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Research Article

Controlling Reproduction in Karakaş Ewes in Rural Conditions and Growth Characteristics of Their Lambs

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Abstract: The possibilities of synchronizing lambing and increasing reproduction by using exogenous hormones in Karakaş ewes raised under rural farm conditions and growth characteristics of their lambs were investigated. 112 Karakaş ewes at 2-5 ages were randomly assigned into treatment (n = 45) and control (n = 67) groups during breeding season. The ewes in treatment group were placed with 60 mg Medroxyprogesterone acetate (MPA) containing intravaginal passaries for 14 days and received 600 IU PMSG injections at passary withdrawal. Ewes in the control group were not treated and allowed to mate at their natural estrus. Ram introduction for both groups was performed in pasture in village common flock in free mating system. Litter size and twinning rates for treatment and control groups were 1.06 and 1.04; and 6.45 and 4.08 %, respectively, for the first two cycles related to passary withdrawal ($P > 0.05$). When the expected lambing time was considered, the proportions of the lambed ewes in the first 7 and 10 days were 70.97% and 70.97% for treatment, and 20.41% and 26.53% for control group. The differences in lambing rates in both periods between groups were significant ($P < 0.05$). Birth weight, 1st, 2nd, 3rd and 4th month live weights, weaning weight and daily live weight gain in treatment group lambs were 3.63 ± 0.13, 9.30 ± 0.41, 16.54 ± 0.50, 23.62 ± 0.77, 31.97 ± 0.66, 31.57 ± 0.92 and 0.221 ± 0.008 kg; and, in control group lambs were 3.26 ± 0.12, 10.11 ± 0.44, 17.80 ± 0.53, 26.30 ± 0.82, 34.59 ± 0.75, 34.42 ± 0.96 and 0.244 ± 0.008 kg, respectively. Except birth weight, treatment group lambs' live weights in all periods were lower than control ones ($P < 0.05$ and $P < 0.01$). The results of this study indicate that in order to run studies to control reproduction by using exogenous hormones in rural conditions successfully some precautions and technical support are required.

Key Words: Rural farm conditions, intravaginal passary, PMSG, Karakaş ewes, growth traits

Yetiştirici Koşullarında Karakaş Koyunlarının Döl Veriminin Denetlenmesi ve Elde Edilen Kuzularda Büyüme Özellikleri

Özet: Bu araştırmada, Van ili Merkez İlçesi Gövelek Köyü'nde bir yetiştirici işletmesinde bulunan Karakaş koyunlarının döl veriminin denetlenmesi olanakları ve elde edilen kuzuların sütten kesim dönemine kadar büyüme özellikleri incelenmiştir. Araştırmada yaşları 2-5 arasında değişen ve aşım mevsiminde bulunan 112 baş Karakaş koyunu ve bunlardan elde edilen 94 baş kuzu materyal olarak kullanılmıştır. 45 baş koyuna 14 gün süreyle 60 mg Medroksiprogesteron asetat (MPA) içeren intravaginal sünger ve hayvan başına 600 I.U. PMSG hormonu uygulanmıştır. Koç katım işlemi, merada serbest aşım şeklinde gerçekleştirilmiştir. Sünger uygulamasından sonraki ilk iki döngüde gebe kaldıkları düşünülen uygulama ve kontrol gruplarındaki koyunlarda doğuran koyun başına doğan kuzu sayısı sırasıyla 1,06 ve 1,04, ikiz doğuran koyun oranı ise sırasıyla ve % 6,45 ve % 4,08 ($P > 0,05$) olarak saptanmıştır. Uygulama ve kontrol gruplarında ilk iki döngüde doğuran koyunlara göre hesaplanan, ilk 7 gün içinde doğuranların oranı sırasıyla % 70,97 ve % 20,41 ($P < 0,05$) ve ilk 10 gün içinde doğuranların oranı % 70,97 ve % 26,53 ($P < 0,05$) olarak saptanmıştır. Bu çalışmada, sünger uygulaması yapılan grupta yer alan koyunların kuzularında doğum, 1., 2., 3. ve 4. ay ağırlıkları, sütten kesim ağırlığı ve günlük ortalama canlı ağırlık artışı sırasıyla 3,63 ± 0,13, 9,30 ± 0,41, 16,54 ± 0,50, 23,62 ± 0,77, 31,97 ± 0,66, 31,57 ± 0,92 ve 0,221 ± 0,008 kg; kontrol grubunda yer alan koyunların kuzularında ise aynı özellikler sırasıyla 3,26 ± 0,12, 10,11 ± 0,44, 17,80 ± 0,53, 26,30 ± 0,82, 34,59 ± 0,75, 34,42 ± 0,96 ve 0,244 ± 0,008 kg olarak saptanmıştır. Uygulama grubunda yer alan koyunlardan elde edilen kuzuların doğum ağırlığı dışında kalan diğer tüm canlı ağırlık dönemlerinde kontrol grubu kuzularına göre daha düşük değerlere ulaştıkları saptanmıştır ($P < 0,05$ ve $P < 0,01$). Bu araştırmadan elde edilen sonuçlar Doğu Anadolu Bölgesi'nde eksogen hormon kullanılarak döl veriminin denetlenmesine yönelik çalışmaların yetiştirici koşullarında başarı ile uygulanması için bazı ön koşulların gerçekleştirilmesinin gerekli olduğunu göstermektedir.

