

REPRODUCTIVE PERFORMANCE OF LOCAL SHEEP AND GOATS BREEDS AND THEIR CROSSES WITH IMPORTED TEMPERATE BREEDS

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ABSTRACT

Reproductive performance of sheep breeds; desert Barki (B), Awassi (A) and F₁ (1/2A.1/2B) in 1st hand and goats breeds of desert Barki (B), Damascus (D), F₁ (1/2D.1/2B), F₂ (3/4D.1/4B), F₃ (7/8D.1/8B) and F₄ (15/16D.1/16B) in 2nd hand were studied under semi-arid condition of the coastal zone of the western desert of Egypt during year 2000.

Genotype of sheep failed to show any significant effect on number of service per conception (NSPC), gestation length (GL), oestrous cycle (OCL) and oestrous duration (OD). The overall mean of gestation length of sheep was 147.93±0.27 days. Barki ewes needed the least number of service per conception and had the least oestrous duration than other genotypes studied. The oestrous cycle of Awassi ewes was shorter than that of Barki ewes. Age of dam had highly significant effect on NSPC and non-significant effect on GL, OCL and OD. The GL and OD decreased with increase of age until more than 4 years. Weight of dam had highly significant effect on GL. Occurrence of oestrous was 100% in ½ A x ½ B ewes but it was 95.15% and 90% in B and A ewes, respectively.

Genotype of goat had significant effect only on number of service per conception. The overall mean of gestation length was 150.25±0.32 days. Oestrous duration was significantly affected by genotype of goat. Weight of dam only had significant effect on OD, while age of dam had significant effect on GL and OD. The onset of oestrous occurred more frequently at morning for B other than D and their crosses.

INTRODUCTION

Sheep is prevailed more than goats in the semi arid Coastal Zone of the Western desert of Egypt (Aboul-Naga, *et al.*, 1988). The Egyptian Barki sheep or Barki goats are small in size, produce small amounts of milk, while the imported breed of sheep or goat (Awassi or Damascus) produce more milk and have faster growth rates (Fahmy *et al.*, 1969 and Haider, *et al.* 1994). Reproductive rate is a major factor affecting financial returns from sheep and goats production. Thus, Awassi sheep and Damascus goats were imported for developing the breeding program in Bourg EL-Arab Farm. This study aimed to study some reproductive performance traits of Barki sheep, Barki goats and their crosses with two of the high milk and/or prolific breeds (Awassi sheep and Damascus goats, respectively).

MATERIALS AND METHODS

The present study included 14 Awassi (A), 49 Barki (BS) and 27 (1/2A.1/2BS) ewes and also 24 Damascus (D), 23 Barki (BG), 33 (1/2D.1/2BG), 51 (3/4D.1/4BG), 30 (7/8D.1/8BG) and 14 (15/16D.1/16BG) during year 2000. Animals were raised in Bourg EL-Arab Research Farm

belonging to Animal Production Research Institute, Egyptian Ministry of Agriculture. Animals were fed Egyptian clover hay (*Trifolium alexandrinum*), barley straw and concentrate mixture pellets. Animals were allowed to drink twice daily. Mating season started in September and lasted for 30 days. Ewes and Does were allowed to mate for the first time at the age of 1.5 years. Lambing and kidding took place during February and March. Lambs and kids were identified by ear tags where their birth weight, type of birth and sex were recorded. Lambs were kept with their dams up to weaning (at 8 weeks age) while kids weaned at 12 weeks age. Reproductive performance; gestation length (GL), number of service per conception (NSPC), oestrous cycle (OCL) and oestrous duration(OD)} were estimated for sheep and goats breeds. Detection of oestrus was practiced twice daily, early morning and late afternoon, using vasectomies males. Ewes/does in oestrus were mated individually to the assigned male and the services were recorded. OCL was calculated as the number of days between two consecutive services for ewes/does that had more than one oestrous period. NSPC was measured as the total number of services per ewe/does conceived in the mating season. Data were analyzed using GLM procedure (SAS, 1995). The following model was applied to estimate NSPC, GL, OCL and OD for the effects of breed of ewe or doe, age and weight of dam.

