J. Agric. Sci. Mansoura Univ., 25 (8): 4989 - 4995, 2000

EFFECT OF LEVEL OF FEEDING AND MILK YIELD ON OVULATION RATE, LITTER SIZE AND OVA WASTAGE OF ZARAIBI GOATS

EL-Nakhla, S.M.[*]; M.A. EL-Harairy[**]; A.Z. Mehrez[**]; M.B. Aboul-Ela[**] and M.R. Mousa[***]

*** Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture.**

**** Animal Production Department, Faculty of Agriculture, Mansoura University.**

***** Animal Production Department, Faculty of Environmental Agricultural Sciences, El-Arish, Suez Canal University.**

ABSTRACT

A total of 106 Zaraibi does were used during the first season to study the ovulation rate, litter size and ova wastage as affected by level of both of feeding and milk yield. Does were divided into two main groups, high and moderate milk producers. Each group was divided into two subgroups with or without supplementary feeding equal to 20% of the NRC recommended allowances for two weeks before and throughout the mating season. Therefore, there were four groups,G_1 and G_3 included does of high and moderate milk yield respectively, receiving the supplementary feeding (120% of NRC), while G_2 and G_4 included does of high and moderate milk yield respectively, that were given 100% of the NRC nutrient allowances. During the second breeding season, 28 high yielding does were divided into two groups. They were fed at 100 or 120% of the NRC recommended allowances. Ovulation rate (OR) was measured, litter size (LS) was recorded and ova wastage (OW) was calculated. The data obtained were statistically analyzed. Average OR in the two studied seasons were 2.76 and 3.16, respectively. About 52 and 45 % of the does in the 1st and 2nd season, respectively had OR of >2.0 while, about 19%, on average, of the does in both seasons had OR of ≥ 4. Overall means of LS obtained herein were 2.04 and 2.54 in the two seasons, respectively. The OW was slightly higher in the 1st than the 2nd season. The increase in OW with the high level of feeding in the first season was, however, small and insignificant. Level of milk yield did not have significant effect on OR, LS or OW.

In conclusion, the results of this study illustrate the potentiality of Zaraibi as a prolific goat breed. The results also indicate beneficial effect for increasing feeding level above the NRC requirements on increasing OR or LS.

Keywords: goat, ovulation, litter size, feeding and milk level.

ITRODUCTION

Ovulation rate (OR) sets the upper limit to the number of offspring produced per pregnancy, and the latter is a major determinant of the biological efficiency of meat production from small ruminants. There seems to be wide genetic variation in ovulation rate in small ruminants (Hanrahan,

1987). Furthermore, ovulation rate has been reported to be influenced by live weight-nutrition interaction, age and season of the year.

Level of feeding is believed to play an important role in determining OR of goats (Chaniago, 1989). Supplementary feeding during the pre-mating and mating periods can increase OR in goats (Chemineau, 1986; Chaniago,1989) and sheep (Gunn *et al.*,1984; Abecia *et al.*,1993).However, information on the role of nutrition in the control of OR or twinning rate in Zaraibi goats are scarce. Aboul-Ela *et al*., (1988) reported that OR in Zaraibi goats varied widely, ranging from 1 to 6 with a mean of 2.6.There is evidence of negative relationship between level of milk yield and fertility in dairy cattle, but such information on the effect of milk yield on fertility in general and on prolificacy in patricular are lacking in goats.

The present study aimed at investigating the effect of level of feeding on ovulation rate, litter size and ova wastage of Zaraibi goats at two levels of milk yield.

MATERIALS AND METHODS

This study was conducted over two breeding seasons, where total of 106 and 28 Zaraibi does were used. The study was carried out at EL-Serw Experimental Station of the Animal Production Research Institute, Ministry of Agriculture, located at the north-eastern part of the Nile Delta.

In the first breeding season, 106 Zaraibi does were divided into two main groups according to the level of milk production during the previous season, either high (>300kg/season) or moderate producers (200-300kg/season).