Anahtar Sözcükler: Yetiştirici koşulları, intravaginal sünger, PMSG, Karakaş koyunları, büyüme özellikleri

Introduction

The success of sheep production is limited to low reproduction as happens in other animal production activities. Therefore, considerable efforts are devoted to controlling reproduction in farm animals. Practices to increase reproduction are focussed on improving environmental factors because improvements in reproduction via genetic strategies are slow and require long-term efforts.

One of the main purposes of hormone treatments in sheep is to synchronize estrus and, subsequently, lambing. Nevertheless, since there are many genetic and environmental factors affecting gestation length, the synchronization rate observed in estrus is not well represented in lambing. Maximum synchronization in lambing could be achieved using various hormone treatments applied during the last days of gestation (1). Synchronization of lambing as a result of synchronization of estrus is important because animal owners have to plan use of barns, feeding and labor depending on the intensity of lambing. Synchronization of lambing helps reducing the death of newborn lambs, provides advantages in care, feeding, use of buildings and the other resources, and some economical benefits. Forty percent of constant expenses of sheep production comprise labor expenses and 46% of these expenses are directly related to lambing period. Therefore, via synchronization of estrus, labor could be utilized more effectively and labor expenses could be minimized. This explains the importance of the synchronization of lambing (2).

Because of scientific and practical benefits of controlling estrus and ovulation via exogenous hormones the studies related to this practice have been increased in Turkey during the last years. Nevertheless, since the majority of the studies are performed in state institutes and are not recognized by farmers this practice has not been widely applied in the field yet (3,4). It is necessary to investigate such practices that satisfy the demands and expectations of animal breeders, and provide production increases in short term and management easiness in rural conditions.

The purpose of this study is to investigate the possibilities of controlling reproduction in Karakaş ewes, a subtype of Akkaraman sheep, via progestogen impregnated sponges in East Anatolian rural conditions and determine the conditions affecting such kinds of studies. Several factors considered to affect the results are discussed. One other aim of the study is to determine growth characteristics of lambs produced under those conditions.

Materials and Methods

A total of 112 Karakaş ewes (2-5 ages) raised in Gövelek village, Van, Turkey, and their 94 lambs were utilized. Ewes were randomly divided into treatment (n = 45) and control (n = 67) groups provided that each group contains nearly equal numbers of ewes at the same ages. Sixty mg Medroxyprogesterone Acetate (MAP) containing passaries (Vetimex, Bladel, Netherlands) were placed in ewes in treatment group for 14 days. Following passary withdrawal each animal was given an intramuscular injection containing 600 I.U. PMSG. Then, as a village practice, ewes were released to join to common flock of village. Free mating was applied with the rams of common flock on pasture. In order not to interfere with the common practices applied in the village and not to generate antipathy to such kind of projects synchronization scheme and ram introduction time was planned to fit to such kind of activities.

During winter ewes were fed with hay, dry grass, dry clover, bran and barley. They were fed with 2 kg/day roughage per animal. Lambs were kept with their dams for 15-20 days after lambing. Then, lambs were separated from their dams and suckled twice a day. The lambs were fed with dry grass after one month age. Lambs and ewes were kept as separate flocks on pasture and lambs suckled twice a day until weaning. Weaning was performed at the beginning of July when lambs were average 123 days of age. No supplementary feeding was applied to the flocks during grazing period.