$$Y_{ijklm} = \mu + b_j + a_k + w_l + e_{ijklm}$$

Where

- Y_{ijklm} is the NSPC, GL, OCL and OD of the n^{th} ewe or doe in the j^{th} breed of ewe or doe, k^{th} age of dam and w^{th} weight of dam, μ is the overall mean, b_j is an effect due to j^{th} breed of ewe, $j = 1, 2, 3$ for Barki (B), Awassi (A) and F_1 (1/2A.1/2B) or breed of doe, $j = 1, 2, 3, 4, 5, 6$ for Barki (B), Damascus (D), F_1 (1/2D.1/2B), F_2 (3/4D.1/4B), F_3 (7/8D.1/8B) and F_4 (15/16D.1/16B),
- a_k is an effect due to k^{th} age of dam of ewe or doe, $k = 1, 2, 3, 4, 5$ for classes of age of dam,
- w_l is an effect due to w^{th} weight of dam of ewe or doe, $l = 1, 2, 3, 4, 5$ for classes of weight of dam and
- e_{ijklm} is an effect due to a random error particular to the $ijklm^{\text{th}}$ ewe or doe assumed normally and independently distributed with zero mean and variance σ_e^2 .

RESULTS AND DISCUSSION

As shown in Table (1), the genotype of sheep failed to show any significant effect on number of services per conception (NSPC), length of gestation (GL), oestrous cycle (OCL) and oestrous duration (OD). The overall means were 2.29 ± 0.09 , 147.93 ± 0.27 days, 16.11 ± 0.29 days and 28.00 ± 1.65 hours for NSPC, GL, OCL and OD, respectively. Barki ewes needed the least number of services per conception (2.27), while 1/2A.1/2BS ewes required the highest number of services per conception (2.51), while Awassi ewes were intermediate. This may be due to reflected genotype in the lower milk yield and the short lactation length of Barki ewes. Badinga et al. (1985)

stated that differences in services per conception were associated with body weight and may be attributed partially to differences in thermo regulatory responses. They showed also positive relationship between milk yield and number of services per conception. Younis et al (1990) showed that the average number of services required for conception and oestrous cycle were 1.34 ± 0.20 and 16.0 ± 0.3 days, respectively, for the same genotypes (B, A and 1/2A.1/2B). Gabrilidis (1992) indicated that the overall means were 1.34 and 148.16 for NSCP and GL, respectively, for five sheep breeds in Greece. The highest number of services needed for Awassi ewes to conceive (2.45) may be partly referred to the large fat tail of Awassi ewes, which may obstruct successful mating as compared with the smaller fat tail of Barki ones (2.27). The obtained value of NSPC was higher than that reported by Younis et al (1990) and Gabrilidis (1992) who stated that the breed had insignificant effect on NSPC.

No significant differences were detected for breed groups on gestation length. The overall mean of gestation length was 147.93 ± 0.27 days. Gestation length of Barki (148.55) was markedly less than Awassi (149.82) and 1/2A.1/2BS (149.13). The differences between genotypes studied may be attributed to litter size or birth weight of lamb. Average gestation length calculated in this study agrees with the obtained estimates by Mukasa-Mugerwa and Lahiou-Kassi (1995). EL-Karim and Owen (1989) and Gabrilidis (1992) showed that breed had insignificant effect on gestation length.

