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REPRODUCTIVE PERFORMANCE OF RAHMANI AND CHIOSE SHEEP AND THEIR LAMBS UNDER UPPER EGYPT CONDITIONS

M. ABD-ALLAH*[1], S.F. ABASS[2], F.M. ALLAM[2]

[1]Animal Production Department, Faculty of Agriculture, Al-Azhar University, Assiut, PO Box 7111, Assiut, Egypt
[2]Animal Production Department, Faculty of Agriculture, Assiut University, Egypt

*E-mail: mohtaram_a_m_e@yahoo.com

ABSTRACT: *The differences of fertility and prolificacy traits for Rahmani and Chios ewes were studied in this investigation. The study was conducted during two consecutive years that included three lambing season with a total of 273 ewes (162 Rahmani and 111 Chios) bred, 230 ewes lambing, 280 lambs born and 237 lambs weaned. Breed of ewes had a significant effect on fecundity, lambing rate and weaning rate. Mating season and year did not significantly affect fertility traits. Age of ewes had a significant effect on fecundity, lambing rate and weaning rate. Breed of ewes had a significant (P<0.01) effect on prolificacy traits. Mating season and year had no significant effect on prolificacy traits. Age of ewes had a significant effect on prolificacy traits, except litter weight at weaning, Chios ewe lambs reached puberty and maturity at younger age and they had heavier body weight than Rahmani ewe lambs. The effects of birth type and weaning system on reproductive traits of ewe lambs were not significant. Early weaned lambs reached puberty and maturity earlier than normal and late weaned lambs. Breed of lambs, birth type and weaning system had no significant on age and weight at puberty of ram lambs, except age at puberty which was significantly affected (P<0.05) by weaning system.*

ORIGINAL ARTICLE

Keywords: *Reproductive performance, Rahmani sheep, Chios sheep, puberty, sexual maturity.*

INTRODUCTION

Number of lambs weaned per ewe is one of the most important factors determining the efficiency of meat production from sheep. It is a complex trait controlled by both genetic and environmental factors, and responds slowly to genetic selection within breeds (Smith et al., 1979). Fertility varied greatly among the different breeds of sheep raised at different conditions. Litter size depends primarily on the number of eggs shed by the ewe, i.e. her ovulation rate. Secondary factors are the proportion of eggs fertilized, losses of embryos and fetuses causing reduction of multiple fetuses, and perinatal deaths (Gatenby, 1986). Total litter weight weaned per ewe lambing is a trait often used as an overall measure of range lamb production (Bromley et al., 2001).

Puberty in the ewe is defined as the time when oestrous cycles start. Awassi lambs on a good diet first display oestrous at 274 days of age (Younis et al., 1978), while, Rambouillet crossbred lambs in Rajasthan are about 615 days old before they display oestrous (Kishore et al. 1982). This difference was largely due to the different growth-rates resulting from different nutrition. In Egypt, the average age at puberty of Ossimi and Barki ewe lambs was 347 days, when reared on a high plane of nutrition, and 366 days on a low plane (El-Hommosi and Abd El-Hafiz 1982). Sexual maturity is the time when the animal expresses its full reproductive power (Asdell, 1946). Age at first behavioural estrus was considered as puberty age for ewe lambs (Quirk et al., 1985), age and weight at sexual maturity after three regular cycles from puberty (Aboul-Naga et al., 1982). Reports of puberty in rams, defined as age at first ejaculate, vary from 132 days

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for Tabasco [Pelibuey] x Dorset lambs on the high plateau in Mexico (Valencia et al., 1977) to as 738 days for ¾ Rambouillet ¼ Malpura lambs in Rajasthan, India (Tiwari and Sahni, 1981). In Egypt, El-Tawel (1980), working on Ossimi and Saidi ram lambs, observed that average age at puberty was 324 and 368 days, respectively. Awassi sheep reached puberty at earlier age than Ossimi and Chios ram lambs. The results reported by Mohamed (1998) indicated that averages age and weight of Ossimi ram lambs at puberty were 376 days and 32.4 kg, respectively.

Objective of the study is to examine the effect of some factors such as lambing season, weaning system and age of ewes on reproductive performance in Rahmani and Chios sheep under the conditions of Upper Egypt.

