A Comparative Study of Body Weight and Growth Rate of Turkish and Barki Lambs During the Suckling Period

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BODY weight and daily gain of 27 Turkish and 30 Barki lambs during the suckling period (10 wks.) were studied. Birth weight (BW, daily weight gain (DG) and weaning weight (WW) of Turkish lambs averaged 3.64 kg, 131 g. and 12.68 kg, resp. The corresponding averages of Barki lambs were 3.23 kg, 106 g. and 10.92 kg, resp. Breed had a significant ($P < 0.05$) influence on all traits studied. Sex of lambs affected DG and WW significantly ($P < 0.05$) but did not affect BW. The significant effect ($P < 0.05$) of age of dam was confined only to BW of lamb, while body weight of dam at lambing had a significant ($P < 0.01$) influence on DG and WW. The regression of WW on BW of lamb was significant ($P < 0.05$) while that of DG on BW was not.

Studying the performance of the exotic breeds of sheep in Egypt is of significant importance. Such studies help determining the productive and reproductive efficiency of these breeds or their crosses with the native sheep under prevailing local environmental conditions, and determining the appropriate policy to raise them. Different studies have been carried out on some foreign breeds of sheep such as Merino [Fahmy et al, 1971 and Badawi, 1974], Suffolk [Aboul-Naga, 1978 and El-Sheikh et al, 1981], Hampshire (Aboul-Naga and Afifi, 1980) and the Finnish Landrance [El-Sheikh et al, 1981 and Aboul-Naga et al, 1984].

The aim of this work was to study the performance of the fat-tailed Turkish lambs (also called Turki or White Karaman) during the suckling period and to compare them with the native Barki lambs.

Material and Methods

Data were collected on 30 Barki and 27 Turkish lambs belonging to El-Magd farm, North Tahreer Agricultural Company. The sheep flock in this farm war run under an accelerated lambing system allowing the ewes to lamb three times in two consecutive years.

All lambs used in the study were born as singles and were ear-tagged and weighed 24 hours after birth One day after lambing, body weight of dams was also recorded and averaged 43.67 and 36.33 kg for Turkish and Barki ewes, respectively. Lamb-suckling technique was used to estimate the milk production of the dams starting one week after birth until weaning the lambs at 10 weeks of age. The mean milk yield was 45.23 and 30.77 kg for Turkish and Barki ewes, respectively.

Statistical analysis

The analysis of the data was carried out using the least squares method [Harvey, 1960]. The general fixed effects model underlying each observation on birth weight, weaning weight and daily weight gain of lambs was :

$$X_{ijkl} = \mu + a_i + d_j + S_k + b_m \left(_m Y_{ijkl} - _m Y'\right) + e_{ijkl}$$

where X_{ijkl} represents the 1*th* observation taken on the lamb of the k*th* sex, the j*th* breed and was born to the ewe of the i*th* age, μ is the overall mean, a_i is the effect of the i*th* age of the ewe, d_j is the effect of the j*th* breed of lamb, S_k is the effect of the k*th* sex, b_m is the partial regression coefficient of the observation on the m*th* independent variable, $_m Y_{ijkl}$ is the observation of the m*th* variable on the 1*th* lamb of the k*th* sex, the j*th* breed and was born to the ewe of the i*th* age, $_m Y'$ is the mean of the $_m Y_{ijkl}$ and e_{ijkl} is a random error assumed to be IRND $(0,6_e)$.

In studying the birth weight of lambs, only the regression coefficient of birth weight on dam weight was included. But, with weaning weight and daily weight gain, the regressions on milk yield of dam, dam weight and birth weight of lamb were calculated in one analysis. In the second, the regression on milk yield of dam was deleted to allow for the variability in these traits accounted for by the effects other than milk yield of dam to be expressed more clearly. Duncan Multiple Range Test [Harvey, 1960]was used to test differences among means.

Results and Discussion

1. *Birth weight of lambs*

Table (1) shows that Turkish lambs were heavier at birth than Barki ones (3.63 vs. 3.23 kg). Breed had a significant ($P < 0.05$) effect on birth weight (Table 2). Similar differences in birth weight of lambs due to breed were reported by Diaz et al, (1983) and Goot et al, (1984).

