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# Effects of Lambing Season, Lamb Breed and Ewe Parity on Production Traits of Fat Tailed Sheep and Their Lambs

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**Abstract:** The reproductive performance of 154 local fat tailed sheep, lambed in the Autumn-Winter (AW) or Spring-Summer (SS) and weights and survival to 60 days of their 188 lambs (102 local and 86 Romanov cross) were evaluated. The litter size at birth and 60 days of AW and SS lambed ewes was 1.27 and 1.15; 1.26 and 1.19 lambs, respectively (p>0.05). At birth, ewes with greater (3rd-4th) parity produced more (p<0.05) lambs than ewes in first-second parity. Ewe postpartum weights at lambing were significantly different within parity (p<0.001) and lambing season (p<0.05). Ewes that lambed with greater parity (3rd and 4th) and in SS season had significantly higher body weights. Birth and weaning weights of lambs were affected by the lamb's genotype. Romanov sired lambs had heavier birth (4.3 vs 3.9 kg) and weaning (19.2 vs 15.7 kg) weights than lambs sired by local breed rams. Lambs born in SS reached higher (p<0.05) weaning weights (18.3 kg) than lambs born in AW (16.7 kg). The lamb's genetic group played an important but not significant role on survival. It was concluded that the greater parity of ewes results in better productivity and lambing season affected dam body weight and lamb growing performance.

**Key words:** Lambing season, romanov, fat tailed sheep, litter size, weaning weights, parity

## INTRODUCTION

In Eastern Turkey, the majority of ewes in fllocks under conventional management are bred in the fall to lamb in the winter. Kutluca *et al*. (2006) reported that fat tailed ewes raised in Eastern Anatolia have an active breeding season in September and October and an anestrous period (166 and 184 days) in the spring and late summer. Seasonal effects associated with lambing have been shown to influence birth weight and daily gain of lambs, as well as the lamb vigour. There have been inconsistent reports for lamb growth performance born in different seasons. Some researchers favoured fall and winter born lambs (Charon, 1988; Stritzke and Whiteman, 1982; Cristian and Suvela, 1999) while others underlined the advantages of spring born lambs (Jenkinson *et al*., 1995; Cruickshank and Smith, 1989; Morris *et al*., 1993). Lamb growth performance and vigour are not only associated with seasonal effect but also other environmental factors (e.g., litter size, ewe parity, maternal nutrition: Dwyer, 2003; Dwyer *et al*., 2003). Dwyer *et al*. (2005) stated that first parity mothers produced lighter litters than more experienced ewes. Moreover, parity number of ewe was noted as an important factor for lamb weights and average daily gains (Gbangboche *et al*., 2006). Cross-breeding with Romanov sheep (RO) has been practised in several countries of the Mediterranean basin (Ricordeau *et al*., 1990) to take advantage of high lamb vigour and rapid growth rates. In Eastern Turkey crossbreeding of fat tailed ewes with Romanov was started in 2004 to increase prolificacy.

The objective of this study was to assess the reproductive performance and productivity of local fat tailed ewes with different parity, when bred to rams of their own breed or to Romanov rams, to lamb in the Autumn-Winter or Spring-Summer season.

## MATERIALS AND METHODS

The Redkaraman and Tuj sheep are concentrated in the central highlands of Turkey at 2000 m above sea level. A total of 124 Redkaraman and Tuj fat tailed ewes, pregnant via laparoscopic insemination, were fed 400 g barley ewe day$^{-1}$ and 1.5 kg dried grass hay ewe day$^{-1}$. Ewes were treated with progesterone sponges (30 mg) and eCG (600 I.U.) and were inseminated with the same volume and dose of fresh diluted spermatozoa either from their own breed (n = 7) or Romanov rams (n = 5), in different breeding seasons (Spring or Autumn). All lambs born, regardless of lambing season, were creep fed from the first week of age up to weaning, with a pelleted feed containing 16% CP, 10% CF and 2500 kcal kg$^{-1}$ ME. The

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average amount of creep feed consumed by lambs was estimated as 100 g day$^{-1}$. Average age of lambs at weaning was 60 days. Water and mineral licks were available *ad libitum*.

Least squares analysis was used to evaluate the significance and magnitude of the random and fixed effects. After a preliminary analysis of frequencies and means to find what fixed effects to consider, the model for the reproductive traits of ewes included the effects of parity and season and were subjected to completely randomized design. The model used with lamb birth and weaning weights and mortality included the effect of lamb genotype and its interaction with the fixed effect of season. Data were analyzed by ANOVA using the GLM procedure. The difference between means was compared using the Duncan's multiple range tests. Survivability data was analyzed by chi-square ($\chi^2$).