Each of the two main groups was divided according to parity, age and body weight into two subgroups with or without supplementary feeding equal to 20% of the NRC (1981) recommended allowances for two weeks before and throughout the mating season.

Therefore, there were four groups of does, G_1 (27) and G_3 (27) included does of high and moderate milk yield respectively, receiving the supplementary feeding, while G_2 (26) and G_4 (26) included does of high and moderate milk yield respectively, that were given only 100% of the NRC (1981) nutrient allowances for goats. Does of all groups were fed on crop residues during June to November, and grazed berseem clover (*Trifolium alexandrinum*) from December to May. Pelleted concentrate feed mixture containing 13 % crude protein was given to cover the rest of the nutrient allowances for the different tested groups.

In the second breeding season, 28 Zaraibi does chosen from the high yielding does in the herd (>300kg/season) were used. They were divided into two dietary groups with or without supplementary feeding equivalent to 20% of the NRC (1981) nutrient allowances for goats.

Drinking water and mineral blocks were freely available to does at all times. Does of each group were loose-housed in semi-open yards. During the breeding season which started on September 1, in the two years of the study, does of each group were run with vasectomized buck to detect oestrus twice

daily at 800 and 1600h, and those that stood for mounting were mated with fertile buck.

Ovulation rate was measured as the number of *Corpora lutea* (CL) by laparoscopy following the procedure described by Oldham and Lindsay (1980). Laparoscopy was performed once during the period from day 5 to day 12 after mating.

At the following kidding season litter size (LS) was recorded and ova wastage (OW) was calculated as the difference between OR and LS for those does that kidded after about 150 d following the mating after which OR was recorded. Body weight of does at time of mating was recorded also.

Measurements of milk yield were recorded once every two weeks. During the suckling period milk suckled by kids was estimated by weighing the kids before and after milking and the difference was added to the residual milk harvested by hand milking twice daily. After weaning, does were hand milked twice daily.

The data obtained in the first season were subjected to analysis of covariance as 2x2 factorial design (two levels of milk yield x two levels of feeding) with body weight at mating as a covariate according to Steel and Torrie (1980). Within groups regression coefficients of OR on milk yield and body weight at mating were estimated. The statistical analysis was performed using Harvey·s computer program package (Harvey,1990). Data of the second season were analyzed using one way analysis of covariance to test the effect of feeding level with body weight at mating as a covariate.

RESULTS AND DISCUSSION

Average values of OR in Zaraibi goats in September mating season in the two studied years were 2.76 and 3.16, respectively, which are close to the values obtained for the same breed by Aboul-Ela *et al.* (1988) who reported average OR of 2.67 and 2.53 over two consecutive cycles. The OR obtained is higher than those obtained for several tropical and subtropical goat breeds (< 2.0) by several authors (Trejo and Perez, 1987; Simplicio *et al.*, 1987; Sah and Rigor, 1988; Agrawal *et al.*, 1992). This indicates the potentiality of Zaraibi as a prolific goat breed.

The data presented in Table 1 indicate that about 52 and 45 % of the does in the two succesive seasons, respectively, had OR of >2.0, while about 19 %, on average, of the does in both seasons had OR of ≥4. Such values along with the high individual variation in OR observed reflect good possibility for improving further the prolificacy of breed through selection for OR. Hanrahan (1987) pointed out that rate of genetic improvement of litter size can be doubled when OR is used as a selection criterion. Overall values of LS obtained herein (2.04 and 2.54 in the two seasons, respectively) are very close to the values of 2.03 and 2.25 obtained over two seasons for the same breed by Aboul-Ela *et al*. (1988), while they are higher than those obtained for many tropical and subtropical breeds (1.7-1.9) as reported by various authors (Epstein, 1971; Garcia *et al.*, 1982 and Devendra and Mcleroy, 1982). About 29.0 and 65.0 % of does in the two studied seasons,

respectively, had LS of > 2.0, which re-emphasizes the potentiality for improving flock offtake from this promising breed through selection.

Table 1: Frequency distribution of ovulation rate (OR) and litter size (LS) in Zaraibi goats during the two studied seasons.