MATERIALS AND METHODS

The present study was carried out during the period from Augusts–September 2005 to May-June 2008 at the Experimental Farm of Animal Production Department, Faculty of Agriculture, Al-Azhar University, Assiut. To assess the possible effect of season of birth, mating was planned in such a way that lambs would be born into the two main season (winter and summer). According to the mating practice of the station, breeding ewes were mated at the middle of the winter season (January–February) and at the beginning of the summer season (may–June) so that lambings could occur within the winter and summer season respectively. Mating started at the age of one year for the ewe lambs and 2 year for the rams. The system of three lambing season per two years was adopted. Mating per breeding season lasted for 45 days. Sires were randomly selected from rams kept for breeding purposes; the sires chosen were all over 45 kg and had at least two permanent teeth (incisors). Those selected were again physically checked for any scrotal deformity or any history of reproductive problems. Four rams per breed were then randomly picked for each mating season. Ewes within breed were assigned to sire groups by a stratified random sampling method taking body weight and parity into consideration.

Management of the flock

A total of 273 ewes (162 Rahmani and 111 Chios) were bred and housed under semi-open sheds which provided enough shade and ventilation in summer and protection from rain in winter. Lambs born were kept with their dams till weaning age. All ewes were grazing on Egyptian clover from December to May. During summer months they were fed on crop residues available besides the green maize (Darawa) in addition ewes were supplemented with pelleted concentrate mixture, starting with 0.5 kg / head / day and increased to 0.750 kg / head / day during late pregnancy and lactation periods. The concentrate pelleted diet containing (68% ground corn, 15% wheat bran, 15% decorticated cotton seed meal, 1.5% calcium carbonate, 0.5 % salt blocks minerals and vitamins mixture were also provided). However, fresh and clean water is available at all times. The flock was sheared twice yearly on April (spring) and September (autumn). They were subjected to routine vaccination program against infectious diseases (foot and mouth disease, Rift fever valley, sheep pox and clostridium disease). The flock was also injected or drenched against internal and external parasites.

Reproductive performance of lambs

Ewe lambs of Rahmani and Chios breeds were born during winter 2006. At four months of age behavioral estrus was detected by introducing a sexually active ram twice daily to the ewe lambs, early in the morning and at 4 p.m. for a period of one hour each. Once the heat symptoms were observed, age and weight of the ewe lambs were recorded. After three regular cycles from the onset of estrus (maturity), length of estrus cycle was recorded (period from previous to next estrus). The age at first conception of each ewe was obtained by subtracting the gestation period from the age of the ewe at first lambing according to Tuah and Baah (1985). This method was adopted since it was not possible to determine the age at puberty by direct observation of first oestrus. Age at first lambing was computed as the average of the ages in days between birth and first lambing of all ewe lambs.

Ram lambs from both breeds were introduced into pens containing five adult females (with oestrus was observed in at least three of these five ewes) of their own breed for a period of 30 min. The manifestations of sexual behavior were observed and recorded. This procedure was repeated twice a week from week 16 to puberty which in the present study was defined as the first observed mounting with ejaculation. According to Belibasaki and Kouimtzis (2000). Age and weight at puberty of ram lambs was recorded.

Data were statistically analyzed using the GLM procedure of the SAS package, 8.1 version (SAS, 1996). Analysis was performed according to the following linear model:

$$Y_{ijklm} = \mu + B_i + MS_j + Y_k + A_l + e_{ijklm}$$

Where: Y_{ijklm} = the trait of study, B_i = fixed effect of the j^{th} breed (j = Rahmani and Chios ewes), MS_j= fixed effect of the j^{th} mating season (j = autumn, summer, winter), Y_k= fixed effect of the k^{th} mating year (k = 2006, 2007), A_l = fixed

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effect of the l^{th} age of dam (l = 1, 2, 3, 4 and 5) where. 1 = 2yr–old or less, 2 = ≤ 3yr–old, 3 = ≤ 4yr–old, 4 = ≤ 5yr–old, and 5 = > 5yr–old., e_{ijklm}= effect of the m^{th} random error.

RESULTS AND DISCUSSION

Reproductive performance of ewes:

Fertility traits

Least squares means, analysis of variance and the significant levels for some factors affecting fertility traits are illustrated in Table (1).

