



# Journal of Biological Sciences

ISSN 1727-3048

**science**  
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## The Growth Traits of Karakaş and its Crosses Lambs (F<sub>1</sub>) with Ile De France x Akkaraman (G<sub>1</sub>) under Unlimited Suckling Regime

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**Abstract:** In this study, the growth traits of Karakaş and (Ile de France x Akkaraman (G<sub>1</sub>)) x Karakaş crosses (F<sub>1</sub>) (IDFAK) lambs were investigated. Ewes in the flock were not milked and lambs were subjected to unlimited suckling regime without weaning. Least squares means of weights of IDFAK and Karakaş lambs at birth and 1-6th months were 4.67 and 4.08 kg (p<0.01), 9.16 and 9.49 kg, 14.87 and 15.44 kg, 22.31 and 24.12 kg, 30.84 and 32.51 kg, 35.34 and 33.79 kg, 39.51 and 35.99 kg, respectively. Least squares means of daily live weight gains of IDFAK and Karakaş lambs from birth to 1., 2., 3., 4., 5. and 6th months of age and between 3-6th months were 0.159 and 0.170 kg, 0.174 and 0.184 kg, 0.198 and 0.219 kg, 0.221 and 0.235 kg, 0.207 and 0.197 kg, 0.196 and 0.177 kg, 0.202 and 0.172 kg, respectively. The survival rates of IDFAK and Karakaş lambs until 60th day were 95.94% and 89.79%, respectively (p<0.05). It seems that (Ile de France x Akkaraman (G<sub>1</sub>)) x Karakaş crosses (F<sub>1</sub>) lambs reached to marketing age more short time than Karakaş lambs. It could be concluded that Ile de France x Akkaraman (G<sub>1</sub>) genotype is useful in improving lamb production in Karakaş sheep and desired growth could be obtained especially for cross lambs during 5th and 6th month age.

**Key words:** Karakaş, Ile de France x Akkaraman (G<sub>1</sub>), growth performance, unlimited suckling

### INTRODUCTION

The majority of the incomes of sheep farming come from lamb meat sell. For this purpose some countries are practising some breeding techniques whose prior aim is lamb meat production. Improving lamb meat amount and quality could be achieved by improving genotype and feedlot conditions. During the recent years, lamb meat traits were taken into consideration in sheep genetic improvement studies in Turkey. More lamb production per ewe, high lamb survival rate and improving growth and development traits are important aspects of lamb meat production (Karaca *et al.*, 1990).

Lamb meat production is mediated in various places of Turkey using traditional ways; however, there are several mistakes in such lamb fattening and lamb meat production practices. Genotype is one of the reasons for carcass weight and quality of the native breeds to be low (Cengiz *et al.*, 1988). In order to obtain heavier and quality carcasses Ile de France breed was imported and used in crossing with native Akkaraman sheep. Carcass results obtained from Ile de France x Akkaraman (G<sub>1</sub>) genotype were considered to be satisfied (Cengiz *et al.*, 1989; Ertuğrul *et al.*, 1989; Cengiz, 1994; Eliçin *et al.*, 2001). Additionally, Ile de France x Akkaraman crosses had no

adaptation difficulties. Researchers suggested that Ile de France and Ile de France x Akkaraman crosses could be utilized in improving meat traits of Middle and East Anatolia native sheep breeds (Eliçin *et al.*, 1989; Cengiz, 1994).

Lamb meat is preferred to other meat sources in Van city in East Anatolian Region, Turkey (Aygün *et al.*, 2004). Based on the results obtained from previous studies, the possibilities to improve meat traits of Karakaş sheep, a subtype of Akkaraman breed, (Sönmez, 1978) using Ile de France x Akkaraman (G<sub>1</sub>) rams are being investigated. Karakaş sheep raised widely around Van and Bitlis cities are characterised with low production traits similar to other native breeds (Demirulus and Karaca, 1994; Aygün *et al.*, 1998; Gökdal, 1998; Gökdal *et al.*, 1999; Ülker *et al.*, 1999; Gökdal *et al.*, 2000; 2003).