Barki sheep had the longest cycle length followed by Awassi then (1/2A.1/2BS), while the oestrous duration was longer in Awassi sheep followed by (1/2A.1/2BS) then Barki. The differences among them were insignificant. The overall means of OCL and OD were 16.11 days and 28.00 hours, respectively. The estimates of the studied traits lie within the range of values given by Aboul-Naga *et al.* (1984). Younis *et al.* (1990) reported that variation in performance of the three genotypes prevailing under the subtropical conditions indicated the importance of the inherited internal physiological rhythm of each breed in determining its cycling activity under a given environmental condition. Kassam *et al.* (1990) estimated OCL and OD of Awassi ewes as 17.4 days and 40 hours, respectively, in Syria. Badinga *et al.* (1985) stated that differences in oestrous duration may be associated with milk yield. Lamberson and Thomas (1982) showed a good evidence for breed group variation in the incidence of oestrous under Oklahoma conditions were between five breed groups. Mukasa-Mugerwa and Lahiou-Kassi (1995) indicated that the oestrus cycle lasted 17.9 days for Menz sheep in Ethiopia.

The results in Table (1) show that age of dam had significant effect ($P < 0.05$) on NSPC, while, it had insignificant effect on GL, OCL and OD. NSPC, GL and OD tended to decrease with aging of ewe up to >4 years, but the OCL increased as age of ewe increased to 3 years then decreased with advance of age. Similar results were showed by Younis et al (1990). On other hand, EL-Karim and Owen (1989) showed that older ewes had a longer gestation length than young ewes and also added that age of dam had insignificant effect on GL.

The weight of dam had insignificant effect on NSPC, OCL and OD except for GL which significantly ($P < 0.05$) increased as weight of dam increased. The NSPC decreased with increase weight of ewe up to 50 kilogram, while the OCL and OD insignificantly increased as weight of ewe increased. The superiority of mature ewes over younger ones in OCL and OD is due to the full development of their body in one hand and reproductive organs in the other hand. The present results are in agreement with Mukasa-Magrewa and Lahiou-Kassi (1995).

Table (1) Least squares means (\pm SE) of number of services per conception, gestation length, oestrous cycle and oestrous duration for B, A and their sheep crosses.

Classification	No. of ewes	No. service/ conception NSPC	Gestation length (days) GL	Oestrous cycle (days) OCL	Oestrous duration (hours) OD
Overall mean	90	2.29 0.09	147.93 0.27	16.11 0.29	28.0 1.65
Breed of ewe		NS	NS	NS	NS
Barki (B)	49	2.27 \pm 0.21	148.55 \pm 0.62	16.28 \pm 0.71	27.61 \pm 3.44
Awassi (A)	14	2.45 \pm 0.30	149.82 \pm 0.90	15.64 \pm 1.03	27.98 \pm 5.08
1/2A.1/2B	27	2.51 \pm 0.25	149.13 \pm 0.77	15.54 \pm 0.86	27.80 \pm 4.26
Age of ewe		*	NS	NS	NS
2 years	32	2.90 \pm 0.26 ^a	149.66 \pm 0.82	15.42 \pm 0.90	35.78 \pm 4.81
3 years	22	2.73 \pm 0.28 ^a	149.12 \pm 0.85	15.85 \pm 0.95	32.22 \pm 4.97
4 years	20	2.46 \pm 0.27 ^a	148.98 \pm 0.82	16.57 \pm 0.95	27.80 \pm 5.05
>4 years	16	1.90 \pm 0.34 ^b	149.05 \pm 1.16	15.97 \pm 1.14	21.26 \pm 7.27
Weight of ewe		NS	*	NS	NS
20-30 Kilogrm	4	2.50 \pm 0.44	147.29 \pm 1.43 ^a	14.48 \pm 1.05	23.70 \pm 8.4
31-40 Kilogrm	30	2.06 \pm 0.18	147.74 \pm 0.61 ^a	16.24 \pm 0.61	23.28 \pm 3.70
41-50 Kilogrm	46	2.20 \pm 0.14	148.01 \pm 0.46 ^a	16.11 \pm 0.51	24.32 \pm 5.4
>50 Kilogrm	10	2.64 \pm 0.29	151.36 \pm 0.90 ^b	16.15 \pm 1.49	33.85 \pm 3.27

* Means in the same column with different superscript differ significantly ($P < 0.05$).

