significant; ** : $P < 0.01$

Table 3. The number and survival rates of the lambs at different ages.

Source of Variation	Number of lambs born	30th day		90th day	
		n	%	n	%
Mating Groups			NS		NS
The Lambs from Group I	455	439	96.5	434	95.4
The Lambs from Group II	265	259	97.7	252	95.1
Sex			*		NS
Male	362	346	95.6	341	94.2
Female	358	352	98.3	345	96.3
Type of Birth			***		***
Single	223	221	99.1 ^a	218	97.8 ^a
Twin	384	378	98.4 ^a	375	97.7 ^a
Triple	113	99	87.6 ^b	93	82.3 ^b

NS: Non Significant ; * : P < 0.05; *** : P < 0.001
a,b : Means within a column in a subgroup with different superscripts differ (P < 0.05).

Table 4. Least Squares means (± SE) for live weights of the lambs at different ages (kg).

Source of Variation	Days							
	Birth weight		45 th		90 th		180 th	
	n	$\bar{X} \pm S\bar{x}$	n	$\bar{X} \pm S\bar{x}$	n	$\bar{X} \pm S\bar{x}$	n	$\bar{X} \pm S\bar{x}$
Mating Groups		***		***		***		***
The Lambs from Group I	455	3.5 ± 0.03	439	11.2 ± 0.12	434	18.3 ± 0.21	417	26.1 ± 0.26
The Lambs from Group II	265	3.9 ± 0.04	259	14.6 ± 0.15	252	21.2 ± 0.26	146	31.1 ± 0.13
Sex		***		***		***		***
Male	362	3.8 ± 0.03	346	13.5 ± 0.13	341	20.8 ± 0.25	271	30.2 ± 0.34
Female	358	3.6 ± 0.03	352	12.3 ± 0.14	345	18.7 ± 0.22	292	27.0 ± 0.30
Type of Birth		***		***		***		***
Single	223	4.2 ± 0.04 ^a	221	14.4 ± 0.16 ^a	218	21.0 ± 0.26 ^a	212	29.8 ± 0.34 ^a
Twin	384	3.7 ± 0.03 ^b	378	12.5 ± 0.12 ^b	375	19.8 ± 0.20 ^b	286	28.1 ± 0.29 ^b
Triple	113	3.2 ± 0.05 ^c	99	11.7 ± 0.23 ^c	93	18.4 ± 0.40 ^c	65	27.9 ± 0.55 ^b
Expected Means	720	3.7 ± 0.02	698	12.9 ± 0.10	686	19.7 ± 0.18	563	28.6 ± 0.25

*** : P < 0.001
a,b,c : Means within a column in a subgroup with different superscripts differ (P < 0.05).

Discussion

It is recommended that live weight for first mating in sheep reach at least two-thirds of adult weight (2). The live weight of Group I (early age mated group), 43.53 kg, was about two-thirds of adult weight of Bafra genotype (61.3 kg) (9). This shows that early age mated animals had enough live weight for first mating.

Reproductive traits of Group I were lower than those of Group II. But the differences between Group I and Group II for reproductive traits were not significant except for lamb production (P < 0.01). The results for reproductive traits indicated that they were not affected negatively by early age mating except for lamb production. The birth rate and litter size found in Group

I were lower than results previously reported for the same genotype ewes in all ages (8). But, results found in Group II were in agreement with the results reported for the same genotype (8). Both birth rates in this study were similar to those of several studies in which Chios was used as an improver (11-13). Birth rates of early mated Chios x Ossimi and Chios x Awassi crossbreeds (65.4% and 59.3%, respectively) were lower than birth rates found in this study (17). Although Group I and Group II consisted of young animals, litter size in both groups was higher than local sheep breeds except Chios (2-5,8,12,13).

One of the most important traits of lambs is a high survival rate at the age of weaning. The survival rates in the lambs from Group I and II ewes at weaning were very similar to each other. Both survival rates found in this study were in agreement with earlier findings for the same genotype and some crossbreed genotypes (6,8,11,13). This shows that survival rates of the lambs were not affected negatively by early age mating.

Growth traits are very important for a sheep enterprise. Genetic and many non-genetic factors (sex of lamb, year, age of dam, type of birth, season, mother milk yield) can affect growth traits in lambs. The live weights of the lambs in Group I were lower than those in Group II at all ages. Since Group I consisted of younger animals and had lower weights, the lambs from Group I ewes might have lower live weights. Also, milk yield from sheep generally increases by age. This might be because

milk yield of sheep in Group I was lower than that of Group II. Since one of the most important non-genetic factors that can affect lambs growth is milk yield of mother, the lambs from early mated group could be affected negatively. The live weights of lambs from Group I were also lower than results reported earlier for the same genotype (8). But weights of the lambs from Group II ewes were in agreement with the results reported by Ünal et al. (8).

In conclusion, early age mated group had enough live weight for first mating. Reproductive traits in early age mated group were lower, but the differences between the groups were not significant except lamb production. The survival rates of the lambs from Group I ewes were practically the same as the findings of Group II ewes. The lambs from Group II ewes were better than the lambs from Group I ewes in terms of growth traits. It is clear that early age mating increases the productive phase of sheep life. The study concluded that early age mating in Bafra sheep negatively affected lamb production and growth of lambs while it did not negatively affect birth rates or litter size of sheep, or survival rates of lambs.

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