Artificial lamb rearing programmes were developed in order to increase sheep milk amount for consumption or cheese production (Napolitano *et al.*, 2002). In the areas where sheep milk has higher price sheep owners desire milking their ewes at once and increase marketable milk production. Therefore several lamb rearing programmes were revealed (Economides and Antoniou, 1989; Akmaz *et al.*, 1992; Knight *et al.*, 1993; Altın and Çelikyürek, 1996; Darcan and Güney, 1996). Various weaning periods

are known to affect growth traits in lambs (Türker and Bulmuş, 1988; Keskin and Biçer, 2000). In the areas where sheep milk is not utilized for human consumption or milking is not considered to be economical ewes are not milked and entire milk of the animals is left for the lambs. In fact, a strong mother-lamb communication is established immediately after lambing and this communication has particular importance for the growth characteristics of the lamb. Therefore significant increases are reported to occur in live weight of lambs kept with their mothers for a long period and allowed suckling unlimitedly (Dayıoğlu *et al.*, 1993; Napolitano *et al.*, 2002).

In the present study some growth traits and survivability rate of Karakaş and (Ile de France x Akkaraman (G<sub>1</sub>) x Karakaş cross (F<sub>1</sub>) (IDFAK) lambs raised in a program in which ewes are not milked and lambs suckled unlimitedly was investigated.

## MATERIALS AND METHODS

This study was carried out on Karakaş lambs (KAR, n = 50) and its crosses (F<sub>1</sub>) (IDFAK, n = 15) with Ile de France x Akkaraman (G<sub>1</sub>) genotype reared Van Ziraat Meslek Lisesi Sheep Farm. All lambs were weighed within 24 h of birth and their birth weight, genotype, sex, birth type, dam age and birth date were recorded.

During winter ewes were kept in barn and fed with a ration composed of dry grass, sainfoin and barley. Ewes were not milked; all of their milk was suckled with their lambs. Lambs were not weaned; instead, they were kept continuously with their mothers. In pasture period, sheep and lambs were grazed only and not provided with any supplementary feeding.

Live weights of the lambs were recorded at bi-weekly intervals until average 6 months of ages. Interpolation was applied to calculate average live weights at certain ages and increases in daily live weights between certain periods.

Some environmental factors affected on growth characteristics of lambs, like genotype, dam age, sex, birth type and birth weight, were investigated using least-squares procedures (SAS, 1998). Duncan test was utilized for determining differences among the subgroups means. Comparisons between the groups with regard to lamb survival rates were made using chi-square method (Düzgüneş *et al.*, 1987). After the elimination of the effects of dam age, sex and birth type, lamb survival rates were calculated.

## RESULTS AND DISCUSSION

Growth curve of IDFAK and Karakaş lambs was given in Fig. 1. IDFAK lambs were heavier at birth,

however, live weight of Karakaş lambs increased beginning from the 1st month and by the 4th month they were heavier than crosses. Nevertheless, after the 4th month growth rate decreased in Karakaş lambs and at 5th and 6th months IDFAK lambs had higher mean live weight.

Live weights of IDFAK and Karakaş lambs at certain periods were given at Table 1. Accordingly, mean birth weight of IDFAK (4.67 kg) and Karakaş (4.08 kg) lambs were different ( $p < 0.01$ ). Birth weight of cross lambs determined in the present study were higher than that of values reported for Karakaş lambs (Demirulus and Karaca, 1994; Altın and Çelikyürek, 1996; Gökdağ *et al.*, 1999; Ülker *et al.*, 1999; Öter, 2000) and other breeds (Yalçın and Aktaş, 1976; Türker and Bulmuş, 1988; Knight *et al.*, 1993; Kaymakçı and Taşkın, 1998; Özder *et al.*, 1999; Esen and Yıldız, 2000; Kaymakçı *et al.*, 2002). In this study, birth weights of male, female, single and twin lambs were 4.56, 4.19, 4.66 and 4.08 kg, respectively. Birth weight of male lambs was 0.370 kg higher than female ones ( $p < 0.05$ ); and similarly, birth weight of single lambs was 0.580 kg heavier than twin lambs ( $p < 0.01$ ). Lambs of three years old dams had highest birth weight (4.53 kg), whereas, lambs of two years old dams had lowest birth weight (4.15 kg). The findings to determine the effects of some environmental factors on birth weight were in agreement with other studies done previously (Karaca *et al.*, 1990; Demirulus and Karaca, 1994; Esenbuğa and Dayıoğlu, 2002). The effect of genotype, dam age and sex on live weights at other periods was not significant, whereas, effect of birth type on live weight until 3rd month age was significant ( $p < 0.01$ ;  $p < 0.01$ ;  $p < 0.05$  for 1st, 2nd and 3rd months, respectively), but not significant at other ages. The effect of birth weight on live weight was significant until 5 months age ( $p < 0.01$ ;  $p < 0.01$ ;  $p < 0.01$ ;  $p < 0.05$ ;  $p < 0.05$  for 1st, 2nd, 3rd, 4th and 5th months, respectively).