Season	Group	% of does								
		Ovulation rate (OR)					Litter size (LS)			
		1	2	3	4	5	1	2	3	4
First season	G1	3.85	19.75	50.00	19.23	7.69	14.82	25.93	25.93	14.82
	G2	4.00	60.00	24.00	12.00	0.00	7.70	42.31	15.38	7.70
	G3	3.70	40.74	44.45	11.11	0.00	7.41	51.85	29.63	3.70
	G4	7.69	53.85	26.92	11.54	0.00	24.00	56.00	20.00	0.00
	Overall mean	4.81	43.40	36.34	13.60	1.92	13.48	44.02	22.74	6.56
Second season	G1	6.25	37.50	18.75	25.00	12.50	5.88	23.53	35.29	23.53
	G2	8.33	58.33	25.00	8. 34	0.00	17.65	41.18	35.29	0.00
	Overall mean	7.29	47.92	21.88	16.67	6.25	11.77	32.36	35.29	29.41

Generally, there was no significant differences in OR due to level of feeding (Table 2), although there was tendency for higher level of feeding (120% of NRC) to produce about 7% higher OR, compared to the standard feeding level (100% of NRC) in the 1st season.

The effect of increasing feeding level on improving OR was more pronounced in the second season (+36%), but such difference was still not statistically significant, possibly due to the high individual variation within groups. Similarly, the effect of feeding level on LS in the two seasons was not significant (P>0.05), (Table 2). It is worthy noting, however, that in the second season, the improvement in OR with the higher feeding level was not maintained since the difference in LS between the two groups studied was much less than in OR (36 vs.6 %) due to significantly (P<0.05) higher incidence of ova wastage (OW) with the high feeding level (Table 2). The increase in OW with high level of feeding in the first season was, however, small and insignificant (P>0.05).

Variation in the response to flushing in sheep flocks may be related to various factors including the status of the ewe prior to flushing, length of flushing period, magnitude of increase in the level of nutrients and the level of both energy and protein (Smith,1985; Aboul-Ela and Aboul-Naga,1987).

Level of milk yield did not have significant (P>0.05) effect on OR, LS or OW (Table2). It seems, however, that the slightly higher OR in high milk producers was not maintained in LS, due to the markedly higher OW in high milk producers which gave lower LS.

Ova wastage was slightly higher in the 1st than the 2nd season. This may be attributed to the higher frequency of does with >2.0 OR in the first than the 2nd season. Similar findings were reported by other authors

(Hanrahan and Quirke,1985; Aboul-Ela *et al*.,1988; Gabr *et al.*, 1989) where OW for double or more ovulations was almost three times than that of single ovulations in different breeds.

In conclusion, the results of this study illustrate the potentiality of Zaraibi as a prolific goat breed. The results also indicate the beneficial effect for increasing feeding level above the NRC recommended allowances on increasing OR or LS.

Table 2: Means ±SE of ovulation rate (OR), litter size (LS) and ova wastage (OW) in Zaraibi goats as affected by level of feeding and milk yield.

	Ovulation rate (OR)	Litter size (LS)	Ova wastage (OW)
First season: Overall mean	2.7±0.099	2.04 **±**0.134	0.72±0.132
Feeding level :			
High (120% of NRC)	2.86 ± 0.122	2.11 ± 0.165	0.75 ± 0.162
Standard (100% of NRC)	2.67± 0.132	1.98 ± 0.178	0.68 ± 0.175
Milk yield level :			
High	2.82 ± 0.129	1.98 ± 0.174	0.84 ± 0.171
Moderate	2.71 ± 0.135	2.11 ± 0.183	0.59 ± 0.179
Milk yield x Feeding level (interaction):			
G1	2.90 ± 0.166	2.03 ± 0.224	0.88 ± 0.221
G2	2.73 ± 0.172	1.93 ± 0.233	0.81 ± 0.229
G3	2.81 ± 0.166	2.19 ± 0.224	0.62 ± 0.221
G4	2.60 ± 0.184	2.03 ± 0.249	0.57 ± 0.245
Second season: Overall mean	3.16 ± 0.239	2.54 ± 0.269	0.611 ± 0.172
Feeding level :			
High (120% of NRC)	3.64 ± 0.366	2.61 ± 0.413	1.02 ± 0.264
Standard (100% of NRC)	2.67 ± 0.357	2.47 ± 0.402	0.199 ± 0.030