Male and female lambs were approximately the same weight at birth (Tables 1 and 2). Kassab and Karam (1961), Fahmy et al, (1969), Fahmy et al, (1971), Badawi (1974), Barghout (1975) and Lanza et al, (1983) also found that sex did not significantly affect the birth weight of lambs.

Tables (1 and 2) show that birth weight of lambs increased significantly ($P < 0.05$) with increasing age of dam. Older ewes of more than 4.5 years gave birth to the heaviest lambs (3.67 kg.), while the youngest group ($\leq$ 2 years) delivered the lightest lambs (3.08 kg). Many authors have reported a significant effect of dam age on birth weight of lambs [Kassab and Karam, 1961; Fahmy et al, 1969; Fahmy et al, 1971; Badawi, 1974 and Subandriyo et al, 1985]. Duncan Multiple Range Test (Table 1) revealed that the mean birth weight of lambs born to < 2-year-old ewes differed significantly ($P < 0.05$) from those of lambs born to older ewes. The mean birth weight of lambs born to > 2-4.5 year-old ewes was not significantly different from that of lambs born to ewes of more than 4.5 years-old.

Table (1 and 2) also show a negative, but insignificant, regression coefficient of -0.006 kg for birth weight of lambs over the dam weight at lambing. This result supports that reported by Barghout (1975) on Barki sheep and Shrivastava et al. (1985) on Soviet Merinos. Those authors found the effect of body weight of ewe on the birth weight of lamb to be insignificant.

2. *Weaning weight and daily gain of lambs*

A strong relationship between the milk production of ewes and weaning weight and pre-weasing growth rate of their lambs was reported by Barghout (1975), Amegee (1984) and Patel and Dave (1984). When weaning weight and pre-weaning daily weight gain of lambs was regressed on the milk yield of dams (Table 3), most of the variability was accounted for by the

TABLE 1. Least squares means (X') and standard errors (SE) of birth weight, pre-weaning daily weight gain and weaning weight of lambs.

Classification	Birth wt (kg.)		Daily gain (g)		Weaning wt (kg)	
	X' or b	SE	X' or b	SE	X' or b	SE
Breed :						
Turkish	3.63a	0.14	131a	7.2	12.68a	0.50
Barki	3.23b	0.13	106b	7.0	10.92b	0.49
Sex :						
Males	3.41a	0.11	128a	5.7	12.43a	0.41
Females	3.45a	0.13	110b	6.6	11.17b	0.47
Dam age :						
$\leq$ 2 yrs.	3.02a	0.20	100a	10.9	10.46a	0.76
> 2-4.5 yrs.	3.60b	0.12	132b	6.3	12.76b	0.44
> 4.5 yrs.	3.67b	0.15	124ab	8.0	12.19ab	0.56
Regression on :						
dam wt.	0.006	0.166	2.510**	0.879	0.176**	0.062
lamb birth wt.	—	—	1.845	7.383	1.129*	0.517

Within each classification, means not followed by the same letter differ significantly (P < 0.05) from each other.

X' = Mean

TABLE 2. Least squares analysis of variance of birth weight, daily weight gain and weaning weight of lambs.

Source of variance	Birth weight			Daily gais	Weaning weight
	d.f.	MS	d.f.	MS	MS
Breed	1	1.47*	1	0.00492*	25.77*
Sex	1	0.02	1	0.00475*	21.59*
Dam age	2	1.31*	2	0.00201	14.29
Dam wt.	1	0.05	1	0.00892**	39.23**
Lamb birth wt.	—	—	1	0.00006	22.98*
Residual	51	0.35	50	0.00098	4.81

* Significant   (P < 0.05)

** Significant   (P < 0.01)

effect of milk yield. The other effects included, particularly breed and sex, exerted nonsignificant influences on these traits. Judging from published research, this was not expected and did not seem in accordance with established biological phenomena. Analysis of variance was, therefore, performed after deleting the effect of milk yield of dam from the regression model.

Results of the analysis (Table 1) showed that Turkish lambs grew faster and had heavier weaning weight than Barki lambs. The mean pre-weaning daily weight gain was 131 and 106 grams for Turkish and Barki lambs, respectively. The corresponding weaning weight was 12.68 and 10.92 kg, respectively. The effect of breed on these two traits (Table 2) was significant $(P < 0.05)$.

