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REPRODUCTIVE PERFORMANCE OF DESERT BARKI GOATS AND THEIR CROSSES WITH DAMASCUS AND ZARAIBI BREEDS UNDER THE COASTAL ZONE OF WESTERN DESERT IN EGYPT

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SUMMARY

Reproductive performance of desert Barki (B), Zaraibi (Z) and Damascus (D) goats, F_1 (crosses D.B and Z.B) and backcrosses to B ((B.DB) and (B.ZB)) was studied under semi-arid conditions of the coastal zone of the western desert of Egypt. The data covered nine years (from 1980 to 1988).

Number of D kids weaned per doe joined (k_{WJ}) was relatively small due to low conception rate and high kid mortality as well. However, high fertility estimated as Kg_{BJ} and Kg_{WJ}) and prolificacy (litter weight at birth and weaning) of pure D does was maintained. The D.B cross performed generally better than the Z.B one. On the other hand,D crosses seemed to perform substantially better than local B in both fertility and prolificacy parameters. Significant variations in reproductive parameters due to year effect were found.

In all genotype, reproductive traits increased with age of doe or parity till certain age and declined afterwards. Parity had highly significant effect ($P < 0.01$) on all prolificacy parameters and a highly significant effect on kids born per doe joined (K_{BJ}).

Keywords: Reproductive performance, goat, crossing

INTRODUCTION

Goat is the second most important livestock species after sheep in the semi-arid coastal zone of the western desert in Egypt. Recently, there is some evidence of an increase in Barki goat population, most probably due to exportation to some neighboring countries.

Goat population in the western desert amounts to nearly 0.3 million heads. They are of good fertility, low prolificacy and have good ability for rearing their kids.

This study aimed at improving the reproductive performance of Barki goats by crossing them with high prolific and good milking breeds. Two breeds, one is local (Egyptian Nubian or Zaraibi) and one is imported (Damascus) were used in this respect. Fertility and prolificacy parameters of different genotypes were investigated.

MATERIAL AND METHODS

This study included the analysis of data available for some reproductive parameters over 9 years. The breeding groups studied were three pure breeds, Barki (B), Zaraibi (Z),Damascus (D), the first cross of Barki does with either damascus (D.B) or Zaraibi bucks (Z.B) and finally the backcrosses of these first crosses to Barki bucks (B.DB and B.ZB) . Some crossbred groups were not represented in earlier years, but started to be present later according to the breeding plan.

A number of 1020 records for does and 910 records for kids obtained throughout the period from 1980 to 1988 were used. The animals were raised at Bourg El-Arab Research Farm, Agriculture Research Center, located at the coastal zone of the western desert, Egypt. All animals were kept in confinement all the year round and were fed Egyptian clover hay (Trifolium alexandrinum) and barley straw in addition to concentrate supplement according to their needs. Animals were allowed to drink twice daily. Mating season started in September and lasted for 45 days. Does and bucks were allowed to mate for the first time at the age of 1.5 years. Kidding took place during February and March. Kids were identified by ear tags and their birth weight, type of birth and sex were recorded. Kids were kept with their dams up to

weaning at about eight weeks of age.

Two parameters were used for evaluating the reproductive performance i.e. fertility and prolificacy.

Parameters used for determining fertility were calculated for does put with the bucks (joined), while those used for determining prolificacy were calculated for does which already kidded. Fertility parameter were conception rate (CR), kids born per doe joined (K_{BJ}), kids weaned per doe joined (K_{WJ}), litter weight at birth per doe joined (Kg_{BJ}) and litter weight at weaning per doe joined (Kg_{WJ}). Prolificacy parameters were litter size at birth per doe kidding (K_{BK}), litter size at weaning per doe kidding (K_{WK}), litter weight at birth per doe kidding (Kg_{BK}) and litter weight at weaning per doe kidding (Kg_{WK}).