Table (2) Reproductive performance of Barki, Awassi sheep and their crosses (%)

Breed of ewe	% of ewe estrus in morning	% of ewe estrus in night	% of ewe anestrous	Ewe estrous/ewe Joined	Ewelambd /eweestrous
Barki (B)	57.69	38.46	4.85	96.15	76.92
Awassi(A)	43.33	46.67	10.0	90	92.86
1/2A.1/2B	42.86	57.14	0.0	100	73.33

Table (2) shows that onset of oestrous occurred more frequently at morning for Barki ewes which was more by about 14.36% and 14.83% than either Awassi or (1/2A.1/2BS) ewes. While the percentage of estrous ewes at night were more for (1/2A.1/2BS) ewes by about 18.68% and 10.47% than for Barki and Awassi ewes. On the other hand, occurrence of estrous in (1/2A.1/2BS) ewes was 100% but it was 95.15% and 90% for Barki and Awassi ewes, respectively. The (1/2 A.1/2BS) ewes had higher values for

estrous / ewes joined than both parental breeds, while Barki ewes had higher values for estrous / ewes joined than Awassi ewes by about 6.15%. The presented values were lower than those reported by Younis et al (1990) for the same breeds.

Conception rate (CR) expressed as percentage ewes in estrous/ewes joined or ewes lambed/ewes in estrous was higher in Awassi ewes than Barki and 1/2A.1/2BS ewes by about 15.91% and 19.53%, respectively. The present results agree with that reported by Younis et al (1990) for the same breeds. They indicated that Awassi ewes was higher than either Barki or 1/2A.1/2BS ewes by about 26% and 16%, respectively. Latif and Abdelsalam (1989) reported that C.R for Barki ewes was 86.27%. Maharam (1996) concluded that differences in fertility were due to breed of ewes, breed of ram and weight of ewes.

Table (3) Least squares means (\pm SE) of number of services per conception, gestation length, oestrous cycle and oestrous duration for BG, D and their crosses.

Classification	No. of doe	No. service/ conception NSPC	Gestation length (days) GL	Oestrous cycle (days) OCL	Oestrous duration (hours) OD
Overall mean	175	3.21	150.25	20.55	30.48
Breed of doe		*	NS	NS	*
Barki (B)	23	2.45 \pm 0.65 ^a	1.26 \pm 1.12	19.37 \pm 2.14	49.78 \pm 11.68 ^a
Damascus(D)	24	4.78 \pm 0.84 ^b	150.47 \pm 1.48	21.50 \pm 2.61	16.78 \pm 9.05 ^b
1/2D. 1/2B	33	2.87 \pm 0.69 ^{ab}	144.57 \pm 1.03	19.79 \pm 2.92	23.71 \pm 13.17 ^b
3/4D.1/4B	51	2.98 \pm 0.84 ^{ab}	149.42 \pm 1.03	19.49 \pm 2.00	29.48 \pm 9.67 ^b
7/8D.1/8B	30	3.32 \pm 0.95 ^{ab}	150.79 \pm 1.19	21.15 \pm 2.59	31.34 \pm 10.18 ^{ab}
15/16.1/16B	14	4.22 \pm 0.73 ^b	151.03 \pm 1.18	20.47 \pm 2.25	31.17 \pm 11.79 ^{ab}
Age of doe		NS	*	NS	*
2years	78	4.70 \pm 0.54	148.83 \pm 0.70 ^a	18.06 \pm 0.06	49.37 \pm 1.56 ^a
3years	57	2.90 \pm 0.98	149.05 \pm 1.32 ^{ab}	19.47 \pm 0.02	47.37 \pm 1.78 ^a
4years	26	2.44 \pm 0.83	151.36 \pm 0.99 ^b	21.58 \pm 0.56	26.59 \pm 0.66 ^b
>4years	14	3.70 \pm 1.49	151.87 \pm 1.13 ^{ab}	22.06 \pm 0.60	27.51 \pm 1.59 ^b
Weight of doe		NS	NS	NS	*
20-30kilogram	39	3.53 \pm 0.86	149.91 \pm 1.14	18.04 \pm 0.84	19.57 \pm 0.55 ^a
31-40kilogram	50	3.30 \pm 1.04	151.66 \pm 1.19	19.16 \pm 0.22	24.27 \pm 0.36 ^a
41-50kilogram	46	2.92 \pm 0.61	149.89 \pm 1.37	19.59 \pm 0.87	36.27 \pm 0.36 ^b
>50kilogram	40	3.72 \pm 1.25	150.33 \pm 1.70	22.84 \pm 0.84	38.46 \pm 0.43 ^b