The Chios ewes were slightly more fertile than Rahmani ewes, but the difference between breeds was not significant. On the other hand, significant (P<0.01) difference was found between both breeds regarding fecundity, lambing rate and weaning rate. The estimates of these parameters were 0.89 %, 88.14 % and 75.99 % for Rahmani ewes, and 1.19, 120 and 95.10 for Chios ewes, respectively. These results indicated that Rahmani ewes had lower fertility rate than Chios ewes. Increase fecundity in Chios than Rahmani ewes may be attributed to implying difference in ovulation rate that directly affects fecundity.

Table 1 - Least-square means and their standard errors of some factors affecting fertility traits of Rahmani and Chios ewes

Items	No	Fertility traits			
		Fertility	Fecundity	Lambing rate	Weaning rate
Overall means	273	0.87 ± 0.14	1.04 ± 0.17	104.8 ± 21.28	85.55 ± 19.0
Breed of ewes		Ns	**	**	**
Rahmani (R)	162	0.86 ± 0.03	0.89 ± 0.05	88.14 ± 5.49	75.99 ± 4.91
Chios (C)	111	0.89 ± 0.04	1.19 ± 0.05	120.0 ± 6.54	95.10 ± 5.84
Mating season		Ns	Ns	NS	Ns
Autumn	74	0.88 ± 0.05	1.04 ± 0.06	104.2 ± 7.98	81.89 ± 7.13
Summer	86	0.86 ± 0.05	1.05 ± 0.06	100.7 ± 7.24	86.06 ± 6.47
Winter	113	0.87 ± 0.04	1.03 ± 0.05	107.4 ± 6.73	88.69 ± 6.01
Mating year		Ns	Ns	NS	Ns
2006	160	0.87 ± 0.03	1.05 ± 0.04	102.4 ± 5.14	83.90 ± 4.67
2007	113	0.87 ± 0.04	1.03 ± 0.05	107.4 ± 6.40	88.69 ± 5.81
Age of ewes		Ns	*	*	*
2yr-old or less	77	0.76 ± 0.06 ^{b}	0.84 ± 0.07 ^{b}	82.99 ± 8.69 ^{b}	71.16 ± 7.76 ^{b}
≤3yr-old	53	0.85 ± 0.06 ^{ab}	0.95 ± 0.07 ^{ab}	95.21 ± 8.69 ^{ab}	87.38 ± 7.76 ^{ab}
≤4yr-old	53	0.89 ± 0.06 ^{ab}	0.98 ± 0.07 ^{ab}	98.18 ± 8.69 ^{ab}	85.09 ± 7.76 ^{ab}
≤5yr-old	45	0.88 ± 0.06 ^{ab}	1.14 ± 0.08 ^{a}	118.5 ± 9.78 ^{a}	102.3 ± 8.74 ^{a}
>5yr-old	45	0.98 ± 0.07 ^{a}	1.27 ± 0.09 ^{a}	125.5 ± 11.1 ^{a}	81.86 ± 9.95 ^{ab}

The Chios breed was superior (P<0.01) than Rahmani breed regarding lambing rate, probably due to its higher ovulation rate as postulated by Brown and Jackson (1995). The lower lambing rate in Rahmani ewes may be as a result of a higher prenatal mortality rate. Weaning rate of Rahmani ewes was significantly (P<0.01) lower than the Chios ewes, probably due to the fact Rahmani ewe produces less milk, hence less vigorous lambs being produced and having a poor mothering ability. Similar results were reported by Ahmed et al. (1992) in Barki ewes.

