



Comparison of Mutton Charollais Lambs and Their Cross Lambs Born from Indigenous Fat Tailed and F1 Prolific Breed Ewes

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| ARTICLE INFO | ABSTRACT |
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| <p>Research Article</p> <p>Received 04 June 2018 Accepted 24 July 2018</p> <p>Keywords: Charollais Crossbreeding Embryo transfer Romanov Morkaraman</p> <p>*Corresponding Author: E-mail: ebruemsen@gmail.com</p> | <p>The objective of this study was to evaluate the effects of dam breed on lambs sired by Charollais rams and purebred Charollais lambs obtained via embryo transfer. Frozen Charollais semen and embryos, used to obtain crossbred and purebred Charollais lambs, were imported from elite flock with pedigrees and progeny test in Canada. The study was conducted on the crossbred Charollais lambs born from Tushin, and Romanov F1 ewes (Romanov × Morkaraman), and Charollais lambs born from Awassi, Morkaraman and Tushin surrogate ewes. The data was collected on 61 lambs (23 Charollais: CH, 20 Tushin × Charollais: F1 CH and 18 Charollais × Romanov F1:COR) from birth to weaning. Average weights at birth for CH, F1 CH and COR lambs were 4.32 ± 0.18 kg, 4.17 ± 0.18 kg, 3.18 ± 0.19 kg and at the age of 60 days were 21.20 ± 1.07 kg, 20.94 ± 0.84 kg, 18.13 ± 0.91 kg, respectively. The genotype of dams significantly affected birth and weaning weights of crossbred lambs, but not average daily live weight gain (ADG). Litter size had constant significant effect on the traits evaluated. Survival rates of crossbred lambs from birth to weaning were affected by the dam genotype. Birth weights and survival rates of CH lambs born from embryo transfer were affected by recipient genotypes and Awassi ewes were found to be the best surrogate mothers.</p> |

DOI: <https://doi.org/10.24925/turjaf.v6i10.1419-1421.2051>

Introduction

Interest in sheep meat production has increased over the last few years, particularly lamb meat with lower fat content, which reflects with consumer preference (Woodward and Wheelock, 1990; Momani Shaker et al., 1996). Many authors reported that it is relatively easy and quick to increase fecundity and growth ability of lambs to an optimum level by means of crossing domestic breeds with prolific and mutton breeds (Romanov, Finnish sheep, Charollais, Texel, etc.), as well as forming synthetic breeds or lines (Momani Shaker et al., 1994; Momani Shaker et al., 1995). Breed substitution has been shown to be a rapid, cost effective means of improving lamb carcass quality (Carson et al., 1999). Stratified crossbreeding program have been used in the sheep industry in Turkey. Texel, Ile de France, Dorset, Hampshire, Lincoln, B. Leicester and German Black Face sires have been shown to improve lamb growth rate in the western region of the country (Kaymakci, 1990; Kaymakci et al., 1999; Ertugrul et al., 1989). The information on the effects of using Charollais sires on

lamb output under high altitude and cold climate environmental conditions is needed. Therefore a research program was set up to compare three lamb genotypes, produced by the Charollais terminal sire breed, for growth rate and survival of lambs kept under semi intensive conditions in the northeast of Turkey.

Material and Methods

This experiment was conducted at the Ataturk University, Sheep Research and Application Farm. A total of 60 frozen embryos were imported from Canada and transferred into three local sheep breeds. The purebred Charollais (CH) lambs were born from three dam (2-5 years old) genotypes such as Awassi (n= 4), Morkaraman (n = 6), Tushin (n=7). Charollais F1 (CH F1) lambs born from Tushin ewes (n=9) and Charollais terminal cross lambs (COR) born from Romanov F1 ewes (n=9). Dams of F1 and terminal cross lambs were bred by laparoscopic artificial insemination (LAI) using frozen thawed