REFERENCES

Abecia,J.A.; F.Forcada and L. Zarazaga (1993). A note on the effect of level of nutrition after weaning on the resumption of reproductive activity by ewes of two Spanish breeds lambing in spring. Anim. Prod.,56:273.

Aboul-Ela, M.B. and A.M. Aboul-Naga (1987). Improving fecundity in subtropical fat-tailed sheep. In: Marai, I.F. and Owen, J.B. (eds) New Techniques in Sheep Production., Butterworths,London,pp.163.

Aboul-Ela, M.B.; A.M. Aboul-Naga; S.M. El-Nakhla and M.R. Mousa (1988). Cyclic activity, ovulation rate and breeding performance of the prolific Egyptian-Nubian goats. Proceeding XI International Congress on Anim. Reprod. and AI, June,27-30, Dublin,pp.545.

Agrawal, A.P.; N.K. Sinha, and A.K. Goel (1992). Reproduction behaviour in Indian goats. Research in goats, Indian Experience, Central Institute for Research on goats, Makhdoom, Mathura, India, pp.82.

Chaniago, T.D. (1989). Comparison of the reproductive performance of Etawah cross goats and Kacang goats maintained on low quality feed with and without supplementation during mating and pre-kidding period. Proc.VI,World Conf. of Anim. Prod., Helsinki, Finland, Finnish Anim. Breeding Assoc.

Chemineau, P. (1986). Sexual behaviour and gonadal activity during the year in the tropical Creole meat goat. 1. Female oestrus behaviour and ovarian activity . Reprod., Nutr. and Development, 26:441.

Devendra, C. and G.B. Mcleroy (1982). *Goat and Sheep Production in the Tropics*. Longman Group Ltd, London.

Epstein, H. (1971). *The Origin of Domestic Animals of Africa*. Vol. II, African Publishing Corporation. New York, London, Munich.

Gabr, M.G.; Q.A.M. Aboul-Naga; M.B. Aboul-Ela and S.M. El-Nakhla (1989). Seasonal variation in ovulation rate, litter size and ova wastage in local Rahmani and Ossimi ewes. Proc.3rd Egyptian-British Conf. on Anim., Fish and Poultry Prod., Alex.October,pp.657.

Garcia, O.; J. Bravo; B. Kennedy and Garcia, E. (1982). Cross breeding of imported and native goats in a dry tropical environment. II. Production and reproduction. Proc. of the 3rd Int. Conf. on Goat Prod. and Disease, Jan.,10-15, Tucson, Arizona, USA. pp. 509.

Gunn, R.G.; J.M. Doney and W.F. Smith (1984). The effect of different durations and times of high level feeding prior to mating on the reproductive performance of Scottish Blackface ewes. Anim. Prod., 39:99.

Hanrahan, J.P. (1987). Genetic variation in ovulation rate in sheep. In: Marai, I.F. and Owen, J.B. (eds) New Techniques in Sheep Production., Butterworths, London, pp.37.

Hanrahan, J.P. and J.F.Quirke (1985). Contribution of variation in ovulation rate and embryo survival to within breed variation in litter size. In: Land, R.B. and Robinson, D.W. (eds) Genetics of Reproduction in Sheep. Butterworths, London, pp.657.

Harvey, W.R. (1990). Mixed Model Least Squares and Maximum Likelihood Computer Program. PC1. Ohio State Univ. Columbia USA (Memeograph).

NRC (1981). Nutrient Requaierments of Goats. Angora, dairy and meat goats in temperate and tropical countries. No.15, National Academy Press. Washington DC.

