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Effect of sex on live weight and growth intensity of Thracian merino lambs

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Abstract

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The aim of the present study was to determine the effect of sex on live weight and growth intensity of lambs of the Thracian merino breed, raised at the Agricultural Institute in Stara Zagora. For the period of two years, ewes in the flock were divided into 2 groups – mated in the spring (hormonally treated) and in the summer (not hormonally treated). The autumn progeny formed the Ist (experimental) group and respectively the winter progeny – the IInd /control/ group. Live weight of lambs at birth, at 10, 30, 70 days of age and at weaning was reported and growth intensity was calculated. Feeding and rearing were equal for both groups. As a result, it was found that male lambs had a higher live weight than females, born in the autumn, with the exception of twins at weaning. Significant differences were found at all ages for the singles /except at weaning/ and from birth up to the 30th day of age for the twins. The male progeny, born in the winter, also showed higher live weight than female progeny, except for the singles at 30 days of age. Significant differences of medium degree ($p < 0.01$) were established at the age of 70 days for both singles and twins and of low degree ($p < 0.05$) only for the twins at birth and at 10 days of age. The live weight of lambs from both groups increased most intensively in the period from 30th to 70th day after birth, except for the females, born in the winter, which grew rapidlier by the 10th day after birth in comparison to the next ages. A higher average daily gain was calculated for the male progeny in the experimental group, while in the control group the results varied by sex.

Keywords: Thracian merino breed; ewes; lambs; effect of sex; average daily gain

Introduction

Reproductive traits play a leading role in all productive sheep systems (Gallivan, 1996; Matika et al., 2003) due to their great contribution to profitability (Hanford et al., 2003). Improving environmental conditions (feeding and flock management) and applying of appropriate genetic selection are the main instruments for increasing reproductive efficiency in sheep (Fogarty, 1995) and optimizing lamb production as a source of farmer income (Yavarifard et al., 2015). Any selection program aimed at improving the growth abilities of animals should be designed on the basis of genetic and environmental influences on the relevant traits (Yazdi et al., 1999), and non-genetic factors should be studied and corrected before starting a genetic analysis. Adjustments should be made for environmental and physiological sources of variation such as age, sex, type and season of birth, number of lambs born and other variables whose influence can be identified and evaluated (Babar et al., 2004). The effect of environmental factors on the growth and development of lambs has been analyzed by a number of authors, as these factors have a specific impact on the respective geographic areas they are studied for (Gbangboche et al., 2006; Momoh et al., 2013).

The present paper is focused on the influence of the sex of progeny, which has also been studied by Sowande and Sobola (2008), Cloete et al. (2001), Babar et al. (2004), Petrovic et al. (2009, 2011, 2015), Tohidi et al. (2017) etc.

The Thracian merino breed, which was the object of study, was in the near past intended for wool production, but since it has lost its economic importance in recent years, the lambs for slaughter are the main source of income. This fact determined the need of studying the genetic and non-genetic factors influencing the growth characteristics of lambs, mainly in order to increase lamb revenues.

The aim of this study was to establish the effect of sex on live weight and growth intensity of Thracian merino lambs.

Material and Methods

The study was conducted in the Experimental farm of the Agricultural Institute in Stara Zagora for the period of 2 years. Female animals from the flock of the Thracian merino breed were divided into 2 groups according to the breeding and lambing season. Vaginal sponges for estrus synchronization and hormonal treatment for inducing superovulation were applied, so that ewes from group I could be mated in the spring (April-May) in ancestral season. No hormonal tratment was made to the ewes of group II, mated in the summer (July-August) during estrous. The progeny lambed at the autumn was Ist (experimental) group, and progeny born in the winter – IInd (control) group, respectively. Live weight of lambs was reported at birth, at 10, 30, 70 days of age and at weaning. The influence of sex on the weight development and intensity of growth in lambs were established. Feeding and rearing was equal for both groups of lambs and ewes. Data from the records of productive performance controls of the flock were processed using Discriptive statistics of the program Statistica for Windows.

Results and Discussion

The effect of sex on live weight of lambs from the experimental group is presented in Table 1. Male and female single lambs and male twin lambs, born in the autumn, were weaned before the 70th day of age, which explains why their body weight was reported higher than at weaning. Only female twins were weaned at a higher age (> 70 days).

Male singles outweighed females as followed: at birth – by 17.34%, at 10 days – by 16.39%, at 30 days – by 15.38%, at 70 days – by 18.08% and at weaning – by 10.99%. Significant differences were found at all ages, except at weaning, with the highest degree of significance at 30 days of age.

The same trend was observed for twin lambs – males had a higher live weight than females, except at weaning. The differences were small, in the range of 1.77% – 2.96% and with a low degree of significance at birth, at 10 and 30 days of age. The difference at weaning was higher – 5.24%, but not significant.

Table 2 shows the influence of sex in the control group. Both male and female lambs were weaned after 70th day of age, so the live weight at weaning was reported higher.

The level of the trait was again calculated higher in male singles than in females, except for the age of 30 days. The difference found at different ages was small and ranged from 1.56% to 9.86%, as only at the age of 70 days was significant ($p < 0.01$).