Also, male lambs grew significantly $(P < 0.05)$ faster during the suckling period and were significantly $(P < 0.05)$ heavier at weaning than females (Tables 1 and 2). This result supports the findings of Mavrogenis and Economides (1980), Nivsarkar *et al.* (1981), Diaz *et al.* (1983) and Goot *et al.* (1984) who reported significant differences in pre-weaning growth rate and weaning weight of lambs due to the effect of sex. Mavrogenis and Economides (1980) found that male lambs consumed significantly more milk than females thus, grew faster and had heavier weaning weight.

Table (1) shows that the pre-weaning daily weight gain and weaning weight of lambs increased with increasing age of the dam to 4.5 years and declined thereafter. Although the means of the daily weight gain and weaning weight of lambs born to ≤ 2 year-old ewes differed significantly $(P < 0.05)$ from those of lambs born to ewes of > 2-4.5 years old, the effect of age of dam on these traits was not significant (Table 2). Similar insignificant effects of age of dam on the pre-weaning growth rate and weaning weight of lambs were observed by Kassab and Karam (1961), Badawi (1974) and Barghout (1975).

Significant $(P < 0.01)$ and positive regression coefficients of 2.510 grams and 0.176 kg were calculated for pre-weaning daily weight gain and weaning weight of lambs, respectively on the body weight of their dams (Table 1). It could be concluded that heavier ewes have larger udders and produce more milk than lighter ones. Owen (1976) and Nivsarkar *et al,* (1981) came to the same conclusion.

The relationship between birth weight of lambs, their pre-weaning daily weight gain and weaning weight was studied (Table 1 and 2). The regressions of pre-weaning daily gain and weaning weight of lambs on their birth weight were 1.845 grams and 1.129 kg, respectively. The second coefficient was significant ($P < 0.05$) while the first was not. Heavier lambs at birth stimulate higher milk yield by more frequent and vigorious suckling, thus grow faster and weigh heavier at weaning ([Owen, 1976].

The results obtained in the present study indicate that Turkish lambs were heavier at birth, grew faster and had heavier weaning weights than the Barki lambs. This superiority was shown due to the heavier body weights and greater milk production of Turkish ewes.

TABLE 3. Least squares analysis of variance of daily weight gain and weaning weight of lambs.

Source of variance	d.f.	Mean square	
		Daily gain	Weaning weight
Breed	1	0.00000	0.0011
Sex of lamb	1	0.00073	3.5561
Birth wt. of lamb	1	0.00003	14.5846*
Dam age	2	0.00067	3.2641
Dam wt.	1	0.00273*	13.3835*
Dam milk yield	1	0.02113**	103.5256**
Residual	49	0.00057	2.8003

* ($P < 0.05$).

** ($P < 0.01$).

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دراسة مقارنة لوزن الجسم ومعدل النمو فى حملان
التركى والبرقى خلال فترة الرضاعة

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تمت دراسة وزن الجسم والزيادة اليومية فى الوزن لعـدد ٢٧ من الحوالى التركى ، ٣٠ من الحوالى البرقى فى خـلال فترة الرضـاعة (١٠ أسابيع) ٠ وقد بلغ متوسط وزن الميلاد ومعدل الزيادة الوزنية ووزن الفطام لحملان التركى ٣ر٦٣ كجم ، ١٣١ جم ، ١٣ر٦٨ كجم على التوالى ٠ بينما بلغت هذه المتوسطات فى حمـلان البرقى ٣ر٢٣ كجم ، ١٠٦ جم ، ١٠ر٩٢ كجم على الترتيب وكان لنوع الحملان تأثير معنوى (٥ ٪) على كل الصفات المدروسة ٠ كما كان أثر جنس الحمل معنويا (٥ ٪) على معـدل الزيادة الوزنية روزن الفطام فى حين لم يؤثر على وزن الميلاد ٠ وقـد كان تأثير عمر الأم معنويا (٥ ٪) ، على وزن الميلاد نقط ، بينما كان تأثير وزن الأم عند الولادة معنويا (١ ٪) على معدل الزيادة الوزنية ووزن الفطام ٠ وقد كان معامل انحدار وزن الفطام على الحوالى على وزن ميلادهم معنويا (٥٪) بينما لم يكن معامل انحدار معدل الزيادة الوزنية على وزن الميلاد معنويا ٠