There was no significant difference between seasons of mating in fertility traits observed in this study. However, autumn season (September–October) was the best season in fertility (88%) compared to 86% in summer (May–Jun) and 87% in winter season (January–February). This finding is in agreement with those reported by Fahmy (1990), Marzouk and Mousa (1998) and Abd Allah (2005). Season of mating influenced fecundity insignificantly and litters were larger in the dry (summer) mating season than the autumn or wet (winter) mating season. Larger litters in the summer mating season may be due to the extra supplementation of concentrate mix to ewes during the dry season, which probably resulted in higher ovulation rates. Mating season affected the lambing rate and weaning rate significantly (P<0.01) and ewes lambing in winter season recorded a higher lambing rate and weaning rate than ewes lambing during autumn and summer seasons. The reason for this response was probably related to the fact that ewe lambing in the winter season had access to better quality and quantity feed during this season. The present results are partly consistent with those reported by Aboul-Naga et al., (1985) who found that the oestrous activity of some subtropical fat tailed sheep was the highest in

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autumn breeding and the lowest in early winter and late spring. In Egypt, Aboul-Naga et al., (1987) concluded that the local breeds showed oestrus activity around all the year without a clear anoestrus period, but with a drop during the period from February to July.

Results showed that mating year had no significant effect on fertility traits. These results are in agreement with the findings of Osinowo et al. (1992). Kilograms born or weaned per ewe exposed were not significantly affected by mating year. These estimates partly agree with those reported by (Morsy, 2002; Abd Allah, 2005 and Hamdon, 2005). Fertility traits tended to increase with advancing age of the ewes. The effect of age on fertility rate is in agreement with Mukasa and Lahlou-Kassi (1995), where the reproductive rate of older ewes was higher than that of younger ewes. Significant ($P<0.05$) increase in fecundity with increase age of ewes may result from an improved ovulation rate, uterine capacity or other maternal traits affecting the reproductive efficiency of the ewe (Fahmy, 1990). The improvement of lambing rate with an increase in ewe age may be due to the fact that, with the increase in the age of ewes, more ova are matured and the ewe's ability to maintain pregnancy Increases (Mukasa and Lahlou-Kassi, 1995). However, age of ewe affected weaning rate significantly ($P<0.05$) with older ewes (3 to 5 year) had higher weaning rates than younger ewes. This may be due to the high pre-weaning lamb mortality rate as a result of poor mothering ability and less milk production of the younger ewes.

Prolificacy traits

Breed of ewes had a significant ($P<0.01$) effect on all prolificacy traits studied. The Chios ewes had a higher litter size at birth, litter size at weaning, litter weight at birth and litter weight at weaning than Rahmani ewes. Despite the expected higher lamb losses in the ewes with a higher litter size, Chios ewes had higher litter size weaned than the Rahmani breed, indicating the superiority of the Chios breed in prolificacy reflected in litter size at weaning. The results obtained of litter size at birth and litter size at weaning for Chios ewes were lower than those recorded by Marzouk (1997) who reported 1.53 for litter size at birth and 1.13 at weaning. In addition, Morsy (2002) found that values of litter size at birth and at weaning in Chios ewes were 1.52 and 1.3, respectively. The present results were higher than those reported by Hamdon (2005) who found values of litter size at birth and at weaning for Chios ewes of 1.3 and 0.89, respectively. The estimates of litter size at birth of Rahmani ewes were approximately similar to those reported by Abd Allah (2005). Which results of the present study follow the same trend as reported in the literature by Ahmed *et al.,* (1992), Morsy (2002), Abd Allah (2005) and Hamdon (2005) who reported that genotype of ewe affected all prolificacy traits studied significantly.

There was no significant effect of lambing season on prolificacy traits. However, ewes lambed in Oct-Nov season had slightly higher litter size at birth than ewes lambed in Feb-Mar or June-July seasons. In contrast, ewes lambed in Feb-Mar season had a slightly higher litter weight at birth and at weaning than ewes lambed in Oct-Nov or June-July seasons. Feb-Mar lambing season was the best season by considering values of litter weight at birth and litter weight at weaning as compared with either Oct-Nov or June-July lambing seasons (4.33 vs. 4.28 & 4.13 kg) and (19.99 vs. 19.36 & 19.89 kg), respectively. These results are in agreement with Maharem (1996), Barghout (2000) and Morsy (2002) who reported that lambing season had no significant effect on each of litter size at birth, litter size at weaning, litter weight at birth and litter weight at weaning.

No significant differences in prolificacy traits have been observed between both lambing years. Similar results were obtained by Sallam et al. (1987) and Ahmed et al. (1992) who reported that year of breeding had no significant effect on prolificacy traits.

