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Estimates of Productive and Reproductive Performances of Commercial Flock of Barki Sheep

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THE study investigated productive and reproductive performances of a commercial flock of Barki sheep raised under the conditions of newly reclaimed lands.

Data were obtained over two successive seasons 1985/86 with flock size of 900 breedable ewes, and 1986/87 with flock size of 700 breedable ewes.

Traits considered were weight at birth, at weaning (120 d), post-weaning weights at 180 d of age, at marketing (10 mo) and at yearling, in addition to survival rate among born lambs up to 4 mo of age, and annual greasy fleece weight of ewes. Fertility traits as per ewe joined were number of ewes lambed (EL / EJ), number of lambs born (LB / EJ), number of lambs weaned (LW / EJ), kilograms born (KB / EJ) and kilograms weaned (KW / EJ), while traits as per ewe lambed were number of lambs born (LB / EL), number of lambs weaned (LW / EL), kilograms born (KB / EL) and kilograms weaned (KW / EL).

Least squares means of body weight at birth, 120 d, 180d, marketing and at yearling were 2.9 kg, 14.1 kg, 18.7 kg, 29.1 kg and 28.7 kg, respectively. Least squares means of survival of lambs up to weaning and of annual greasy fleece weight of ewes were 85% and 1.63 kg, respectively.

The overall least squares means for EL / EJ, LB / EJ, LW / EJ, KB / EJ, KW / EJ, LB / EL, LW / EL, KB / EL and KW / EL were 0.64, 0.65, 0.54, 1.9 kg, 7.39 kg, 1.02, 82.8, 3.0 kg and 11.2 kg, respectively.

Keywords: Barki sheep, commercial flocks, production, reproduction.

Barki sheep dwell the semi - arid strip of the north western coastal desert of Egypt. The breed is hardy and well adapted to the harsh conditions prevailing in the region. So far, research work done on Barki sheep was on experimental flocks raised in desert station (*e.g.* Fahmy *et al.*, 1969) or in the Nile valley (*e.g.* Ragab and Ghoneim, 1961 Aboul-Naga *et al.*, 1972 and Kassab and Karam, 1961).

With effort to intensify production from sheep in an attempt to meet growing demand on red meat, producers established commercial Barki flocks on newly reclaimed lands on the fringes of the desert. The present work was conducted to evaluate the productive and reproductive performances of Barki sheep in a commercial flock raised under the conditions of the newly reclaimed lands.

Material and Methods

Source of Data

This study was carried out over two successive seasons 1985 / 86 and 1986 / 87 utilizing data on a commercial flock of Barki sheep in a newly reclaimed area in West of Nubaria, Nile Agriculture Developments Company (NADCO), 80 km south east from Alexandria. In that company sheep operations represent only a minor activity as compared to cropping and dairy operations.

Traits considered were weight at birth, at weaning (120d), at 180d of age, at marketing (10 mo) and at one year of age, in addition to lamb survival rate up to weaning, annual greasy fleece weight of ewes, number of ewes lambed per ewe joined (EL / EJ), number of lambs born per ewe joined (LB / EJ), number of lambs weaned per ewe joined (LW / EJ), kg born per ewe joined (KB / EJ) and kg weaned per ewe joined (KW / EJ), number of lambs weaned per ewe lambed (LW / EL), kg born per ewe lambed (KB / EL) and kg weaned per ewe lambed (KW / EL).

Management of the Flock

Sheep were kept in open shed wire - fenced yards. Sheep were usually shorn in

April every year. The mating season started in May and lasted for 51 days (three oestrus cycles) where ewes were joined with the rams at a rate of three rams per 100 ewes. Ewes were weighed approximately every month. Lambs were kept with their dams all the time up to weaning at an average age of four months. Lambs were weighed regularly at intervals no longer than three weeks until weaning. After weaning ewe lambs and ram lambs grazed with the rest of the flock, and were weighed regularly at an interval of one month until marketing.

At the age of nearly seven months ram lambs were separated from the flock and fattened for a period of three months. During fattening, lambs were offered formula concentrate feed at the rate of 0.25 - 0.75 kg head^{-1} day^{-1}, besides grazing on alfalfa if available. Concentrate feed consisted of 25% undecorticated cotton seed meal, 15% wheat bran, 15% rice bran, 22% ground yellow-corn, 15% rice hulls, 2% lime - stone and 1% common salt. Molasses was used at the rate of 5 to 95 of the mixture for pelleting. Surplus ewe lambs were left to graze with the rest of the flock till marketing at the age of 10 mo. Marketing took place usually around Eid Al-Adha, Bairam. Ram lambs and ewe lambs selected for replacement were allowed to breed for the first time at approximately 19 mo of age.