Data were analysed using the method of least squares analysis of variance with unequal subclass numbers (Harvey, 1977). The model describing each observation in fertility and prolificacy traits was assumed to be

$Y_{ijkl} = \mu + A_i + B_j + C_k + e_{ijkl}$ where, Y_{ijke} = the lth observation taken on the individual of the ith breed group, in the Jth year of kidding and the kth parity of doe,

μ = the overall mean,
A_i = the effect of the ith breed group,
B_j = the effect of the jth year of kidding,
C_k = the effect of the kth parity of doe and
e_{ijkl} = a random error assumed to be IRND($0, \sigma_e$).

Duncan's Multiple Range Test was used to compare among means of each trait

RESULTS AND DISCUSSION

Effect of breed

Pure breeds

Comparing doe productivity of the imported breed (D) with that of the two native ones (B and Z) reveals that although damascus does had the smallest litter size at birth and at weaning (Table 1), yet they had the highest litter weight at birth and at weaning either per doe joined or per doe kidding. This could be attributed to the higher birth weight and growth rate of Damascus, kids, a matter that reflects the beneficial effect of

using Damascus bucks in crossbreeding. Nevertheless, birth and weaning litter weight of Damascus in the present study were markedly less than those reported by Constantinou (1981) for the same breed in cyprus (6.9 and 27.0 kg., respectively).

Table 1. Least-squares means (± S.E.) of reproductive parameters classified by genotype

Genotype	No. of records	Fertility Traits[a]				
		CR	K_{BJ}	K_{WJ}	Kg_{BJ}	KgWJ
Pure breeds						
Barki (B)	294	84.3±0.03^{ab}	90.7±0.06^{a}	68.9±0.05^{ab}	2.31±0.28^{a}	4.77±0.74^{b}
Zarabi (Z)	315	71.4±0.03^{b}	98.6±0.06^{a}	69.1±0.05^{ab}	2.18±0.16^{a}	4.27±0.43^{b}
Damascus(D)	295	72.9±0.03^{ab}	80.2±0.06^{a}	51.4±0.05^{b}	2.63±0.17^{a}	4.78±0.44^{b}
First cross						
Z.B	43	67.9±0.07^{b}	97.9±0.13^{a}	62.0±0.12^{ab}	2.55±0.52^{a}	4.65±1.37^{b}
D.B	34	88.3±0.07^{ab}	122.7±0.14^{b}	98.9±0.13^{a}	3.22±0.75^{b}	8.62±1.98^{a}
Backcross						
B.ZB	6	95.8±0.17^{a}	99.7±0.33^{a}	72.1±0.29^{ab}	2.39±0.88^{a}	5.00±2.00^{b}
B/DB	33	82.3±0.08^{ab}	94.9±0.15^{a}	69.9±0.14^{ab}	2.47±0.41^{a}	4.57±1.08^{b}
		Prolificacy Traits[b]				
		K_{BK}		K_{WK}	Kg_{BK}	Kg_{WK}
Pure breeds						
Barki (B)	200	160.76±0.02^{abc}		114.94±0.05^{a}	4.04±0.14^{bc}	7.99±0.71^{ab}
Zaraibi (Z)	194	168.11±0.02^{ab}		115.12±0.03^{a}	3.64±0.08^{bc}	7.21±0.44^{ab}
Damascus(D)	180	159.96±0.02^{bc}		105.19±0.09^{a}	4.99±0.09^{ab}	9.48±0.45^{ab}
First cross						
Z.B	29	160.99±0.04^{abc}		101.32±0.11^{a}	4.15±0.27^{abc}	7.47±0.38^{ab}
D.B	29	168.40±0.04^{abc}		126.29±0.10^{a}	4.29±0.36^{bc}	10.78±1.83^{a}
Backcross						
B.ZB	3	159.33±0.13^{a}		130.69±0.32^{a}	3.24±0.56^{a}	10.24±2.87^{ab}
B.DB	26	161.23±0.04^{c}		110.47±0.11^{a}	3.86±0.19^{c}	7.37±0.99^{b}

a: CR = conception rate; K_{BJ}= kids born/doe joined; K_{WJ} = kids weaned/doe joined; Kg_{BJ}= litter weight at birth/doe joined; Kg_{WJ}= litter weight at weaning /doe joined.