Oldham, C.M. and D.R. Lindsay (1980). Laparoscopy in the ewe: A photographic record of the ovarian activity of ewes experiencing normal or abnormal oestrus cycle. Anim. Reprod. Sci., 3:119.

Sah, S.K. and E.M. Rigor (1988). Estrus cycle, estrus duration and ovulation time in goats. Philippine Agric., 68: 461.

Simplicio, A.A.; W.C. Foote and G.S. Riera (1987). Frequency and ovulation rate in three native genotypes of goats under two feeding management systems. Proc. IV, Int. Goat Conf. Brazil,8-13March, pp.1485.

Smith, J.F. (1985). Protein, energy and ovulation rate. In: Land, R.B. and Robinson, D.W. (eds) Genetics of Reproduction in Sheep. Butterworths, London, pp.349.

Steel, R.D. and J.H. Torrie (1980). Principles and Procedures of Statistics. A Biometrical Approach. 2nd ed. McGraw-Hill Book Co., Inc., New York, USA.

Trejo, A. and Y. Perez (1987). Seasonal productive activity of Cariollo does slaughtered in Mexico. Proc. IV. Int. Goat Conf., Brazil, 8-13March, pp.15001.

تاثير مستوى التغذية ومحصول اللبن على معدل التبويض وحجم الخلفة والفقد فى البويضات فى الماعز الزرايبى

سيد محمد النخلة[1] ؛ مصطفى عبد الحليم الحرايرى[2] ؛أحمد زكى محرز[2] ؛ محمد بدر الدين أبو العلا[2]؛ محمد رضا موسى[3]

1. معهد بحوث الانتاج الحيوانى- مركز البحوث الزراعية - وزارة الزراعة.

2. قسم الأنتاج الحيوانى - كلية الزراعة - جامعة المنصورة .

3. كلية العلوم الزراعية البيئية بالعريش - جامعة قناة السويس.

أجرى هذا البحث فى محطة السرو لبحوث الإنتاج الحيوانى. حيث استخدم عدد 106 ، 28 عنزة زرايبى لدراسة تأثير مستوى التغذية ومحصول اللبن على كل من معدل التبويض وحجم الخلفة والفقد فى البويضات فى موسمين من التناسل على التوالى. وقد تم تقسيم الحيوانات إلى مجموعتين رئيسيتين إحداهما عالية فى إنتاج اللبن والأخرى عادية. بعد ذلك قسمت كل مجموعة إلى تحت مجموعتين وبذلك اصبح هناك اربعة مجموعات اشتملت المجموعة الأولى والثالثة منها على الحيوانات ذات ادرار اللبن العالى والعادى على التوالى حيث غذيت على 120% من المقررات الغذائية للماعز. بينما اشتملت كل من المجموعة الثانية والرابعة على الحيوانات ذات إدرار اللبن العالى والعادى على التوالى وغذيت على 100% فقط من المقررات الغذائية الموصى بها للماعز. تم اخذ القياسات الآتية: معدل التبويض وعدد المواليد وبحساب الفرق بينهما حسب الفقد فى البويضات ثم تم تحليل البيانات إحصائيا. **وكانت النتائج كالتالى:**

كان متوسط معدل التبويض عاليا فى الموسمين تحت الدراسة (76،2 ، 16،3) على التوالى. وكان معدل التبويض اكبر من اثنين فى حوالى 52 ، 45 % من الحيوانات فى كلا الموسمين على التوالى. بينما زاد هذا المعدل الى اكثر من أربعة فى حوالى 19% من الحيوانات. كان المتوسط العام لعدد المواليد 4،2، 2،54 على التوالي وزاد عدد البويضات المفقودة فى الموسم الأول عن الموسم الثانى ولكن بدون معنوية، كما لم يكن لمستوى محصول اللبن تأثير معنوى على أى من القياسات من معدل التبويض أو عدد المواليد أو الفقد فى البويضات.

توضح النتائج أهمية زيادة مستوى التغذية للوصول إلى معدل تبويض عالى وبالتالى إنتاج عدد أكبر من المواليد من الماعز الزرايبى ذات الكفاءة الإنتاجية العالية.