## RESULTS AND DISCUSSION

Least squares means and standard deviations for litter size at birth and weaning and ewe postpartum weights at lambing are set out in Table 1. Parity was a significant source of variation (p>0.05) for litter size at birth but not at weaning. Ewes in their 1st and 2nd parity had significantly (p<0.05) lower litter size at birth compared to ewes with greater parity. Peak litter size was generally achieved at 4th parity of ewes, which is in agreement with Notter (2000). In other studies, Glimp (1971) reported that prolificacy in several US breeds was maximized at 5 years and that 2 year old ewes produced 0.19 fewer lambs than 3-6 year old ewes. Performance of primiparous ewes in this study was similar to those described in hair sheep such as Pelibuey, Blackbelly, West African, Morada Nova, Brazilian Somali and Santa Ines in which prolificacy was increased with advances in parity, showing the lowest values by young and primiparous ewes (Rajab *et al*., 1992; Galina *et al*., 1996; Pérez *et al*., 2005). Body weight of ewes at parturition was higher (p<0.01) in 3rd and 4th parity ewes. Lambing season did not affect litter size either at birth or weaning while ewes that lambed in spring-summer season had higher (p<0.05) postpartum weights at parturition. In general, it has been reported that lambing season and age of the ewe usually affected litter size (Mourad *et al*., 2001), while only litter size at birth was effected by parity of ewes in this study.

Birth and weaning weights of lambs were found significantly (p<0.01) different for local breed and Romanov sired lambs. Romanov sired lambs had higher birth (4.3 vs 3.9 kg) and weaning (19.7 vs 15.6 kg) weights than those recorded for local lambs. Spring-summer born lambs (18.3 kg) were 1.6 kg heavier (p<0.05) at weaning (60 days of age) than lambs born in Autumn-Winter (16.7 kg). The reverse tendency was reported by Yilmaz *et al*. (2007) and Zapasnikiene (2002). Lambing season did not affect lamb birth weights. This is in agreement with Yilmaz *et al*. (2007), who claimed that lambing season did not have a significant effect on birth weight. However, lamb genotype and lambing season interaction showed that Romanov cross lambs had higher birth weights in Autumn-Winter season but conversely higher weaning weights in spring summer season. The seasonal differences in birth and weaning weights in the current study may have been partly due to differences in parity of ewes, ambient temperature and maternal pre-natal effects during gestation (Table 2).

Higher indicators of the Romanov crossbreds compared with the local lambs were observed due to the significant genetic and geographical difference of exotic sire breeds and probably due to the suggested influence of heterosis. Similar results were reported by Meyer *et al*. (1978) and Mavrogenis and Louca (1979), who found that crossbreds had faster growth and higher live weight at 140 days of age as compared with purebred lambs. The local breed of lambs had the highest lamb mortality (0.10), while the Romanov cross lambs had the lowest (0.03). The

Table 1: Litter size at birth and weaning, body weight after parturition by parity of dam and lambing season

| Parity | n | Litter size at birth | Litter size at weaning | Ewe postpartum weights at lambing (kg±SD) |
|---|---|---|---|---|
| First | 43 | 1.23±0.3[a] | 1.10±0.4 | 48.3±6.4[a] |
| Second | 33 | 1.17±0.4[a] | 1.11±0.5 | 52.7±8.2[b] |
| Third | 24 | 1.25±0.5[b] | 1.25±0.5 | 57.7±9.2[c] |
| Fourth | 54 | 1.45±0.6[b] | 1.23±0.6 | 56.7±7.5[c] |
| | | * | ns | ** |
| **Lambing season** | | | | |
| Autumn-Winter (AW) | 81 | 1.27±0.5 | 1.15±0.5 | 52.0±7.1[a] |
| Spring-Summer (SS) | 76 | 1.26±0.5 | 1.19±0.5 | 55.5±9.4[b] |
| | | ns | ns | * |

Least squares means within a column followed by different letter differ (p<0.05); ns: p>0.05; *p<0.05; **p<0.01

Table 2: Least squares means±SD for weights and survival of lambs

| Lamb genotype | n | Birth weight | Weaning weight | Survivability (%) |
|---|---|---|---|---|
| Local (L) | 102 | 3.9±0.4[a] | 15.6±4.2[a] | 90 |
| Romanov Crossbred (RC) | 86 | 4.3±0.3[b] | 19.7±4.4[b] | 97 |
| | | ** | ** | ns |
| **Lambing season** | | | | |
| Autumn-Winter (AW) | 99 | 4.2±0.5 | 16.7±4.1[a] | 92 |
| Spring-Summer (SS) | 89 | 4.0±0.5 | 18.3±4.9[b] | 95 |
| | | ns | * | ns |
| **Interaction** | | | | |
| L-AW | 75 | 3.8±0.9[a] | 15.4±4.2[a] | 89 |
| L-SS | 27 | 4.1±1.1[a] | 16.2±4.3[ab] | 93 |
| RC-AW | 24 | 4.7±0.8[b] | 18.0±3.1[b] | 100 |
| RC-SS | 62 | 4.0±0.9[a] | 20.4±4.6[c] | 95 |
| | | ** | * | ns |

Least squares means within a column followed by different letter differ (p<0.05); ns: p>0.05; *p<0.05; **p<0.01

excellent lamb survival rate observed for composite breeds containing Romanov genetics has been previously recognized by other authors (Ricordeau *et al*., 1977). The trend of lamb mortality across lambing seasons was inconsistent for local and $F_1$ lambs. Romanov cross lambs had the lowest lamb mortality in spring and the highest in autumn.

## CONCLUSION

Primiparous, Redkaraman and Tuj ewes were less productive compared with multiparous ewes. Lambing that occured in spring-summer season favoured lamb growth performance and ewe postpartum weights. Fat tailed ewes could be crossed with Romanov rams in order to take advantage of heterosis and to form a unique flock which could constitute the framework for improved meat production of the fat tailed breed.

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