b: K_{BK}= litter size at birth/doe kidded; K_{WK}= litter size at weaning/doe kidded; Kg_{KB}= litter weight at birth /doe kidded; Kg_{WK}= litter weight at weaning/doe kidded.

means in the same column with different letters differ significantly from each other (P<0.05)

Though Zaraibi does had the lowest litter weight at

Though Zaraibi does had the lowest litter weight at birth and at weaning among the three pure breeds, yet they had the highest litter size born or weaned either per doe joined or per doe kidding.

Barki does were superior over both Zaraibi and Damascus in conception rate (84.3% vs. 71.4 and 72.9%, respectively). Haider (1982) and Aboul-Naga *et al.* (1988) concluded that Zaraibi does had high fertility and were able to wean more kids than did Barki or Damascus goats.

Crossbred

Crossing Barki with Damascus goats led to the best performances of all fertility and prolificacy traits over those of parental breeds except Kg_{Bk} which was intermediate between values of the parental breeds (Table 1). Aboul-Naga (1988) reported similar results using limited numbers of the same genotypes. However, does of the F1 (D.B) performed better than those of the backcross with Barki (B.DB) for all fertility and prolificacy traits denoting that such superiority is due to the higher percentage of Damascus blood. Similar results were found by Haider (1982) and Aboul-Naga *et al.* (1985).

(Z.B) crossbred does had lower values for all fertility and prolificacy traits than those produced by (D.B) crossbreds (Table 1). Comparing (Z.B) does with their parents clarifies that values of fertility and prolificacy traits obtained by (Z.B) does were intermediate between those of parental breeds in the cases of litter size at birth and litter weight at weaning, but exceeded those of parents in litter weight at birth while were less in the cases of litter size at weaning and conception rate.

Backcrossing (Z.B) does to Barki buck, generally resulted in higher values for fertility traits than those obtained by F_1(Z.B) does, pure parents or the backcross (B.DB). With prolificacy traits, (B.ZB) does were still superior over the previous genotypes except at birth where they performed less.

However, Table 4 shows that genotype had a significant effect on all fertility and prolificacy traits except K_{WK}.

parity were found (Table 2).

Table 2. Least-squares means (± S.E) of reproductive parameters classified by parity of doe

Parity of doe	No. of records	Fertility Traits				
		CR	K_{BJ}	K_{WJ}	Kg_{BJ}	Kg_{WJ}
1	269	83.4±0.04	79.0±0.07	64.1±0.06	2.17±0.19	5.42±0.50
2	221	88.9±0.04	97.1±0.07	82.0±0.07	2.61±0.20	6.35±0.54
3	187	83.6±0.04	98.9±0.08	80.8±0.07	2.85±0.22	6.46±2.59
4	138	88.9±0.05	116.3±0.09	82.1±0.08	2.97±0.24	6.78±0.64
5	97	78.1±0.05	88.3±0.10	71.5±0.09	2.47±0.27	5.61±0.71
6	58	68.6±0.06	69.1±0.12	61.6±0.11	2.65±0.33	4.90±0.88
7	26	87.4±0.08	110.1±0.17	76.4±0.15	2.70±0.45	4.91±1.19
8	24	72.5±0.15	97.2±0.24	57.2±0.22	2.50±0.67	4.42±1.78
		Prolificacy Traits				
		K_{BK}	K_{WK}	Kg_{BK}	Kg_{WK}	
1	161	156.95±0.03	131.28±0.08	4.07±0.13	11.01±0.67	
2	157	167.39±0.03	135.93±0.07	4.13±0.11	10.45±0.59	
3	121	160.38±0.03	129.74±0.07	4.62±0.12	10.38±0.62	
4	100	161.84±0.03	104.59±0.08	4.03±0.13	8.55±0.65	
5	61	155.45±0.04	122.18±0.09	4.15±0.17	9.28±0.85	
6	31	169.81±0.05	109.46±0.12	4.39±0.21	7.78±1.09	
7	17	161.71±0.06	97.50±0.16	3.62±0.26	5.98±1.43	
8	13	167.93±0.07	89.10±0.18	3.99±0.31	6.73±1.59	

Results given in Table 2 show that various fertility traits were improved with advancing parity up to the 4th parity (5.5 years old) with oscillatory values afterwards. This result is in agreement with those reported earlier with a wide range of breeds in different regions for various fertility traits (Adu et al., 1979; Corteel et al., 1982; Haider, 1982 and Pander and Kanaujia, 1988).