The dam weights and birth weights of the lambs were taken within 24 hours of lambing. Live weights of the lambs were recorded every second week after 12 h fasting. Interpolation was applied on data to determine monthly live weights. Weights at birth, 1^{st}, 2^{nd}, 3^{rd} and 4^{th} month of age, weaning age and daily live weight gains from birth until weaning were investigated for treatment and control ewe's lambs. Data collection ended at weaning. Because of various reasons such as lamb losses on the pasture, age differences of lambs and deaths, lamb numbers varied during some of the data collection time. Lambing occurred in a wide time period in control group.

Investigated lamb numbers changed especially because of the lambs which did not complete 4 months.

Litter size and twinning rate were considered as reproductive traits at lambing (5). Distribution of lambing related to synchronization schedule was evaluated. For this purpose, lambings were evaluated at the bases of 150 and 167 days after ram introduction. Distribution of lambing was calculated by considering the lambings during the first 7 and 10 days of lambing period and 150 and 167 days after ram introduction (6,7). Ewes that are thought to be conceived during the first two cycles after sponge removal and lambed on term were taken into consideration. Later lambings were considered unrelated to the effect of hormone treatment and, therefore, they were not evaluated. Additionally, lamb survival rate until weaning were evaluated on group basis.

Comparisons related to reproductive traits, lamb survival rates and distribution of lambing between the groups were made using chi-square method (8). Analyses of data related to growth characteristics of lambs were done using mixed linear models (9). Duncan test was utilized for determining differences among the sub-groups' means (8).

The model used for analysis of birth weight was as follows:

$$Y_{ijklm} = m + a_i + b_j + c_k + d_l + b_1 (X_{ijklm} - \bar{X}) + e_{ijklm}$$

The model used for analysis of 1st, 2nd, 3rd, 4th month weights and daily live weight gains was as follows:

$$Y_{ijklm} = m + a_i + b_j + c_k + d_l + b_1 (X_{ijklm} - \bar{X}) + b_2 (W_{ijklm} - \bar{W}) + e_{ijklm}$$

The model used for analysis of weaning weight was as follows:

$$Y_{ijklm} = m + a_i + b_j + c_k + d_l + b_1 (X_{ijklm} - \bar{X}) + b_2 (W_{ijklm} - \bar{W}) + b_3 (Z_{ijklm} - \bar{Z}) + e_{ijklm}$$

where Y_{ijklm} is the observation of lamb weights or daily live weight gains, μ is the overall mean, a_i is the effect of dam age (i = 2-5), b_j is the effect of lamb sex (j = 1 (male); 2 (female)), c_k is the effect of birth type (k = 1(single); 2 (twin)), d_l is the effect of group (l = 1 (treatment); 2 (control)), b_1 , b_2 , b_3 are the linear regression coefficients of related characters, X_{ijklm} is the individual weight of dam, $\bar{X}$ is the mean weight of dams, W_{ijklm} is the individual birth weight of lambs, $\bar{W}$ is the mean birth weight of lambs, Z_{ijklm} is the individual weaning age (day) of lambs, $\bar{Z}$ is the mean weaning age of lambs, e_{ijklm} is the random error associated with ND (0, σ^2).

Results

Reproductive traits and survival rates of the lambs for treatment and control groups were given in Table 1. Four and 5 ewes in treatment and control groups, respectively, aborted during the last days of their pregnancy. Twinning rate and litter size were 6.45% and 1.06, and 4.08% and 1.04 for treatment and control group, respectively. There were no differences between groups in twinning rate and litter size (P > 0.05). The survival rates of the treatment and control lambs at weaning were 96.96% and 98.36%, respectively (P > 0.05).

Table 1. Reproductive traits in treatment and control groups.