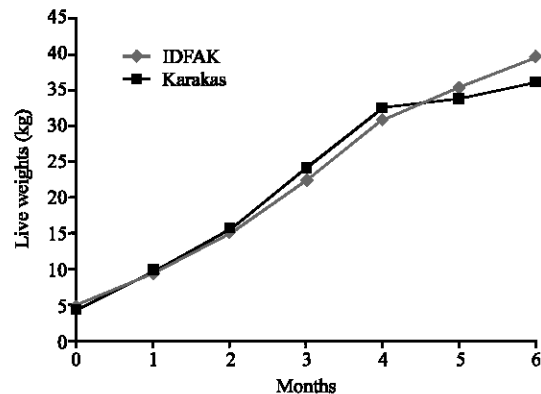


Fig. 1: Growth curve of Karakaş and IDFAK lambs

Table 1: Live weights (kg) of Karakas and IDFAK lambs at different periods

Factors	Birth weight			1st month live weight			2nd month live weight			3rd month live weight		
	n	C.E.	Mean±S.E.	n	C.E.	Mean±S.E.	n	C.E.	Mean±S.E.	n	C.E.	Mean±S.E.
Genotype			**									
IDFAK	15	+0.588	4.67±0.19	15	-0.328	9.16±0.47	15	-0.570	14.87±0.76	14	-1.809	22.31±1.09
Karakas	50	-0.588	4.08±0.10	45	+0.328	9.49±0.28	45	+0.570	15.44±0.46	44	+1.809	24.12±0.62
Dam age												
2	17	-0.280	4.15± 0.19b	14	+0.148	9.37±0.50	14	+0.511	15.46±0.80	13	-1.007	22.91±1.13
3	26	+0.103	4.53±0.15ab	24	+0.161	9.38±0.39	24	+0.099	15.05±0.63	24	-1.116	22.80±0.84
4	22	+0.177	4.43±0.15a	22	-0.309	9.22±0.38	22	-0.610	14.95±0.60	21	+2.123	23.92±0.81
Sex			*									
Male	36	+0.370	4.56±0.14	33	-0.188	9.23±0.36	33	+0.239	15.28±0.58	32	+1.627	24.03±0.77
Female	29	-0.370	4.19±0.14	27	+0.188	9.42±0.36	27	-0.239	15.04±0.58	26	-1.627	22.40±0.81
Birth type			**			**			**			*
Single	43	+0.579	4.66±0.12	40	+2.198	10.43±0.32	40	+3.013	16.66±0.52	38	+2.843	24.63±0.74
Twin	22	-0.579	4.08±0.16	20	-2.198	8.23±0.43	20	-3.013	13.65±0.69	20	-2.843	21.79±0.92
Regr.(Lin.)												
Birth wt. (kg)			-			1.6997±0.3635**			2.3596±0.5853**			3.4254±0.8056**
Expected mean	65		4.354	60		9.762	60		15.768	58		24.225
Factors												
	n	C.E.	Mean±S.E.	n	C.E.	Mean±S.E.	n	C.E.	Mean±S.E.	n	C.E.	Mean±S.E.
Genotype												
IDFAK	12	-1.671	30.84±1.33	7	+1.547	35.34±1.77	5	+3.520	39.51±2.91			
Karakas	23	+1.671	32.51±1.15	21	-1.547	33.79±0.99	17	-3.520	35.99±1.69			
Dam age												
2	6	-0.985	31.73±1.73	5	-1.986	33.73±1.98	3	-2.263	37.07±3.53			
3	15	-2.114	30.60±1.13	13	-1.475	34.25±1.35	12	-2.475	36.85±2.30			
4	14	+3.099	32.71±1.04	10	+3.461	35.72±1.36	7	+4.738	39.33±2.18			
Sex												
Male	9	+2.900	33.13±1.47	-	-	-	-	-	-			
Female	26	-2.900	30.23±0.94	-	-	-	-	-	-			
Birth type												
Single	20	+1.037	32.20±1.00	14	+1.410	35.27±1.29	9	+0.090	37.79±2.19			
Twin	15	-1.037	31.16±1.27	14	-1.410	33.86±1.36	13	-0.090	37.70±2.14			
Regr.(Lin.)												
Birth wt. (kg)			2.9049±1.1770*			3.7417±1.5179*			2.3914±2.2554			
Expected mean	35		31.270	28		34.295	22		36.702			