Litter size at birth and litter size at weaning were influenced significantly ($P<0.05$) by ewe age at mating. Highly significant ($P<0.01$) effect of ewe age on litter weight at birth was also observed, but no significant effect was observed on litter weight at weaning. These results may be attributed to significant increase in litter size as ewe advance in age due to the higher increase in ovulation rate, which was strongly correlated with litter size, (Mukasa and Lahlou-Kassi, 1995). These results can be due to the fact that older ewes (4 years old) had mature body size and better conformation. These provide higher ovulation rate and convenient uterus cavity that increase percentage of twins. These results are in good agreement with those reported by Hamdon (2005) who reported that the effect of ewe age at mating on prolificacy traits were highly significant. Abd Allah (2005) reported that age of ewes had no significant effect on litter size at birth.

Ewes aged 5 year-old or more had the highest value of litter weight at birth and litter weight at weaning than younger ewes. Presumably, the nursing ability as well as the milk production merit is stronger in the older ewes than younger ones. These results follow the same trend reported by Maharem (1996) that litter weight at birth and litter weight at weaning tended to increase with age of the ewe up to 5 years and then decreased with advancing age. Morsy (2002) found that age of ewe had a significant effect either on litter size at birth and at weaning or litter weight at birth and at weaning.

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Table 2 - Least-square means and their standard errors of some factors affecting prolificacy traits of Rahmani and Chios ewes

Items	N	Prolificacy traits			
		Litter size at birth	Litter size at weaning	Litter weight at birth	Litter weight at weaning[1]
Overall means	230	1.20 ± 0.15	1.01 ± 0.19	4.25 ± 1.21	19.75 ± 5.39
Breed of ewes		**	**	**	**
Rahmani (R)	139	1.03 ± 0.04	0.89 ± 0.05	3.73 ± 0.10	17.63± 0.51
Chios (C)	91	1.37 ± 0.05	1.13 ± 0.06	4.77 ± 0.14	21.87± 0.69
Mating season		Ns	Ns	Ns	Ns
Autumn	65	1.19 ± 0.06	0.96 ± 0.07	4.33 ± 0.17	19.99 ± 0.82
Summer	73	1.22 ± 0.05	1.03 ± 0.07	4.28 ± 0.14	19.36 ± 0.68
Winter	92	1.19 ± 0.05	1.03 ± 0.06	4.13 ± 0.13	19.89 ± 0.60
Mating year		Ns	Ns	Ns	Ns
2006	138	1.20 ± 0.04	0.97 ± 0.05	4.23 ± 0.14	19.33 ± 0.68
2007	92	1.19 ± 0.04	1.06 ± 0.06	4.12 ± 0.13	20.00 ± 0.61
Age of ewes		*	*	**	Ns
2yr-old or less	57	1.10 ± 0.06 ^{b}	0.94 ± 0.08 ^{b}	3.73 ± 0.17 ^{b}	19.95 ± 0.79 ^{ab}
≤3yr-old	44	1.13 ± 0.06 ^{ab}	1.04 ± 0.08 ^{ab}	4.10 ± 0.18 ^{ab}	18.94 ± 0.85 ^{a}
≤4yr-old	47	1.10 ± 0.06 ^{b}	0.95 ± 0.08 ^{b}	4.14 ± 0.18 ^{ab}	18.98 ± 0.84 ^{ab}
≤5yr-old	41	1.35 ± 0.07 ^{a}	1.24 ± 0.09 ^{a}	4.77 ± 0.21 ^{a}	20.53 ± 0.94 ^{b}
>5yr-old	41	1.31 ± 0.08 ^{ab}	0.85 ± 0.10 ^{b}	4.52 ± 0.21 ^{ab}	21.36 ± 1.07 ^{ab}

[1] Litter weight at weaning (at 3 month old)

Reproductive performance of lambs

Puberty and sexual maturity of ewe lambs

The breed of ewe lambs had a significant effect on age (P<0.01) and weight (P<0.05) at puberty. Chios ewe lambs reached puberty at younger ages and heavier weights (275.1day and 32.28 kg) than Rahmani ewe lambs (Table 3). These results conformed to those reported by Mousa (1991) and Hassan, *et al*. (2002) who found that Chios lambs reached puberty at younger ages than Awassi and Ossimi ewe lambs. Similar results were recorded by Michailidis (1985) who found that age at puberty was (243-290 days) which breed. The average puberty age reported in the present study (298.9 day) of Rahmani ewe lambs was very near to that previously reported by Aboul-Naga, *et al.* (1982) who obtained age and weight at puberty in Rahmani ewe lambs of 300.9 day and 34.1 kg, respectively. Such differences may be attributed to flock differences, location, as well as nutrition.