Reproductive traits	Groups			
	Treatment		Control	
	n	%	n	%
Mated ewes	45	-	67	-
Aborted ewes	4	8.89	5	7.46
Sponge dropped ewes	1	2.22	-	-
Ewes lambed within first 167 d	31	-	49	-
Twinning rate	2	6.45	2	4.08
Litter size	1.06	-	1.04	-
Lamb survival rate	-	96.96	-	98.36

Distribution of lambing by considering the first 7 and 10 days of lambing period and 150 and 167 days after ram introduction was given in Table 2. Aborted and sponge dropped ewes were not included into calculations. Lambing rates during the first 7 days of lambing period were 55.0% and 16.1% (P < 0.05) for treatment and control group, respectively. These rates were 55.0% and 20.9% (P < 0.05) during the first 10 days of lambing period. When ram introduction date was taken into consideration the rate of lambed ewes within 150 and 167 days happened as 55.0% and 27.4% (P < 0.05), and 77.5% and 79.0% (P > 0.05) for treatment and control group, respectively.

The rates of lambed ewes during the first 7 and 10 days of lambing period in ewes lambed within 167 days

Table 2. Distribution of lambing by considering the first 7 and 10 days of lambing period, and 150 and 167 days after ram introduction.

Groups	n	Days after lambing				Days after ram introduction			
		First 7 days		First 10 days		150 days		167 days	
		n	%	n	%	n	%	n	%
Treatment	40	22	55.0 a	22	55.0 a	22	55.0 a	31	77.5
Control	62	10	16.1 b	13	20.9 b	17	27.4 b	49	79.0
Total	102	32	31.3	35	34.3	39	38.2	80	78.4

a, b; Means with different letters within the same column differ significantly ($P < 0.05$)

after ram introduction are given in Table 3. The rates of ewes lambed for the first 7 and 10 days for control and treatment groups were 70.97% and 20.41% ($P < 0.05$), and 70.97% and 26.53% ($P < 0.05$), respectively.

Birth weights of lambs, live weights at 1st, 2nd, 3rd and 4th month of age, daily live weight gains from birth until weaning, and least square means of some environmental factors affecting these traits, standard errors and multiple comparison test results were given in Table 4. Accordingly, mean birth weight of Karakaş lambs, live weights at 1st, 2nd, 3rd and 4th month of age, weaning weight and average daily live weight gain were 3.96 ± 0.55, 10.10 ± 1.65, 17.22 ± 1.98, 24.53 ± 3.08, 31.65 ± 2.38, 32.31 ± 3.61 and 0.228 ± 0.031 kg, respectively. Birth weights, live weights at 1st, 2nd, 3rd and 4th month of age, weaning weight and average daily live weight gain in lambs of treatment group were 3.63 ± 0.13, 9.30 ± 0.41, 16.54 ± 0.50, 23.62 ± 0.77, 31.97 ± 0.66, 31.57 ± 0.92 and 0.221 ± 0.008 kg, respectively. The same values for control group's lambs were 3.26 ± 0.12, 10.11 ± 0.44, 17.80 ± 0.53, 26.30 ± 0.82, 34.59 ± 0.75, 34.42 ± 0.96 and 0.244 ± 0.008 kg, respectively. Lambs of treatment group were higher at birth ($P < 0.01$); nevertheless, as the age increased the lambs of control group became superior in live weight. The control lambs were higher than the treatment groups lambs until the end of the 4 months of ages ($P < 0.05$ and $P < 0.01$, Table 4).

Discussion

Litter size and twinning rate in treatment group observed in the present study (Table 1) were considerably lower than values observed in hormone treated native ewes of Turkey and the other sheep breeds (4,5,10-12). Various characteristics of previous studies such as hand mating, artificial insemination, maintenance conditions, breed, season, animal numbers, brand and concentrate of hormones could be the reasons for these differences. In the mean time, these results are similar to those reported by Fukui et al. (13), and Wani et al. (14,15).

Several reasons are thought to be effective in expected litter size and twinning rate not to occur. These could be the fact that ram introduction happened in common flock of the village in a considerable large pasture area, inappropriate feeding during this period, factors related to formation of village common flock, reasons which could arrive depending of villagers' social and economical situation, and vaginal anatomy of first breeder ewe lambs. Additionally, it is well known that dominant rams could prevent other rams from mating. Fukui et al. (13) reported that low libido rams could cause such results, as well.

High survival rate at weaning is one of the important lamb characteristics. In this study, the differences of survival rates between the groups were not statistically significant ($P > 0.05$) (Table 1). The survival rates of lambs until weaning was slightly higher than those reported from the other sheep breeds of Turkey (16,17).