In winter, feeding was mainly on grazing Egyptian clover *(Trifolium alexandrinum)*. In summer the flock stubble grazed in addition to rice straw and pelleted formula concentrate mixture at the rate of 0.25 - 0.50 kg head^{-1} day^{-1} according to the pasture condition.

Two weeks before the mating season, ewes grazed on barley fields for flushing. During the first week of lactation ewes were supplemented with formula concentrate mixture feeds at the rate of 0.50 kg head^{-1} day^{-1} indoors, then grazed with the flock. Sheep were allowed to drink fresh water twice daily.

Statistical Analysis

Least squares analysis described by Harvey (1987) was performed using a fixed linear model for all productive traits, while a mixed model was used to analyze ewe reproductive traits. The non-genetic factors included in the lamb fixed models thought to exert effects on the studied traits were year of birth, sex, age of dam and age at weighing. Mixed models for ewe traits included the fixed effects of year of lambing, age of ewe and the random effect of the ewe. As the data allowed, interactions between these factors were also considered.

Results and Discussion

A. Body weights

The general mean of birth weight of lambs of 2.92 kg is identical to that obtained by Galal *et al.* (1972) for the same breed. However, the estimate of the present study is higher than those reported for Barki sheep by Kassab and Karam (1961) of 2.7 kg, Aboul-Naga *et al.* (1972) of 2.7 Kg. El - Kouni *et al.* (1974) of 2.3 kg and El-Kimary (1975) of 2.4 kg. The present estimate is lower than those reported by Labban and Radwan (1963) of 4.3 kg, Fahmy *et al.* (1969) and Younis *et al.* (1984) of 3.4 kg and Barghout and Abdel-Aziz (1986) of 3.2 kg. Such differences may be due to differences in environmental conditions under which different flocks were maintained and to statistical model used in the analysis.

Least squares means of body weights at weaning (120d), at 180 d of age, at marketing (286 d) and at one year of age were 14.1 kg, 18.7 kg, 29.1 kg and 28.7, respectively. The general mean of weaning weight is lower than that reported by Kassab and Karam (1961), Labban and Radwan (1963), Fahmy *et al.* (1969), Aboul - Naga *et al.* (1972), Galal *et al.* (1972), El - Kouni *et al.* (1974), El - Kimary (1975) and Younis *et al.* (1984) of 18.9, 22.4, 18.4 16.9, 16.8 and 19.9 kg, respectively, all measured on experimental flocks.

The least squares mean of yearling weight of 28.7 kg was close to that estimated by Galal *et al.* (1972) and El - Kimary (1975), as 28.4 and 28.2 kg, respectively. The estimate of the present study, however, is higher than those reported by El - Kouni *et al.* (1974) of 27.8 kg and Azzam (1982) of 24.4 kg, but lower than those reported by Kassab and karam (1961) of 29.6 kg, Labban and Radwan (1963) of 35.0 kg, Fahmy *et al.* (1969) and Aboul-Naga *et al.* (1972) of 32.2 kg.

In the present study, year of birth, sex and age of dam, all had significant effects ($P<.01$ or $<.50$) on all weights studied except those at 120 d and 180 d (Table 1). This generally agrees with reports of Fahmy *et al.* (1969), Aboul - Naga *et al.* (1972), Abdel-Aziz *et al.* (1978), El - Tawil *et al.* (1970) and Sidwell and Miller (1971) working on different breeds of sheep and their crosses.

Lambs born in 1986 exceeded significantly those born in 1985 in weights at 180 d and at yearling. These differences were due to changing management practices from year 1985 to 1986 through culling of old and weak ewes, and better feeding conditions in year 1986.

TABLE. 1. Least squares means (M) and standard errors (S.E.) for body weights (kg).

