

## Environmental Factors Influencing Birth Weights of Norduz and Karakas Lambs

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**Abstract:** The aim of this study was to compare birth weights of Norduz and Karakas genotypes and determine the effects of gender, birth type, dam age and genotype on birth weight. The data were composed of a total of 204 (103 Norduz and 101 Karakas) lambs born in 2003 in Van, in located region of the Eastern Anatolia, Turkey. The effects of gender ( $p < 0.05$ ), birth type ( $p < 0.05$ ) and dam age ( $p < 0.05$ ) on birth weight were found to be significant, whereas difference among averages of birth weight of breeds was found to be non-significant. As a result, using of birth weight as crucial criterion for early selecting animal is based on determination and elimination of some factors affecting the trait.

**Key words:** Birth weight, norduz, karakas lamb

### INTRODUCTION

Sheep breeding contributes noticeably to economy and nourishment of all people in Turkey and World. The fat-tailed Norduz and Karaka<sup>o</sup> sheep which are subtypes of Akkaraman breed raise in Van, the Eastern Anatolian province of Turkey and have the best adaptation to harsh environmental and management conditions, poor feeding and diseases (Aygun and Bingol, 1999; Bingol *et al.*, 2006; Yilmaz *et al.*, 2007). These genotypes are conventionally raised on small household farms in the Eastern Anatolian Region of Turkey.

It is well-known that live weight at birth and pre-weaning periods of lambs in sheep provide useful information for breeding effective selection program. Correction of significant macro environmental factors (birth type, gender, rearing systems, dam age at lambing and year etc.) influencing birth weight and pre-weaning weight is very important for researchers to estimate accuracy genetic parameter and breeding value in a selection program (Thieme *et al.*, 1999; Matika *et al.*, 2003; Cemal *et al.*, 2005).

The aim of this study was to compare birth weights of Norduz and Karakas lambs and determine the effects of the gender, the dam age, the birth type and the breed on birth weight.

### MATERIALS AND METHODS

The data were collected from 204 lambs (103 Norduz and 101 Karakas) in 2003 at Research and Application

Farm Faculty of Agriculture, University of Yuzuncu Yil, in Van, Turkey. The data composed of gender (male and female), birth type (single and twin), dam age (1, 2, 3, 4, 5, 6 and 7 years) of lambs of Norduz and Karakas breeds. The fat-tailed Karakas and Norduz sheep, a subtype of the Akkaraman breed, are characterized by adaptation to harsh environmental and feeding conditions. Animals of both genotype were kept under same management and feeding conditions.

The assumed linear model for analyzing the data was as follows:

$$Y_{ijklm} = \mu + b_i + g_j + z_k + t_l + e_{ijklm}$$

where,

- $Y_{ijklm}$  : Birth weight associated to m. lamb with i. genotype, j. gender, k. dam age and l. birth type,
- $\mu$  : Expected mean of birth weight,
- $b_i$  : I. effect of genotype (i= 1, 2; Norduz and Karakas)
- $g_j$  : j effect of gender (j= 1, 2; male and female)
- $z_k$  : k. effect of dam age (k= 1, 2, 3, 4, 5, 6 and 7)
- $t_l$  : l effect of birth type (l= 1, 2; single and twin)
- $e_{ijklm}$  : the random error normally distributed with mean zero and variance  $\sigma_e^2$ .

Statistical analysis was performed by using GLM procedure of SAS statistical package program and differences between means were evaluated using Duncan's Multiple Range Test (SAS, 2005).

**RESULTS AND DISCUSSION**

Descriptive statistics for birth weights of Norduz and Karakas lambs are presented in Table 1.

Difference between averages of birth weights of Norduz and Karakas lambs was found to be non-significant. These findings are consistent with Aygun and Bingol (1999) that difference among averages of birth weights of Norduz and Karakas lambs was not significant. Averages of birth weights for Norduz and Karakas lambs in this study were heavier than those of Aygun and Bingol (1999), who found as 4.11 and 4.19 kg, respectively. As seen in Table 1, average of birth weights of Karakas lambs was heavier than that stated by other authors (Demirulus and Karaca, 1994; Gokdal *et al.*, 1999; Ulker *et al.*, 2004).

The averages for birth weight of Norduz and Karakas lambs are presented in Table 2.

As seen in Table 1 and Table 2, the effect of ewe age had significant effect on birth weight ( $p < 0.05$ ). These findings were in agreement with those reported by Aygun and Bingol (1999) studied on same breeds, but not in consistent with Kucuk (2004) for Morkaraman, Karakul and Hamdane breeds, Tekin and Akcapinar (1994) for Turkish Merino and Turkish Merino x Lincoln crossbreed and Boztepe *et al.* (1994) and Karakaya *et al.* (1997) for Awassi lambs.

The effect of birth type on birth weight was found to be significant ( $p < 0.05$ ). These findings were in consistent with findings of Aygun and Bingol (1999), Kucuk (2004), Boztepe *et al.* (1994), Karakaya *et al.* (1997), Tekin and Akcapinar (1994), Koyuncu *et al.* (1999), Yilmaz *et al.* (2007).