Data taken from all animals except for aborted and sponge dropped ewes were used to calculate distribution of lambing (Table 2). Synchronization rate of lambing in the present study is lower compared to previous studies (6,7,11,18,19). In the mentioned studies, which were conducted with different breeds, methods and

Table 3. Distribution of lambing by considering ewes lambed within 167 days after ram introduction.

Groups	Ewes lambed within 167 days after ram introduction	Day after the beginning of lambing			
		First 7 days		First 10 days	
		n	%	n	%
Treatment	31	22	70.97 a	22	70.97 a
Control	49	10	20.41 b	13	26.53 b
Total	80	32	40.00	35	43.75

a, b; Means with different letters within the same column differ significantly ($P < 0.05$)

Table 4. Birth weights of lambs, live weights at 1st, 2nd, 3rd and 4th month of age, weaning weight, daily live weight gain and least square means of some environmental factors affecting these traits, standard errors and multiple comparison test results.

Factors	Birth wt (kg)			1st mo. wt. (kg)			2nd mo. wt. (kg)			3rd mo. wt. (kg)		
	n	Mean ± s.e.	C.e.	n	Mean ± s.e.	C.e.	n	Mean ± s.e.	C.e.	n	Mean ± s.e.	C.e.
Dam age		**			*							
2	33	3.06 ± 0.16b	-0.381	32	9.06 ± 0.56b	-0.647	32	16.91 ± 0.67b	-0.258	32	25.07 ± 1.04b	0.112
3	33	3.53 ± 0.13b	0.090	33	9.62 ± 0.41a	-0.084	33	16.86 ± 0.50b	-0.313	32	24.42 ± 0.78ab	-0.541
4	16	3.85 ± 0.18a	0.403	16	9.25 ± 0.54a	-0.451	16	16.85 ± 0.65a	-0.315	16	24.48 ± 1.01a	-0.485
5	12	3.33 ± 0.18b	-1.113	12	10.89 ± 0.57a	1.183	12	18.06 ± 0.69b	0.887	12	25.87 ± 1.07ab	0.914
Sex					**			**			**	
Male	44	3.54 ± 0.13a	0.962	43	10.19 ± 0.42a	0.489	43	17.89 ± 0.51a	0.725	43	26.22 ± 0.79a	1.264
Female	50	3.35 ± 0.12b	-0.962	50	9.22 ± 0.42b	-0.489	50	16.44 ± 0.50b	-0.725	49	23.70 ± 0.77b	-1.264
Birth type		**										
Single	87	4.17 ± 0.07a	0.731	86	10.28 ± 0.21a	0.579	86	17.24 ± 0.26a	0.070	85	24.21 ± 0.40a	-0.749
Twin	7	2.71 ± 0.21b	-0.731	7	9.13 ± 0.76b	-0.579	7	17.10 ± 0.91b	-0.070	7	25.71 ± 1.42b	0.749
Group		**			*			**			**	
Treatment	33	3.63 ± 0.13a	0.184	33	9.30 ± 0.41	-0.403	33	16.54 ± 0.50	-0.634	32	23.62 ± 0.77a	-1.335
Control	61	3.26 ± 0.12 b	-0.184	60	10.11 ± 0.44	0.403	60	17.80 ± 0.53	0.634	60	26.30 ± 0.82b	1.335
Regr. (Lin.)												
Dam wt. (kg)	-	-0.016 ± 0.011	-		0.069 ± 0.035*	-		0.143 ± 0.042**	-		0.137 ± 0.065*	-
Birth wt. (kg)	-	-	-		0.918 ± 0.324**	-		1.712 ± 0.389**	-		2.057 ± 0.605**	-
Weaning age	-	-	-		-	-		-	-		-	-
Total	94	3.96 ± 0.55	-	93	10.10 ± 1.65	-	93	17.22 ± 1.98	-	92	24.53 ± 3.08	-

Mo.=Month, Wt.=Weight, C.e.=Constant estimate, Regr.(Lin.) = Linear Regression

*; $P < 0.05$, **; $P < 0.01$.

a, b; Within each factor, means in the same column with unlike superscripts differ significantly ($P < 0.05$).