Classification	Birth			120 d			180 d			Marketing			Yearling	
	No	M ± S.E	No	M ± S.E	No	M ± S.E	No	M ± S.E	No	M ± S.E	No	M ± S.E		
General mean	847	292 .02	705	41.1 .08	677	18.7 .11	653	29.1 .16	383	28.7 .18				
Year of birth		**		NS		NS		**		**				
1985	409	3.07 .02	313	14.0 .10	290	18.8 .13	280	29.9 .20	145	28.4 .21				
1986	438	2.78 .03	392	14.2 .11	387	18.5 .14	373	28.3 .21	198	29.1 .22				
sex		**		**		**		**						
Male	401	3.17 .03	335	15.0 .11	319	20.0 .14	307[1]	34.4 .21	--	--				
Female	446	2.68 .03	370	13.2 .12	358	17.3 .16	346	23.7 .23	--	--				
Age of dam		**		**		**		NS	--	NS				
2 yr	40	2.86 .06	34	13.9 .27	33	18.5 .35	31	29.2 .54	13	28.8 .62				
3 yr	175	2.86 .03	142	13.9 .13	133	18.4 .17	127	28.6 .25	66	28.2 .27				
4 yr	386	2.97 .02	320	14.4 .09	305	19.0 .11	295	29.3 .17	166	28.9 .17				
> 4 yr	246	3.00 .03	209	14.1 .11	206	18.9 .15	200	29.1 .22	98	28.8 .24				
Year of birth Xsex		NS		*		**		**		--				
Sex X age of dam Residual:		NS		NS		NS		NS		--				
Mean squares		.15		2.2		3.733		8.15		4.76				
Degress of freedom		837		694		666		642		337				
R^{2b}		.371		.474		.409		.786		.145				

1 : The in teractions year of birth X sex, sex x age of dam were also included in the model.
** : Highly significant. ($P < .01$)
a : Non significant. ($P \leq .05$)
b:Coefficient of determination of the model.

Male lambs exceeded female lambs in weights significantly (P<.01) at all ages. This significant effect of sex on birth weight, agrees with Fahmy *et al.* (1969), El - Tawil *et al.* (1970), El - Kimary (1975) and Younis *et al.* (1984). Sex effect increased with the increase of age of lamb which could be explained as an effect of increasing the level of sex hormones with age.

The findings of the present study show that all body weight of lambs up to 180 d of age increased significantly with increasing age of dam. Mature ewes, due to their large size and more developed systems, provide their foetus with better environment and their young with more milk than do younger ones.

Interaction of year of birth x sex was found to have significant effect (P<.01 or P<.05) on all weaning and post-weaning body weights, while the interaction sex x age of dam was nonsignificant in the same traits. Both interactions had nonsignificant effects on preweaning traits.

Significant regression coefficients of weight on age of .096 kg/d, .065 kg/d, .077 kd/d and .060 kg/d were estimated around 120 d, 180 d, marketing and yearling ages.

B. Survival

The least squares means of lamb survival from birth up to weaning and results of analysis of variance are presented in Table (2). Survival to weaning of lambs was estimated as .85 which is close to the value of 85.3% obtained by Galal *et al.* (1974) working on Barki, Hungarian Merino, Syrian Awassi and some of their crosses. The estimate of the present study, however, is higher than that reported by El - Kimary (1975) of 77% and Galal *et al.* (1981) of 79.2%, but lower than those reported by Labban *et al.* (1966) of 93.7%, aboul-Naga *et al.* (1972) of 91%, Galal *et al.* (1972) of 90%, Younis *et al.* (1984) of 92.1% and Aboul - Naga (1985) of 93.3%.

Year of birth was the only factor among those studied that exerted a significant on lamb survival up to weaning.

Survival rate from year to year fluctuated according to health condition and change in feed availability. In 1986 the ewe share of feedstuffs and grazing area was higher than in 1985. This reflects on the ewe condition and subsequently on her milk supply. This result agrees with the findings of Sidwell *et al.* (1962), Aboul-Naga *et al.* (1972) and Galal *et al.* (1974).

Age of dam had no significant effect on survival. Sidwell and Miller (1971) and Galal *et al.* (1974) arrived at similar findings.

TABLE. 2. Least squares means (M) and standard errors (S.E.) for lamb survival up to 4 mo of age and greasy fleece weight of ewes.

Classification	Lamb survival			Greasy fleece weight, Kg		
	No.	M ± S.E		No.	M ± S.E	
General mean	847	.85	.018	1309	1.63	.015
Year of birth		**			NS[a]	
1985	409	.78	.022	707	1.61	.031
1986	438	.93	.025	602	1.66	.032
Sex		NS				
Male	401	.85	.024		--	
Female	446	.85	.028		--	
Age of dam / ewe		NS			NS	
2 yr	40	.93	.062	132	1.64	.089
3 yr	175	.83	.028	305	1.66	.033
4 yr	386	.85	.019	534	1.63	.034
> 4yr	246	.80	.026	338	1.61	.086
Year of X sex						
Sex X Age		NS			--	
Residual:		NS			--	
Mean squares		.135			.0399	
degress of freedom		837			596	

** : Highly significant. (P < .01)

[a]NS : Nonsignificant. (P > .05)

C. Greasy Fleece Weight

The least squares means, standard errors of greasy fleece weight and results of analysis of variance are presented in Table 2.