Charollais semen imported from Canada. The traits evaluated were measured from the start of the lambing to weaning of the lambs, at 8 weeks of age. Litter size at birth, sex of lambs, birth and weaning weight of lambs were recorded. All lambs were offered a total-mixed creep diet (2.50 Mcal of ME kg⁻¹ DM with 16% CP) by approximately 14 days of age. The average amount of creep feed consumed by lambs was estimated at 100 g/day. For the finishing experiment, lambs raised on the same farm were placed on a finishing diet for 70 days after weaning. At the beginning of the finishing period, the live weights of all lambs (body weight at three consecutive days after weaning) were recorded. The animals were fed a concentrate diet *ad libitum* and 250 g clover hay/animal/day. The concentrate diet contained 90.0% dry matter and 168 g crude protein, 88.8 g crude ash and 98 g crude fat/kg feed. The hay contained 91.2% dry matter and 139 g crude protein and 375 g crude fibre/kg feed. Live body weights of all animals were recorded every two weeks.

The model for the growth traits included the effects of genotype, litter size and sex of the lambs. 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 (χ^2).

Results

Lamb birth and weaning weights were significantly different between breeds. Birth and weaning weights of lambs were found significantly ($P<0.01$) higher in CH and F1 CH than COR lambs (Table 1.). Litter size at birth was 1.4, 2.2, and 2 for CH, F1CH and COR lambs, respectively. Crossbred lambs, which had different birth weights, were usually twins. F1 CH lambs were produced by fat tailed ewes with larger body sizes than the medium size of Romanov F1 dams. Even though the Charollais percentage is the same in both crossbred genotypes, dam genotype affected the birth weights of lambs and consequently later growth rates.

Average daily gains were found to be similar for the three lamb genotypes. Survival rates from birth to weaning were significantly different for the genotypes studied. CH lambs were recorded with a lower ($P<0.01$) survival rate compared to crossbred lambs (Table 1.). Sex of the lambs did not affect any of the traits studied, while birth type was associated with significant differences for traits evaluated.

Charollais lambs born to Awassi and Morkaraman recipients had higher ($P<0.05$) birth weights than those born from Tushin. Weaning weights and ADG of the lambs were found to be similar between recipient breeds (Table 2).

Table 1 Mean (\pm S.E.) birth weight, weaning weight, average daily gain and survival rates of Charollais (CH), Charollais×Tushin (F1 CH) and Charollais x Romanov F1 (COR) Lambs

| Indicator | N | Birth Weight (kg) | Weaning Weight (kg) | ADG (g) | Survival Rate (%) |
|------------|----|-----------------------------|------------------------------|--------------------------------|-------------------|
| Genotype | | | | | |
| F value | | 12.27*** | 3.74* | 1.85 | 5.47*** |
| CH | 23 | 4.3 \pm 0.18 ^a | 21.2 \pm 1.07 ^a | 278.8 \pm 16.41 ^a | 68.4 ^a |
| F1 CH | 20 | 4.1 \pm 0.18 ^a | 20.9 \pm 0.84 ^a | 280.7 \pm 12.92 ^a | 100 ^b |
| COR | 18 | 3.1 \pm 0.19 ^b | 18.1 \pm 0.91 ^b | 248.8 \pm 13.93 ^b | 94.1 ^b |
| Sex | | | | | |
| F value | | 3.35 | 0.01 | 0.03 | 1.11 |
| Female | 30 | 4.0 \pm 0.14 | 20.1 \pm 0.70 | 268.2 \pm 10.79 | 92.3 |
| Male | 31 | 3.7 \pm 0.13 | 20.0 \pm 0.68 | 270.7 \pm 10.50 | 82.8 |
| Birth Type | | | | | |
| F value | | 41.68*** | 19.80*** | 13.77*** | 1.96 |
| Single | 14 | 5.5 \pm 0.22 ^a | 25.8 \pm 1.06 ^a | 341.9 \pm 16.15 ^a | 92.3 ^a |
| Twin | 32 | 3.3 \pm 0.13 ^b | 18.6 \pm 0.72 ^b | 251.9 \pm 11.07 ^b | 79.3 ^b |
| Triplet | 15 | 2.7 \pm 0.22 ^b | 15.8 \pm 1.04 ^c | 214.5 \pm 15.94 ^c | 100 ^a |