Parity had a significant effect on all prolificacy traits ($P<0.01$) (Table 2). Litter size at birth increased with increasing parity up to the 6th one and declined afterwards. However, litter size at weaning increased only to the second parity and declined afterwards though a hump was noticed in the 5th parity. This finding indicates higher mortality in kids of older does.

Table 3. Least-squares means (± S.E) of reproductive parameters classified by year of kidding

Year of kidding	No. of records	Fertility Traits				
		CR	K_{BJ}	K_{WJ}	Kg_{BJ}	Kg_{WJ}
1980	123	75.9±0.06	104.5±0.11	61.3±0.10	2.7±0.30	4.9±0.79
1981	131	78.8±0.06	106.4±0.11	87.6±0.10	2.7±0.30	7.1±0.78
1982	103	78.7±0.06	99.6±0.11	62.6±0.10	2.3±0.30	4.9±0.81
1983	109	80.5±0.05	90.3±0.11	67.8±0.11	2.0±0.29	4.7±0.78
1984	130	88.5±0.05	110.0±0.10	81.4±0.09	3.1±0.28	6.4±0.73
1985	114	78.5±0.05	91.3±0.10	63.7±0.09	2.1±0.27	5.2±0.73
1986	109	85.2±0.05	95.7±0.10	82.1±0.09	2.7±0.28	6.8±0.74
1987	114	84.4±0.05	92.0±0.10	61.2±0.09	2.6±0.26	4.7±0.69
1988	87	73.4±0.05	90.4±0.10	63.1±0.09	2.9±0.28	4.4±0.74
		Prolificacy Traits				
		K_{BK}	K_{WK}	Kg_{BK}	Kg_{WK}	
1980	77	163.9±0.04	86.8±0.09	3.9±0.16	6.5±0.82	
1981	94	156.5±0.04	137.2±0.09	3.9±0.16	10.9±0.80	
1982	64	169.2±0.04	115.8±0.10	3.8±0.17	9.0±0.88	
1983	75	162.7±0.04	114.7±0.11	3.3±1.18	8.5±0.92	
1984	85	170.6±0.09	118.1±0.09	4.6±0.15	9.2±0.78	
1985	66	158.0±0.04	116.5±0.09	3.5±0.16	9.4±0.82	
1986	73	160.6±0.04	141.2±0.10	4.4±0.17	11.4±0.88	
1987	70	160.0±0.04	109.4±0.10	4.4±0.17	8.4±0.89	
1988	56	162.3±0.05	93.7±0.12	5.3±0.21	5.5±1.08	

Table 4. Mean squares of reproductive parameters studied

Source of variation	df	Fertility CR	K_{BJ}	K_{WJ}	Kg_{BJ}	Kg_{WJ}
Genotype	6	0.68**	1.41*	1.64**	13.25*	115.96**
Parity	7	0.35*	2.62**	0.79	8.66*	45.91
Year	8	0.24	0.94	1.13**	12.533**	102.40**
Error	999	0.15	0.61	0.49	4.37	30.83
Source of Variation	df	Prolificacy	K_{BK}	K_{WK}	Kg_{BK}	Kg_{WK}
Genotype	6		0.108**	0.289	25.372**	111.030**
Parity	7		0.101**	0.855**	2.909**	77.653**
Year	8		0.112**	1.255**	8.862**	117.962**
Error	640		0.299	0.360	1.781	23593

* Significant at (P<0.05).
** Significant at (P<0.01).