In present study, ewes shorn in 1986 gave heavier greasy fleece weight than those shorn in 1985 (1.66 vs 1.61 kg), the difference being nonsignificant. That increase in weight is due to better feeding in 1986 than 1985 in addition to culling procedures. The result of year effect on greasy fleece weight agrees with Aboul-Naga *et al.* (1972) working on Merino, Barki and their crosses.

Age of dam, in the present study, showed a nonsignificant effect on greasy fleece weight.

Ewe exerted a significant effect ($P \leq .01$ or $. \leq 05$) on fleece weight. This effect is due to the individual, *i.e.* genetic and permanent environmental differences among ewes. Repeatability of fleece weight was estimated as .68±.021.

D. Productivity traits as per ewe joined

The overall least squares means for EL/EJ, LB/EJ, LW/EJ, KB/EJ and KW/EJ were 64.4%, 65.4%, 54%, 1.9 kg and 7.36 kg, respectively (Table 3).

The general mean of EL/EJ is nearly the same as that reported by Aboul-Naga and Mansour (1987). However, higher estimates were reported by Bedier (1978) of .70, Younis *et al.* (1984) of .84 and .92 under farm and desert conditions, respectively.

The general mean of LB/EJ is relatively low which reflects the high incidence of barren ewes and very low incidence of multiple birth among Barki ewes in the present study.

The general mean of LW/EJ of .54 is lower than that reported by Bedier (1978) of .59. The general mean of KB/EJ is estimated as 1.9 kg while general mean of KW/EJ of the present study is lower than that reported by Bedier (1978) of 11.08 kg.

In general, the least squares means in the present study involving ewe fertility are lower than those reported by most authors on the same breed. This may be due to that most of the estimates reported are from experimental flocks where management, selection and disposal policies are usually more strict than the ones followed in the flock of the present study.

Linear regression of traits on age of ewe, showed nonsignificant effects in all fertility traits studied, while quadratic regression showed significant effect on all traits.

Ewe exerted a significant effect on EL/EJ, KB/EJ and KW/EJ and nonsignificant effect on LB/EJ and LW/EJ. This different effect of the ewe on the different traits may be an indication of the magnitude of genetic and permanent effect in different ewe traits. Repeatabilities were estimated as .07±.0393, .14±.0307, .09±.039, .05±.040 for these traits, respectively.

E. Productivity traits, as per ewe lambed

The overall least squares means for LB/EL, LW/EL, KB/EL and KW/EL were 1.02, .83, 3.00 kg and 11.2 kg, respectively (Table 4).

TABLE. 3. Least squares means (M) and standard errors (S.E.) for ewe productivity traits

Classification	EL/EJ[1]			LB/EJ[2]			LW/EJ[3]			KB/EJ[4]			KW/EJ[5]		
	No	M ± S.E	P[6]	M ± S.E		P	M ± S.E		P	M ± S.E		P	M ± S.E		P
General mean	1600	64.4	2	65.4	2		54	2		1.90	.053		7.36	.230	
Year of breeding		NS[a]		NS			NS			NS			NS		
1985	900	57.9	12	58.8	13		44.9	12		1.79	.367		5.29	1.666	
1986	700	70.9	12	72	13		63.1	12		2.01	.369		9.42	1.675	
Regression on age															
Linear		-.032	.2433	NS	-.032	.2534	NS	-.020	.2441	NS	-.074	.7252	NS	-1.461	3.2978	NS
Quadratic		-.122	.0149	**	-.125	.0155	**	-.097	.0149	**	-.355	.0444	**	-1.231	.2019	**
Residual:															
Mean squares		.22			.24			.22			1.93			39.86		
Degrees of freedom		697			697			697			697			697		

1 : EL/EJ, Number of ewe lambed per ewe joined; 2: LB/EJ, Number of lambs born per ewe joined; 3: LW/EJ, Number of lambs weaned per ewe joined; 4: KB/EJ, Kilograms of lambs born per ewe lambed; 5: KW/EJ, Kilograms of lambs weaned per ewe joined.

6: Probability of type I error.

a: Nonsignificant. (P > .05)

**: Highly significant .(P ≤ .01)

TABLE 4. Least squares means (M) and standard errors (S.E.) for ewe productivity traits as per ewe lambed.