\*:  $p < 0.05$ , \*\*:  $p < 0.01$ . a, b: For a factor, differences between means having different letter within the same row are significant ( $p < 0.05$ ). C.E. : Constant estimate Reg.(Lin.): Partial regression of live weight at the related period to birth weight of lamb

IDFAK lambs was heavier at birth ( $p < 0.01$ ) and 5th and 6th month of age than Karakas lambs, but lighter at other ages. The fact that Karakas lambs have heavier fatty tail than IDFAK lambs at 5th and 6th month of age should not be ignored in comparing live weight of IDFAK and Karakas lambs at this age.

Live weight data of Karakas lambs at third month age obtained in the present study were higher than values obtained in other studies for Karakas (Gökdal, 1998; Ülker *et al.*, 1999; Öter, 2000); Hamdani x Karakas crosses ( $G_1$ ) (Altın and Çelikyürek, 1996); Dağlıç (Demir, 1989) and Akkaraman and Sakız x Akkaraman lambs (Esen and Yıldız, 2000). On the other hand, live weight of Karayaka (Arıtürk, 1961); Kangal Akkaraman (Akçapınar and Kadak, 1982); Karakas (Demirulus and Karaca, 1994) and Sakız x Akkaraman ( $F_1$ ) and Akkaraman lambs (Ünal, 2002) at third month age obtained in other studies were higher than the values of Karakas and IDFAK lambs in the present study. Mean live weight of IDFAK and Karakas lambs at six month age were 39.51 and 35.99 kg,

respectively. Live weight of Konya Merino lambs, which suckled until the end of lactation period, at six month age (Akmaz *et al.*, 1992) was higher than the value determined in the present study at the same age. The value determined for IDFAK crosses at this age was higher than those determined for Morkaraman (Dayıoğlu *et al.*, 1993); Karakas (Gökdal, 1998; Ülker *et al.*, 1999); Kangal Akkaraman (Akçapınar and Kadak, 1982); Dağlıç (Demir, 1989); Karayaka (Arıtürk, 1961); Akkaraman and Sakız x Akkaraman (Esen and Yıldız, 2000; Ünal, 2002) lambs. In the mean time, live weight of Karakas lambs suckled unlimitedly was higher than the values determined for other genotypes subjected to weaning (Torun and Özcan, 1991; Cengiz *et al.*, 1998; Kaymakçı and Taşkın, 1998; Özder *et al.*, 1999; Kaymakçı *et al.*, 2002). Various studies determined the fact that live weight gain is higher in lambs kept continuously with their mothers until weaning than those having limited suckling (Altın and Çelikyürek, 1996; Darcan and Güney, 1996).

Table 2: Daily live weight gains (kg) of Karakaş and IDFAK lambs at different periods