* Means in the same column with different superscript differ significantly (P< 0.05).

As shown in table (3), the genotype had significant effect on number of services per conception and oestrous duration, while it failed to indicate any significant effect on length of gestation or oestrous cycle. Barki goats needed significantly less number of services per conception than Damascus and all of their crosses. Saber (2000), attributed that difference to the inherited lower milk yield and short lactation length of Barki does. Badinga *et al.* (1985) stated that differences in services per conception associated with body weight may be attributable partially to differences in thermo regulatory responses. They also showed positive relationship between milk yield and

number of services per conception. The present value of No. of services/conception was higher than that reported by Garcia et al (1997) for Criollo and imported goats in Venezuela and that reported by Shalaby et al (1998) for Damascus goats in Sinai. The reported values of these studies ranged from 1.16 to 1.42 services per conception. On the other hand, Kale and Tomer (1999) reported that type of crossbred was significantly ($P < 0.01$) influenced the numbers of mating per conception. The same trend of the present results was observed by Mukundan *et al.* (1981). They showed that number of services per conception is considered too large. No significant differences were detected due to breed group for either gestation length or estrous cycle. The overall mean of gestation length was 150.25 ± 0.32 days, which was higher than that obtained by Shalaby *et al.* 1998; (149.40 ± 0.35 days) for Damascus goats. Although Kale and Tomer (1999) showed that one mean for gestation length of crossbred goats was 151.45 ± 6.63 days, Gabrilidis (1992) showed a significant difference between breed groups in Greece for the same character. As shown in table (3), no significant difference was observed in cycle length between different genotypes.

Oestrous cycle was longer for Damascus and 7/8D.1/8BG than BG and 3/4D.1/4BG goats. Maria *et al.* (1988) showed that oestrous cycle averaged 20.33 ± 4.03 days for native goats in Chile. Eiamvitayakorn et al (1988) reported that mean oestrous length was 21.1 ± 1.3 days for unspecified goats in Philippines, while Kumbhakar and Prasad (1998) reported that the mean length of the oestrous cycle was 20.29 ± 0.38 days for Black Bengal does. Shalaby *et al.* (1998) showed that the average length of the cycle was 19.50 ± 0.38 days for Damascus goats in Sinai. Significant breed differences were reported by Aboul-Naga *et al.* (1984) on oestrus cycle length of does.

The results in table 3 show significant differences between B goat and the other genotypes studied for oestrous duration. Differences in oestrous duration may be associated with milk yield (Badinga *et al.*, 1985). Maria *et al.* (1988) estimated the duration of estrous as 29.37 ± 11.18 hours for the native Chile goats. Eiamvitayakorn. *et al.* (1988) reported that duration of oestrous averaged 31.7 ± 0.2 hours for unspecified goats in Philippines.

Oestrous duration increased significantly as weight of dam increased, while the weight of dam had insignificant effect on number of services per conception, gestation length and oestrous cycle. On other hand, age of dam had significant effect on gestation length and estrous duration only. Similar results were found by EL-Karim and Owen (1989), who showed that older does had a long gestation length and estrous duration than younger does.

Table (4) Reproductive performance of Barki, Damascus goats and their crosses, %.