* $P<0.05$; ** $P<0.01$; *** $P<0.001$

Table 2 Mean (\pm S.E.) birth weight, weaning weight, average daily gain and survival rates of pure Charollais lambs born from Awassi, Morkaraman and Tushin recipients.

| Indicator | Birth Weight (kg) | Weaning Weight (kg) | ADG (g) | Survival Rate (%) |
|--------------------|-----------------------------|---------------------|-------------------|--------------------|
| Recipient Genotype | | | | |
| F value | 4.04* | 0.10 | 0.29 | *** |
| Awassi | 6.3 \pm 0.67 ^a | 24.90 \pm 1.97 | 308.5 \pm 25.18 | 100.0 ^a |
| Morkaraman | 5.7 \pm 0.60 ^a | 25.70 \pm 0.97 | 335.5 \pm 25.18 | 50.0 ^b |
| Tushin | 4.3 \pm 0.44 ^b | 24.48 \pm 1.76 | 324.4 \pm 22.53 | 45.4 ^b |

* $P<0.05$; ** $P<0.01$; *** $P<0.001$

Discussion

Birth weight of animals is one of the most important factors influencing the pre-weaning growth of the young. Martinez (1983) has reported a positive correlation between birth weight and subsequent live body weight

development in sheep. In another study (Gatenby, 1986), it is stated that lambs that are heavier at birth grow faster than light birth weight lambs. The results of the current study supported the reports referenced above.

Weaning weights of CH lambs were found to be similar to those (23.2 kg) reared in Hungary (Komlósi, 2008). Charollais lambs raised in Hungary had higher (313.3 g versus 278.8 g) ADG than the lambs reared by recipient breeds such as Awassi, Morkaraman and Tushin. Kridli et al., (2006) reported for F1 CA (50% Charollais: 50% Awassi) reached weaning at 70 days weighing 20.6 kg and this result was found to be similar with the current study findings. In another study conducted in Slovenia, the goal was to improve growth and carcass traits of the prevalent breeds in Slovenia by crossbreeding with Charollais. The daily gain weights were reported for Charollais F1 lambs as 268±9 g/day which was relatively lower than the results obtained from F1 Charollais lambs in our study (Cividini et al., 2005). When different terminal sire breeds such as Texel, Suffolk and Charollais were used in terminal crossbreeding programs in mountainous areas having a temperate climate in the UK, birth weights were found to be 4.88 ±0.04 kg for lambs sired by Charollais (Yağoob et al., 2004). This is higher than the birth weights obtained from either pure Charollais lambs or hybrid crosses in the current study. The difference could be explained by dam genotype. In a different study (Yağoob et al., 2005) conducted with the same animal genotypes, growth rates from birth to weaning were found to be 273 g/day for lambs sired by Charollais which is similar to the F1 CH lambs. Sweeney and Hanrahan et al. (2008) reported that lamb survival, as measured by the number of lambs reared, was 1.78 over 1.94 for Charollais pure bred lambs which was 20% higher than the pure Charollais born from embryo transfer. Survival rates of Charollais lambs in our previous study (Emsen et al., 2008) were 75% and it showed that recipient dams from local sheep breeds had a negative impact on the survival of Charollais lambs. It is concluded that Awassi was the best recipient in terms of total outcome of frozen embryo transfer.

Conclusion

In crossbreeding studies to produce lambs for slaughter in Turkey since 1980, it was seen that German Black Headed Mutton and Hampshire Down rams were more successful at crossbreeding with native breeds. With the crosses of other mutton sheep breeds (Border Leicester, Lincoln, Dorset Down, Ile de France etc) under various ecological conditions in Turkey, some problems like low fertility and adaptation of lambs were reported (Baspınar et al., 1991; Bulmus and Demir, 1995). It is concluded that Charollais breed can be a valuable source of mutton breed for the northeast Turkey to obtain high growing rates and acceptable survival rates of lambs produced as F1 or terminal crosses.

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