Male twins were definitely heavier than female, as the differences were higher than in the experimental group – 8.49%, 2.61%, 6.29%, 10.25% and 7.42%, respectively. With low degree of significance were calculated the differences at birth and at 10 days of age, and of medium significance – at 70 days of age.

Table 1. Live weight of lambs born in the autumn, depending on sex

Live weight	Male lambs (I group)			Female lambs (I group)		
	n	$\bar{x} \pm Sx$	C, %	N	$\bar{x} \pm Sx$	C, %
Singles						
– at birth	26	3.931 ± 0.199*	25.85	22	3.350 ± 0.181*	25.37
– at 10 days	26	6.973 ± 0.195**	14.27	22	5.991 ± 0.265**	20.73
– at 30 days	26	13.516 ± 0.336***	12.43	22	11.714 ± 0.360***	14.41
– at 70 days	8	27.750 ± 0.977*	9.96	8	23.500 ± 1.763*	21.22
– at weaning	8	25.250 ± 1.206	13.51	8	22.750 ± 1.250	15.54
Twins						
– at birth	55	3.044 ± 0.056*	13.73	58	2.991 ± 0.072*	18.39
– at 10 days	55	5.487 ± 0.107*	14.43	58	5.345 ± 0.114*	16.28
– at 30 days	55	9.838 ± 0.225*	16.96	58	9.590 ± 0.218*	17.35
– at 70 days	25	20.920 ± 0.695	16.61	22	20.318 ± 0.796	18.38
– at weaning	25	20.040 ± 0.474	11.83	22	21.091 ± 0.501	11.13

Significance:
Sex: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 2. Live weight of lambs born in the winter, depending on sex

Live weight	Male lambs (II group)			Female lambs (II group)		
	n	$\bar{x} \pm Sx$	C, %	N	$\bar{x} \pm Sx$	C, %
Singles						
– at birth	40	3.770 ± 0.159	26.66	63	3.590 ± 0.110	24.37
– at 10 days	40	6.410 ± 0.157	15.54	63	6.400 ± 0.169	20.95
– at 30 days	40	11.470 ±0.318	17.52	63	11.630 ± 0.306	20.91
– at 70 days	40	23.575 ± 0.485**	13.00	63	21.825 ± 0.346**	12.57
– at weaning	40	24.175 ± 0.620	16.23	63	23.984 ± 0.552	18.27
Twins						
– at birth	20	3.155 ± 0.097*	13.82	40	2.908 ± 0.082*	17.92
– at 10 days	20	5.595 ± 0.148*	11.87	40	5.433 ± 0.097*	11.28
– at 30 days	20	10.080 ± 0.333	14.75	40	9.483 ± 0.210	13.98
– at 70 days	20	21.375 ± 0.614**	12.85	40	19.388 ± 0.395**	12.88
– at weaning	20	23.875 ±0.573	10.74	40	22.225 ± 0.383	10.90

Significance:
Sex: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Similar results were obtained by Zishiri (2009), taking into account the influence of non-genetic factors on the growth intensity of Dorper, Ile de France and Merino Landsheep lambs at an early age. The author reported that male lambs were considerably heavier than female. Petrovic et al. (2009) showed a similar trend for the Mis sheep population in Serbia – the average live weight of male progeny at birth was 4.54 kg and that of female progeny – 4.52 kg, the difference being small and insignificant. However, according to other authors, the influence of sex on birth weight was significant (Unal & Akcapinar, 2001; Notter et al., 2005). Petrovic et al. (2015) pointed out that the live weight at birth and weaning of lambs born after crossing of two local Serbian breeds /Pirot and Sjenica/ with Wurttemberg was significantly influenced by their sex. Male crossbred lambs were 1.13 kg and 1.01 kg heavier than females, respectively. Yilmaz et al. (2007) also indicated that males were 0.5 kg heavier at birth than females. According to McManus et al. (2003), Babar et al. (2004), Macedo and Arredondo (2008) and Ulutas et al. (2010) this also refered to the next ages – at 3, 6, 9 and 12 months.

In Bulgaria, Ivanova and Raicheva (2017) found a higher live weight at birth for male lambs of the Ile de France breed, and Iliev et al. (2018) reported an advantage of male animals from weaning to 18 months of age for the Karnobat merino breed. Stoychev et al. (2015) established live weight of 25.14 kg and 32.01 kg for male and 24.15 kg and 31.25 kg for female lambs of the White marishka breed, at 60 and 90 days of age, respectively.

Matika et al. (2003), Nourian (2000), Shahroudi et al. (2003) and Rashidi (2008) found major differences in weight of lambs according to their sex. The authors explained this fact with the hormonal secretion, mainly of estrogen, which had a limited effect on the growth of long bones in female individuals. This is probably one of the reasons why they had a smaller body and lower weight than males (Baneh and Hafezian, 2009; Rashidi, 2008; Shahroudi et al., 2002). According to Lupi et al. (2015) testosterone contributes to the more intensive postnatal development of male animals because, as a steroid hormone, it stimulates growth due to its anabolic effect.