Factors	Birth-1st month		Birth-2nd month		Birth-3rd month		Birth-4th month		Birth-5th month		Birth-6th month		3rd-6th month	
	n	Mean±S.E.	n	Mean±S.E.	n	Mean±S.E.	n	Mean±S.E.	n	Mean±S.E.	n	Mean±S.E.	n	Mean±S.E.
Genotype														
IDFAK	15	0.159±0.016	15	0.174±0.013	14	0.198±0.012	12	0.221±0.011	7	0.207±0.012	5	0.196±0.016	5	0.202±0.021
Karakaş	45	0.170±0.009	45	0.184±0.008	44	0.219±0.007	23	0.235±0.010	21	0.197±0.007	17	0.177±0.009	17	0.172±0.012
Dam age														
2	14	0.166±0.017	14	0.184±0.013	13	0.205±0.013	6	0.228±0.014	5	0.197±0.013	3	0.183±0.020	3	0.184±0.026
3	24	0.166±0.013	24	0.178±0.010	24	0.203±0.009	15	0.219±0.009	13	0.200±0.009	12	0.182±0.013	12	0.170±0.017
4	22	0.161±0.013	22	0.176±0.010	21	0.217±0.009	14	0.236±0.009	10	0.210±0.009	7	0.195±0.012	7	0.207±0.016
Sex														
Male	33	0.161±0.012	33	0.181±0.010	32	0.218±0.009	9	0.240±0.012	-	-	-	-	-	-
Female	27	0.167±0.012	27	0.177±0.010	26	0.199±0.009	26	0.216±0.008	-	-	-	-	-	-
Birth type		**		**		*								
Single	40	0.201±0.011	40	0.204±0.009	38	0.224±0.008	20	0.232±0.008	14	0.207±0.009	9	0.187±0.012	9	0.171±0.016
Twin	20	0.128±0.014	20	0.154±0.012	20	0.193±0.010	15	0.223±0.011	14	0.197±0.009	13	0.186±0.012	13	0.203±0.016
Regr.(Lin.)														
Birth wt. (kg)		0.0233±0.0121*		0.0224±0.0097*		0.0280±0.0091**		0.0158±0.0098**		0.0182±0.0101		0.0076±0.0126		0.0074±0.0164

\*: p<0.05, \*\*: p<0.01

Daily weight gains of IDFAK and Karakaş lambs at different periods are given in Table 2. There was no significant effect of genotype, dam age and sex on daily weight gain at any period of growth. Birth type (p<0.01; p<0.01; p<0.05 for birth-1st, birth-2nd and birth-3rd month periods, respectively) and birth weight (p<0.05; p<0.05; p<0.01 for birth-1st, birth-2nd and birth-3rd month periods, respectively) effect until 3rd month age were significant.

Daily weight gains of IDFAK and Karakaş lambs in the present study were higher than that of Hamdami and Karakaş cross (G<sub>1</sub>) (Altın and Çelikyürek, 1996); Karakaş (Öter, 2000); Ivesi and Morkaraman lambs (Esenbuğa and Dayıoğlu, 2002). Nevertheless, daily weight gains until third month age in the present study were lower than values determined for Morkaraman lambs (Odabaşıoğlu *et al.*, 1996). Since there were differences in maintenance conditions and genotype, it is difficult to make direct comparisons. Daily weight gains between birth and 5th to 6th month age in Morkaraman lambs (Akçapınar and Aydın, 1984) were similar to the values obtained for IDFAK lambs, but higher than that of Karakaş lambs in the present study. Economides and Antoniou (1989) reported that mean daily weight gain in lambs suckled unlimitedly was higher than that of suckling limitedly.

The survival rates of IDFAK and Karakaş lambs until 60th day age were 95.94 and 89.79%, respectively. There was no difference between groups in this trait. Yalçın and Aktaş (1976) reported that the survival rates until 45 and 75 days age for Ile de France x Akkaraman crosses were 96.0-97.4 and 94.9-97.4%, respectively. The survival rates for Akkaraman lambs at the same age in the mentioned study were 97.5 and 96.6%. The differences in the survival rates between crosses and native breeds' lambs were not significant. The survival rate of Morkaraman lambs until 60th day age was 96.2% (Akçapınar and Aydın, 1984). This rate was 68.96 and 78.57% until 105 days age in

Akkaraman and Sakız x Akkaraman lambs, respectively (Esen and Yıldız, 2000). Ünal (2002) reported 97.83 and 91.30% the survival rates for Akkaraman lambs until 30th and 90th day age, respectively. Also, in the same study, the survival rates for Sakız x Akkaraman (F<sub>1</sub>) until 30th and 90th day age were reported to be 97.83 and 91.30%.

In general, IDFAK and Karakaş lambs could reach up appropriate live weight in the conditions where they had good maintenance conditions and unlimited suckling opportunity. Their developing performance was better than other native breeds. Thus, it could be advantageous leaving entire milk to the lambs if milking the ewes is not profitable. In the mean time, with this maintenance conditions, desired growth could be obtained especially for cross lambs during 5th and 6th month age, the time coincides with the end of grazing season. It could be concluded that Ile de France x Akkaraman (G<sub>1</sub>) genotype is useful in improving lamb production in Karakaş sheep.

#### ACKNOWLEDGMENT

This study was supported by The Scientific and Technological Research Council of Turkey (TÜBİTAK). Project no: TOGTAG-TARP-2427.

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