The effect of breed on age at maturity was highly significant (P<0.01). Chios lambs reached maturity significantly at younger age (329.1 vs. 352.9 day) and they were insignificantly heavier than Rahmani ewe lambs. Fahmy (1990) reported that breed had a significant effect on maturity in Finnsheep, Suffolk and Booroola ewe lambs. However, Attallah (1993) reported that breed of lambs had no significant effect on age at maturity, while the effect of breed on body weight at maturity was significant (P<0.05).

There was no significant difference in gestation length between Rahamni and Chios ewe lambs. Moreover, breed of lambs had a significant (P<0.01) on age at first lambing. Chios ewe lambs reached age at first lambing at younger ages (477 day) than Rahmani ewes (501.1 day). Age at first lambing of Djallonke sheep was 408 days obtained by Oppong-Anane, (1971), 575 days by Fall et al., (1982) and 638 days by Tuah and Baah, (1985). Generally, the effect of breed on estrous cycle length was significant (P<0.05), Chios ewe lambs had shorter estrous cycle length than Rahmani ewe lambs by 1.15 days.

Generally, the effect of birth type on age and weight at first estrus (puberty), age and weight at maturity was not significant (Table 3). Also, type of birth had no significant effect on gestation length, age at first lambing and estrus cycle length. This could be attributed to the variation in body weight between single and twin ewe lambs. These observations are in agreement with the findings of Mousa (1991) who reported a no significant effect on both pubertal age and pubertal weight. Hamdon (2005) reported that type of birth had no significant effect on age and weight at puberty.

Age at weaning had no significant on reproductive performance of ewe lambs, the early weaned ewe lambs attained puberty 8.7 and 11.1 day earlier than their contemporaries that weaned normally or late. This result is in agreement with those reported by Roux et al., (1978) on Karakul sheep, who found that early weaning did not increase the age at which lambs reached puberty. The results of this study were also in agreement with those reported by Aboul-Naga et al., (1982) and Mohamed (1986) on Rahmani and Barki ewe lambs, respectively.

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Table 3 - Least square means ± standard errors of some factors influencing puberty and maturity parameters for ewe and ram lambs of Rahmani and Chios breed.

Sources of variation	Ewe lambs							Ram lambs	
	Age at puberty (day)	Weight at puberty (kg)	Age at Maturity (day)	Weight at Maturity (kg)	Gestation length (day)	Age at first lambing (day)	Oestrus cycle length (day)	Age at first ejaculation (day)	Weight at first ejaculation (day)
Overall mean	287.0 ± 11.7	31.6 ± 1.72	341.0 ± 11.7	35.0 ± 2.89	148.9 ± 3.12	483.7 ± 12.9	17.57 ± 1.19	324.0 ± 28.48	36.65 ± 2.45
Breed of lambs	**	*	**	Ns	Ns	**	*	Ns	Ns
Rahmani	298.9 ± 3.83	30.92 ± 0.57	352.9 ± 3.83	34.41 ± 0.56	149.6 ± 1.14	501.1 ± 4.72	18.14 ± 0.39	328.5 ± 7.78	36.0 ± 0.76
Chios	275.1 ± 3.26	32.28 ± 0.48	329.1 ± 3.26	35.58 ± 0.47	148.2 ± 1.03	477.0 ± 4.26	16.99 ± 0.33	319.4 ± 12.1	37.3 ± 1.04
Type of birth	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns
Single	285.5 ± 4.92	32.04 ± 0.38	339.5 ± 4.92	35.44 ± 0.38	148.3 ± 0.75	490.3 ± 3.08	17.45 ± 0.27	317.6 ± 11.1	37.0 ± 0.86
Twins	288.5 ± 2.58	31.16 ± 0.73	342.5 ± 2.58	34.56 ± 0.72	149.5 ± 1.56	487.8 ± 6.45	17.69 ± 0.50	330.4 ± 9.98	36.2 ± 0.96
Weaning system	Ns	Ns	Ns	Ns	Ns	Ns	Ns	*	Ns
Early	280.4 ± 4.28	31.99 ± 0.63	334.4 ± 4.18	35.76 ± 0.62	149.9 ± 1.52	480.8 ± 6.26	17.78 ± 0.44	298.3 ± 12.0^{b}	37.8 ± 1.04
Normal	289.1 ± 3.38	31.53 ± 0.50	343.1 ± 3.38	34.97 ± 0.49	148.5 ± 1.01	492.6 ± 4.17	17.69 ± 0.36	333.2 ± 13.0^{ab}	35.4 ± 1.12
Late	291.5 ± 4.18	31.28 ± 0.62	345.5 ± 4.28	34.27 ± 0.61	148.4 ± 1.14	493.8 ± 4.71	17.23 ± 0.43	340.4 ± 10.8^{a}	36.6 ± 0.93