Table 4. (Cont.) Birth weights of lambs, live weights at 1st, 2nd, 3rd and 4th month of age, weaning weight, daily live weight gain and least square means of some environmental factors affecting these traits, standard errors and multiple comparison test results.

Factors	4th mo. wt. (kg)			Weaning wt. (kg)			Daily wt. gain (kg)		
	n	Mean ± s.e.	C.e.	n	Mean ± s.e.	C.e.	n	Mean ± s.e.	C.e.
Dam age									
2	15	34.08 ± 0.98bc	0.798	32	32.78 ± 1.22c	-0.209	32	0.229 ± 0.010b	-0.003
3	26	32.19 ± 0.66b	-1.093	32	32.56 ± 0.93ab	-0.435	32	0.230 ± 0.008ab	-0.002
4	10	33.64 ± 0.94a	0.358	16	32.78 ± 1.19a	-0.218	16	0.230 ± 0.010a	-0.002
5	10	33.22 ± 0.92c	-0.063	12	33.86 ± 1.26bc	0.862	12	0.240 ± 0.011b	0.007
Sex		**			**			**	
Male	26	35.94 ± 0.72a	2.664	43	35.39 ± 0.92a	2.392	43	0.251 ± 0.008a	0.019
Female	35	30.62 ± 0.69b	-2.664	49	30.60 ± 0.91b	-2.392	49	0.214 ± 0.008b	-0.019
Birth type		*							
Single	55	31.78 ± 0.37a	-1.502	85	32.04 ± 0.47	-0.958	85	0.226 ± 0.004	-0.006
Twin	6	34.78 ± 1.23b	1.502	7	33.95 ± 1.67	0.958	7	0.239 ± 0.014	0.006
Group		**			**			**	
Treatment	26	31.97 ± 0.66a	-1.307	32	31.57 ± 0.92	-1.425	32	0.221 ± 0.008a	-0.011
Control	35	34.59 ± 0.75b	1.307	60	34.42 ± 0.96	1.425	60	0.244 ± 0.008b	0.011
Regr. (Lin.)									
Dam wt. (kg)		0.362 ± 0.064**	-		0.214 ± 0.077**	-		0.0016 ± 0.006*	-
Birth wt. (kg)		2.310 ± 0.543**	-		2.411 ± 0.708 **	-		0.0116 ± 0.006*	-
Weaning age		-	-		0.228 ± 0.037 **	-		-	-
Total	61	31.65 ± 2.38	-	92	32.31 ± 3.61	-	92	0.228 ± 0.031	-

Mo.=Month, Wt.=Weight, C.e.=Constant estimate, Regr.(Lin.) = Linear Regression

*; P<0.05, **; P<0.01.

a, b, c; Within each factor, means in the same column with unlike superscripts differ significantly (P < 0.05).

maintenance conditions, 92.08% to 94.25% of treated ewes lambed within first 7 and 10 days of lambing period (5,19); 62-75 % of treated lambed ewes within 150-153 days after ram introduction (6,11,18,20). These findings indicate that majority of conceptions occurred at the first estrus after sponge removal. As a general conclusion, researchers reported that hormone treatment for estrus synchronization resulted in an effective synchrony of lambing. In the present study, even though expected values were not obtained, treatment group had higher lambing rates during the first 7 and 10 days of lambing and 150 days after ram introduction compared to control group. Similar results related to synchronization rates were reported by various researchers (13-15,21). Breed, primarily, maintenance conditions, season, type of progestagen, dose of PMSG, insemination techniques, flock size and age variation within the flock could be the reasons for the differences in synchronization rate observed in the previous studies. In the present study, the facts for expected synchronization rate did not happen could be attributed to the breed, low animal numbers, being ram introduction on the pasture with common flocks and factors related to gathering of common flocks. There is a possibility that some of the synchronized ewes were mated but did not conceive at the first estrus as reported by Pabuçcuoğlu et al. (20).

The number of lambed ewes within a week out of total lambed ewes is the best indication to assess the success of synchronization of lambing (12). In the present

study, lambing rates calculated by all lambed ewes within 167 days after ram introduction during the first 7 and 10 days of lambing period were higher in treatment group compared to control group ($P < 0.05$) (Table 3). Similar findings were reported by Ainsworth and Shrestha (11). In the present study the ratio of lambed ewes within a week during expected lambing period was lower than the values reported by Başaran and Dellal (3) and Aşkın (6,12). The fact that the mentioned studies were performed in state farms having better maintenance conditions utilized large animal numbers and controlled breeding/insemination practices could be a reason for these differences.