Litter weight at birth increased up to third parity, then declined. It is interesting to note that does in the first parity had the heaviest litter at weaning

indicating that older does were retarded animals. Yet, they still give better litter weight in the second and third parities (Table 3). This could be attributed to improvement in body weight and udder size of doe with the increase in parity which led to production of heavier litters and availability of more milk for kids. Haider (1982) found that does in their second and subsequent kiddings were able to produce more kids than did does in their first kidding. The present results concerning prolificacy traits confirm the findings of Adu et al. (1979) and Tizikara (1983).

Effect of year of kidding

A highly significant ($P<0.01$) effects of year of kidding on all traits studied, except CR and K_{BJ}, were found (Table 2).

Generally, the present results showed that differences in reproductive traits due to year of kidding were more pronounced with number and weight of kids at weaning. This may reflect the great fluctuations in mortality rate of kids and availability of good managerial and nutritional conditions from year to year.

Aboul-Naga and Haider (1982), Latif and Abdelsalam (1988) and Pander and Kanaujia (1988) came to the same conclusion.

CONCLUSIONS

On the basis of the findings obtained in this study, crossbred does resulted from crossing B with D performed generally better than those resulted from crossing B with Z goats. On the other hand, D crosses seemed to perform substantially better than local Barki in both fertility and prolificacy traits. However, the backcross performance was less than expected form the additive contribution of D genes. Deviations from the expected means were higher in F_1 does than in backcrosses.

The influence of parity of doe on all fertility and prolificacy traits were statistically significant. Similar findings were reported by Haider (1982), Corteel et al. (1982) and Pander and Kanaujia (1988), who concluded that reproductive traits in various breeds increased almost linearly with age of doe or parity.

Significant variations in reproductive traits due to year of kidding were found.

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الأداء التناسلى للماعز البرقى الصحراوى وخليطها مع نوعى الدمشقى والزرايبى فى الساحل الشمالى الغربى بمصر .

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اجريت الدراسة على الماعز البرقى والزرايبى والدمشقى وهجنها المرباه بمزرعة بحوث الانتاج الحيوانى ببرج العرب التابعة لوزارة الزراعة الواقعة بمنطقة الساحل الشمالى بالصحراء الغربية وذلك بغرض دراسة الاداء التناسلى للماعز فى الفترة من عام ١٩٨٠ حتى عام ١٩٨٨ . واوضحت النتائج ان الماعز الدمشقية امتازت بارتفاع الخصوبة ومعدل الولادات معبرا عنها بعدد الكيلو جرامات المولودة والمفطومة لكل ام ملقحة .

من ناحية اخرى فقد تفوق الخليط (١/٢ دمشقى ١/٢ برقى) على نظيره (١/٢ زريبى ١/٢ برقى) فى جميع الصفات الخاصة بالخصوبة ومعدل الولادات موضع الدراسة وبصفة عامة قد تفوقت خلطان الدمشقى عن سلالة البرقى المحلية فى صفتى الخصوبة ومعدل الولادات وكان اداء الخليط الرجعى مع البرقى اقل مما هو متوقع وكانت الانحرافات عن المتوسطات المتوقعة اعلى فى الجيل الاول عن الخليط الرجعى .

وجدت ان الاختلافات فى الصفات التناسلية خلال سنوات الدراسة كانت معنوية كما وجد علاقة معنوية بين الصفات موضع الدراسة وعمر الام فى جميع التراكيب الوراثية المدروسه . ووجد ان عمر الام كان له تأثير عالى المعنوية على جميع المقايس المعبرة عن صفة معدل الولادات (عدد الجداء المولودة والمفطومة وعدد الكيلو جرامات المولودة والمفطومة لكل ام والدة كما كان اثره عالى المعنوية فى عدد الجداء المولودة لكل ام ملقحه كأحد مقاييس صفة الخصوبه .

بصفة عامة اشارت النتائج الى ان خلط الماعز البرقى بالذكور الدمشقى كانت أفضل فى ادائها التناسلى عن خلطها بالذكور الزرايبى