*= P < 0.05, ** = P < 0.01, NS = P > 0.05.

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The effect of age at weaning on age and weight at maturity was not significant. Ewe lambs of the early weaned group were not significantly younger (334.4 day) and heavier (35.76 kg) at maturity than those of the normal and late weaned groups. Similar results were reported by Mohamed (1986) in Barki ewe lambs, stating that the effect of age at weaning on age at maturity was not significant. Also, Attallah (1993) found that the effect of age at weaning on age at maturity was not significant. On the other hand, Aboul-Naga *et al* (1982) reported a significant effect of age at weaning on age at maturity of Rahmani ewe lambs. In the present study, early weaned lambs reached age at first lambing earlier by (12- 13 days) than normal and late weaned ewe lambs, but the differences was not statistically significant. Also, age at weaning had no significant effect on estrous cycle length of ewe lambs. This result was in agreement with those reported by Attallah (1993) who found that age at weaning had no significant effect on estrous cycle length of ewe lambs.

Age and weight **at puberty of ram lambs:**

The Chios ram lambs performed their first ejaculation at a slightly older age and heavier weight than Rahmani ram lambs. They showed better performance in terms of pubertal weight and age than Rahmani ram lambs, possibly due to slower growth rates (Aboul-Ela and Chemineau, 1988). Variation in pubertal age and weight within each breed was low.

Single born lambs reached puberty at younger age (317.6 vs. 330.4 days) and heavier body weight (37.3 vs. 36.0 kg) at first ejaculation than twins born lambs. Results obtained in Table (3) show that the difference in age at first ejaculation (puberty) between early, normal and late weaned ram lambs was a significant ($P<0.05$). Moreover, weight at first ejaculation did not differ significantly between the early, normally and late weaned ram lambs of both Rahmani and Chios. Early weaned ram lambs reached puberty at younger age (298.3 day) compared to normal and late weaning (333.2 and 340.4 day, respectively). Also early weaned lambs had heavier body weight (37.8 kg) than those normally (35.4 kg) and late weaned (36.6 kg) ram lambs.

These values were lower than those recorded by Mousa (1991) who indicated that the averages age at puberty for Ossimi and Chios were 296.8 and 334.9 days, respectively. Mohamed (1998) found that averages of age and weight of Ossimi ram lambs at puberty were 330 days and 38 kg. These results were higher than those recorded by Ali and El-Saidy (2003) who reported averages of age and weight of (½ Rahmani ½ Romanove) were 245 days and 38 kg at puberty. The results obtained by Hamdon (2005) for average age and weight of Farafra ram lambs at first ejaculation were approximately similar in magnitude, being (329.17 days and 36.19 kg).

CONCLUSSION

Chios ewes in this study had higher fertility, prolificacy, and total lamb weight weaned per ewe than did Rahmani ewes. It can be concluded from the present results that crossing the local subtropical fat-tailed Rahmani sheep with the mutton prolific Chios may improve lamb production from the local sheep. In the present study, Chios lambs reached puberty, maturity and age at first lambing at a younger age and heavier weight than Rahmani ewe lambs. Early weaning had no deleterious effect on lamb performance either in weight or in age at puberty and maturity. Early weaning is therefore recommended.

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