Breed of doe	% of doe estrus in morning	% of doe estrus in night	% of doe anestrous	Doe estrous/ doe Joined	Doe lambed /doe estrous
Barki(B)	76.52	23.48	0.	100	91.30
Damascus(D)	70.0	20.0	10.0	90	80
1/2D.1/2B	70.0	28.08	1.92	98.08	78.85
3/4D.1/4B	72.94	24.12	2.94	96.06	64.71
7/8D.1/8B	76.25	22.50	2.25	93.75	58.75
15/16D.1/16B	70.0	17.50	12.5	87.50	56.25

From table 4, we can noticed that onset of oestrus cycles occurred more frequently at morning (70% to 76%) for BG, D and their crosses. The percentage of oestrus were 100% and 90% for B and D goats, respectively. While, other genotypes were intermediate except for 15/16D.1/16BG which had lower value than them. The same trend was shown by Kumbhakar & Preasad (1998), who stated that in Black Bengal does the onset of estrus occurred more frequently at morning (80%) than afternoon ($p < 0.01$).

The conception rate expressed as; Doe conceived / Doe joined or Doe lambed / Doe joined showed that the native goat (B) had higher value than the imported D goat. On other hand, the 15/16D.1/16B does had lower value than all genotype studied, which due to that does were of younger ages than the rest genotypes studied. Nevertheless, the estimate of conception rate in the present study was higher than that reported by Aboul-Naga et al (1988), Haider et al (1994) and Saber (2000) for B ,D and their crosses and also higher than that reported by Shalaby et al (1998) for D goat only.

Meanwhile, results in general invite to more research and open a scope for improvement.

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الأداء التناسلي للأغنام والماعز المحلية و خلطانها مع أغنام المنطقة المعتدلة
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تمت دراسة الأداء التناسلي للأغنام البرقي والعواسى و خلطانهما والماعز البرقى والدمشقي و خلطانهما تحت الظروف الشبه جافة لمنطقة الساحل الشمالى بالصحراء الغربية بمصو خلال عام ٢٠٠٠.

وأوضحت النتائج أن التركيب الوراثى لم يظهر أى تأثير معنوي على عدد التلقيدات اللازمة للإخصاب وكذلك على طول فترة الحمل و طول دورة الشبق و أيضا على فترة الشبق. وكان متوسط طول فترة الحمل $147,93 \pm 0,27$ يوما.

احتاجت النعاج البرقى لأقل عدد من التلقيدات لإحداث الخصب وكان لها أقل طول لفترة الشباع مقارنة بالتركيب الوراثية الأخرى المدروسة. وجد أن طول دورة الشبق للنعاج العواسى كان أقصر من مثيلتها للنعاج البرقى. وقد وجد أن عمر الأم له تأثير عالى المعنوية على عدد التلقيدات اللازمة لإحداث الخصب وغير معنوي على طول كل من فترة الحمل ودورة الشبق و فترة الشباع. لوحظ أيضا أن طول فترة الحمل وطول فترة الشباع ينخفضان بزيادة العمر حتى أكثر من ٤ سنوات. كما أوضحت النتائج أن وزن الأم يملك تأثيرا معنويا على طول فترة الحمل. وكانت نسبة حدوث الشبق في الأغنام الخليطة ١٠٠% بينما كانت ٩٥,١٥% ، ٩٠% في النعاج البرقى والعواسى على الترتيب.

وبالنسبة للماعز فقد أوضحت النتائج أن التركيب الوراثى له تأثير معنوي على عدد التلقيدات اللازمة للإخصاب بينما ليس له أى تأثير معنوي على طول فترة الحمل وطول دورة الشبق. وكان متوسط طول فترة الحمل $150,25 \pm 0,32$ يوم. كذلك تأثر طول فترة الشبق معنويا بالتركيب الوراثية المختلفة للماعز. وكان لوزن الأم تأثيرا معنويا على طول فترة الشبق فقط بينما عمر الأم كان له تأثير معنوي على طول فترة الحمل وفترة الشبق. وتكرر حدوث الشبق بدرجة أعلى فى الصباح فى النعاج البرقى مقارنة بالنعاج العواسى والنعاج الخليطة.