Classification	LB/EL[1]				LW/EL[2]			KB/EL[3]			KW/EL[4]		
	No.	M ± S.E		P[5]	M ± S.E		P	M ± S.E		P	M ± S.E		P
General mean	835	1.02	.006		.83	1.72		3.00	.02		11.2	.25	
Year of breeding			NS[a]			NS			NS			NS	
1985	403	1.02	.029		.80	11.91		3.14	.13		9.5	1.62	
1986	432	1.02	.029		.86	11.92		2.90	.13		12.8	1.62	
Regression on age													
Linear		-.003	.0577	NS	.072	.2358	NS	.119	.2476	NS	-.580	3.249	NS
Quadratiec		-.002	.0051	NS	.013	.0207	NS	.009	.0217	NS	.253	.2822	NS
Residual:													
Mean squares		.0066			.1105		.122				20.540		
Degrees of freedom		226			226		226				226		

1: LB/EL, Number of lambs born per ewe lambed; 2: LW/EL, Number of lambs weaned per ewe lambed; 3: KB/EL, Kilograms born per ewe lambed; 4: KW/EL, Kilograms, weaned per ewe lambed .

5: Probability of type I error.

a: Nonsignificant. (P > . 05)

Least squares mean of LB/EL is estimated as 1.02 which is the same as the value obtained by Younis *et al.* (1984). The estimate of the present study, however, is lower than those reported by Aboul-Naga *et al.* (1985) of 1.10, Aboul-Naga and Aboul-Ela (1987) of 1.05 and 1.10 under farm and desert condition, respectively.

Ewe exerted a significant effect ($P < .01$ or $P<.05$) on all prolificacy traits studied. Repeatabilities were estimated as .53±.045, .20±.069, .48±.049 and .25±.065 for LB/EL, LW/EL, KB/EL and KW/EL, respectively.

In spite of relatively large difference between 1985 and 1986, the year of breeding showed a nonsignificant effect on these traits studied due to the relatively large error term as judged by high CV.

Age of ewe had a nonsignificant effect on all prolificacy traits studied. Both linear and quadratic components of age of ewe were nonsignificant.

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تقييم الأداء الإنتاجي والتناسلي لقطيع تجاري من الأغنام البرقي

على مصطفى أحمد[1] - السيد صلاح السيد جلال[2] - أحمد عبد المقصود يونس[1]

مركز بحوث الصحراء - المطرية.

و قسم الأنتاج الحيوانى - كلية الزراعة - جامعة عين شمس - القاهرة - مصر.

بحثت هذه الدراسة الأداء الإنتاجي والتناسلي لقطيع تجاري من الأغنام البرقي المرباة تحت ظروف الأراضي حديثة الاستزراع.

وقد تم جمع بيانات موسمين انتاجين : ٨٥ / ١٩٨٦ وبحجم قطيع من نعاج التربية قوامه ٩٠٠ رأسا ، وعام ٨٦ / ١٩٨٧ وبحجم قطيع من نعاج التربية قوامه ٧٠٠ رأساً.

الصفات التى درست هى وزن الميلاد ، وعند الفطام (١٢٠ يوما) ، وبعد الفطام عند عمر ١٨٠ يوما ، وعند التسويق (١٠ شهور) وعند عمر ١٢ شهرا بالإضافة الى معدل الحياة للحملان المولودة حتى عمر ٤ شهور وإنتاج الصوف الخام السنوى للنعاج.

كما درست صفات الخصوبة منسوبة الى عدد النعاج الملقحة وهى عدد النعاج الوالدة ، عدد الحملان المولودة ، عدد الحملان المفطومة ، الكيلو جرامات المولودة والكيلو المفطومة . بينما صفات التكاثرية المنسوبة الى عدد النعاج الوالدة هى عدد الحملان المفطومة ، الكيلو جرامات المولودة والكيلو جرامات المفطومة.

تقديرات متوسطات أوزان الجسم عند الميلاد ، عند الفطام ، بعد الفطام ، عند التسويق وعند عمر ١٢ شهراً كانت ٢،٩ كج ، ١٤ كج ، ١٨،٧ كج ، ٢٩،١ كج و ٢٨،٧ كج على التوالى. قدر متوسط معدل الحياة بين الحملان حتى الفطام ووزن الصوف الخام السنوى للنعاج بمقدار ٨٥٪ و ١،٦٣ كج على التوالى.

تقديرات متوسطات صفات الخصوبة للنعجة منسوبة الى عدد النعاج الملقحة والتى شملت عدد النعاج الوالدة ، عدد الحملان المولودة ، عدد الحملان المفطومة ، الكيلو جرامات المولودة والكيلو جرامات المفطومة وصفات التكاثرية للنعجة منسوبة الى عدد النعاج الوالدة والتى شملت عدد الحملان المولودة والمفطومة والكيلو جرامات المولودة والمفطومة هى ٦٤ ، ٦٥، ، ٥٤، ، ١،٩ كج، ٧،٣٩ كج ، ١،٠٢ ، ٨٢،٨ ، ٣ كج ، ١١،٢ كج على التوالى .