In the present study, factors affecting the results and preventing expected results from happening were evaluated. The results indicated that some precautions should be taken prior to initiate the studies to control estrus using exogenous hormones and increase reproduction in rural conditions. Especially, conditions of maintenance, feeding and hygiene should be improved. Flock management and ram introduction should be more organized. In order to improve the conditions of farmers some practices should be introduced provided that not to interfere with their daily activities and common economical and social arrangements done with other farmers. This approach will allow some projects and practices to be applied in their conditions and, consequently, to get benefit from the advantages of application and extension of many technological practices. Beside sponge application, the evaluation of flocks' structure, production systems established upon breeders' practices and performance of sheep are important for better results, as well.

The values related to birth weight and growth traits observed in the present study were higher than those reported previously for the same genotype (22,23). Öter (24) reported similar results for Karakaş lambs raised in rural and semi-intensive conditions, respectively. Different breeding conditions and habits could cause variation in pre-weaning growth characteristics. Birth weight of Karakaş lambs observed in the present study appeared to be similar to the other sheep breeds of Turkey (16,25-27).

When compared two groups of lambs, treatment group's lambs were higher at birth ($P < 0.01$); nevertheless, as the age increased the lambs of control group became superior in live weight. There were significant differences ($P < 0.05$) in 1st and 2nd month of age live weight and very significant differences ($P < 0.01$) after this period in same trait between treatment group's lambs and control ones. Başaran and Aşkın (19) reported that mean birth weight of lambs of induced ewes for multiple lambing was lower ($P < 0.05$) than that of control group in Awassi sheep raised in semi-intensive conditions; nevertheless, this difference closed at weaning. In the mean time there are several reports that there were no differences in birth weight and live weights in later periods between synchronized ewes' lambs and control ones (5,15). Beside group effect, in the evaluation of factors affecting growth traits it was observed that dam age affected live weight until 2 months of age. Live weights of lambs of 2 years old ewes were low, and live weights of lambs of 5 years old ewes were high compared to other lambs except at birth and 4th months weights of lambs. Male lambs were superior over female ones in all traits. The effects of birth weight on live weight in all ages were significant ($P < 0.05$) and very significant ($P < 0.01$). Single lambs had higher live weight until 3 months of age, and after this age, although not statistically significant, twin lambs had higher live weight. The effects of various environmental factors on live weights of lambs at different periods observed in the present study are in agreement with previous findings (17,23,25-28).

Average weaning weight of lambs weaned at 123 days of age was 32.31 kg. Weaning weight observed in this study could be considered high when compared to other studies (17,22,23,25-27); however, it is difficult to make a comparison because of different breeding conditions and age at weaning.

Live weight at weaning was affected from group, birth weight, dam weight, sex and weaning age (day) ($P < 0.01$). The effects of these factors on weaning weight were similar to the findings reported in various studies (16,17,23,26-28). The average daily live weight gain (0.228 kg) between birth and weaning (123 days) in the present study was higher than the value reported previously for Karakaş lambs (22,23). Daily live weight gain calculated for Akkaraman lambs weaned at 45 days of age was higher than the value observed in the present study (29). Live weight gains were affected from group and sex ($P < 0.01$) as observed in previous studies done with Karakaş lambs (24,30).

In conclusion, the fact that synchronization rate of lambs happened below expected values in the present study could be attributed to several factors such as the presence of some primitive economical and social arrangements established among breeders, applying ram introduction in village common flock and absence of estrus detection. There is a possibility that estrus was synchronized in ewes and they were mated but not conceived. The results of this study indicate that in order to run studies to control reproduction using exogenous hormones in rural conditions successfully some precautions are required to be taken. Since the majority of studies related to controlling reproduction by using progestagen impregnated passaries have been maintained in state farms and not been recognized by breeders this practice has not gained a country wide acceptance. Therefore, in order to increase the recognition of this practice in a wide range and develop applicable recommendations for breeders several investigations are needed. These investigations should be performed in various rural farm conditions and aim to determine the factors affecting the success of this practice.

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