It is clearly demonstrated that the effect of gender is significant on birth type ( $p < 0.05$ ). The finding was generally in consistent with literature (Kucuk, 2004; Boztepe *et al.*, 1994; Karakaya *et al.*, 1997; Aygun and Bingol, 1999; Tekin and Akcapinar, 1994; Gokdal *et al.*, 1999; Demirulus and Karaca, 1994; Koyuncu *et al.*, 1999; Yilmaz *et al.*, 2007).

The significant effects of sex and birth type on birth weight were not in agreement with previous studies (Koyuncu *et al.*, 1999; Thieme *et al.*, 1999; Esenbuga and Daytoglu, 2002; Ates *et al.*, 2003; Matika *et al.*, 2003; Emsen *et al.*, 2004; Hassen *et al.*, 2004; Cemal *et al.*, 2005; Gootwine and Rozov, 2006; Yilmaz *et al.*, 2007).

It is essential that the dam age, birth type and gender is to be studied while considering birth weight of lambs. It is well-known that differences among results of studies on birth weight may be due to genotypic and environmental variations (Falconer and Mackay, 1996).

Table 1: Descriptive statistics for birth weight of Norduz and Karakas lambs (kg)

Factors	n	$\bar{X} \pm S_x$	Minimum	Maximum
Overall mean	204	4.59±0.06	1.80	6.30
Genotype		NS		
Norduz	103	4.52±0.09	1.80	6.20
Karakas	101	4.67±0.07	3.00	6.30
Dam age (year)		*		
1	7	4.33±0.33ab	2.70	5.30
2	50	4.75±0.11a	3.20	6.30
3	67	4.47±0.11a	1.80	6.20
4	35	4.61±0.13a	3.00	6.10
5	36	4.73±0.09a	3.30	5.70
6	6	4.51±0.38a	3.90	6.20
7	3	3.70±0.75b	2.80	5.20
Birth type		*		
Single	118	4.83±0.07a	1.80	6.30
Twin	86	4.26±0.07b	2.50	6.20
Gender		*		
Male	102	4.79±0.07a	2.80	6.30
Female	102	4.40±0.08b	1.80	6.10

(\*):  $p < 0.05$ ; NS: Non Significant; <sup>ab</sup>: Difference among column means with the different letters for each factor is significant ( $p < 0.05$ )

Table 2: Mean (±S.E.) birth weight of Norduz and Karakas lambs (kg)

Factors	Birth weight			
	Karakas <sup>a</sup>		Norduz	
	N	$\bar{X} \pm S_x$	n	$\bar{X} \pm S_x$
Overall mean	101	4.67±0.07	103	4.52±0.09
Dam age (year)		NS		*
1	2	4.40±0.60	5	4.30±0.44ab
2	21	4.97±0.17	29	4.6±0.13a
3	35	4.55±0.09	32	4.38±0.20ab
4	22	4.55±0.14	13	4.72±0.25a
5	15	4.83±0.12	21	4.65±0.13a
6	6	4.51±0.38	-	-
7	-	-	3	3.70±0.75b
Birth type		*		*
Single	57	4.84±0.10a	61	4.83±0.10a
Twin	44	4.46±0.06b	42	4.05±0.12b
Gender		*		*
Male	57	4.81±0.09a	45	4.77±0.11a
Female	44	4.50±0.09b	58	4.32±0.12b

(\*):  $p < 0.05$ ; NS: Non significant; <sup>ab</sup>: Difference among column means with the different letters for each factor is significant ( $p < 0.05$ )

Contrarily, the non-significant influence of genotype or breed for birth weight was not in line with Thieme *et al.* (1999); Boujenane and Kansari (2002); Ates *et al.* (2003); Matika *et al.* (2003); Hassen *et al.* (2004), Emsen *et al.* (2004), Emsen (2005) and Cemal *et al.* (2005), but does agree with the results of Esenbuga and Daytoglu (2002).

The significant effects of sex and birth type on birth weight were not in agreement with previous studies (Koyuncu *et al.*, 1999; Thieme *et al.*, 1999; Esenbuga and Daytoglu, 2002; Ates *et al.*, 2003; Matika *et al.*, 2003; Emsen *et al.*, 2004; Hassen *et al.*, 2004; Cemal *et al.*, 2005; Gootwine and Rozov, 2006; Yilmaz *et al.*, 2007).

The significant effect of dam age for birth weight was in agreement with those reported by Ates *et al.* (2003) and Matika *et al.* (2003), but not in line with the findings of Thieme *et al.* 1999); Esenbuga and Dayıoglu (2002) and Cemal *et al.* (2005).

Phenotypic traits such as meat, milk and egg in animal science have been influenced by two components, genotypic (breed) and environmental (gender, birth type, birth weight, ewe age at lambing, lambing season) effects (Falconer and Mackay, 1996). For instance, body weight at all growth periods of lambs can be varied by these effects. However, knowledge and elimination of these effects impressing weights at the growth periods of lambs is important for performing effective and reliable selection in breeding program (Aygun and Bingol, 1999).

### CONCLUSION

In this study, it was concluded that the overall effects of birth type, gender and ewe age had significant effect on birth weight, whereas difference between Norduz and Karakas breed was non-significant. Therefore, it is suggested that the variation for birth weight between two breeds may be due environmental factors. As a result, birth weight is an essential criterion for early selecting animal for breeding. The determining and controlling of factors affecting it are significant for a reliable selection program.

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