The average daily gain of lambs, as a clearer growth indicator, is presented in Figures 1 and 2. In both groups it reached its maximum in the period from 30 to 70 days of age. There was a exception however – female lambs from the control group, which grew most intensively from birth to the 10^{th} day.

In single lambs, born in the autumn, the trait showed higher values in males than in females – by 15.35%, 14.28% and 20.86% (Figure 1). In both sexes there was a tendency of increasing the level of the indicator with increasing the age. The results obtained fully corresponded to the abovementioned superiority of male lambs over females in terms of weight.

In singles born in winter, the growth rate was higher for females – by 6.48% and 2.25%, but only for the first and second periods /to the 10^{th} and from 10^{th} to 30^{th} day/. Its advantage until the 10^{th} day of age was comparatively low and due to that reason the live weight remained in favor of the male progeny. Just at the age of 30 days females managed to overweight males. After 30 days of age, however, male lambs began to grow more intensively /by 18.78%/ and at 70 days they were 1.75 kg heavier than females.

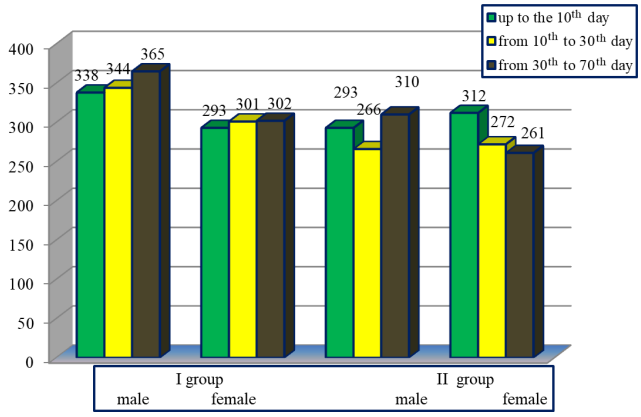

Fig. 1. Average daily gain of single lambs, g

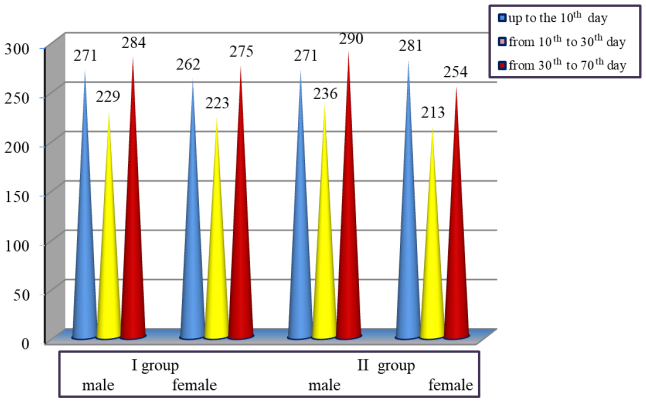

Fig. 2. Average daily gain of twin lambs, g

The tendency, which definitely outlined in twin lambs (Figure 2) was of decreasing average daily gain for the second period /from 10th to 30th day of age/ compared to the first one (from birth to the 10th day) and again of increasing during the third one (from 30th to 70th day).

In twins born in the autumn, a higher growth rate was reported for male lambs than for female – by 3.43%, 2.69% and 3.27%, respectively. The differences were small and inessential, but together with the higher birth weight they affected the higher weights of males at the next ages (Table 1).

In twins born in winter, the intensity of growth was higher for the female progeny until the 10th day after birth (by 3.69%). In the following periods (from 10th to 70th day of age) males had a notable advantage both in terms of growth rate – by 10.8% and 14.17%, respectively, and also as an absolute value of live weight of lambs at the age of 30 and 70 days of age (Table 2).

Similar results were reported by Mellado et al. (2016) for the Dorper breed in Mexico, and by Norouzian (2014) for the Iranian Balouchi breed, finding a higher average daily gain for male than for females lambs.

In Bulgaria, Ivanova & Raicheva (2017) also pointed out that male Ile de France lambs had an advantage over females in terms of growth intensity. Stoychev et al. (2015) reported values of the trait 418.9 g and 229.1 g in males and 402.5 g and 236.4 g in females from birth to the 60th day of age and from the 60th to the 90th day of age in the White marishka breed.

Conclusions

It could be summarized that male lambs, born in the autumn, had a higher live weight than females, with the exception of twins at weaning. Significant differences ($p < 0.05$, $p < 0.01$ and $p < 0.001$) were found at all ages for the singles /except at weaning/ and from birth up to the 30th day of age for the twins. The male progeny, born in the winter, also showed higher live weight, except for the singles at 30 days of age. Significant differences of medium degree ($p < 0.01$) were established at the age of 70 days for both singles and twins and of low degree ($p < 0.05$) only for the twins at birth and at 10 days of age. The live weight of lambs from both groups increased most intensively in the period from 30th to 70th day after birth, except for the females, born in the winter, which grew rapidlier by the 10th day after birth in comparison to the next ages. A higher average daily gain was calculated for the male progeny in the experimental group, while in the control group the results varied by sex .

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