The effect of suckling intervals on lactation milk yield and length of lactation of Sudan Nubian goats

A. E. Khalid, and A. M. Awadelkarim.

SUMMARY

40 mature Nubian goats were selected and divided on a weight and age basis into four groups of 10 does each. The four groups were allocated at random to one of the following treatments:

1) Group A were suckled their kids for 6 weeks
2) Group B for 8 weeks
3) Group C for 10 weeks
4) Group D for 12 weeks

Lactation length of milk and milk production were determined for each animal.

The mean daily milk yield was 1.58, 1.21, 1.21 and 1.09 Kg for group A, B, C and D, respectively.

The mean maximum yield per day was 2.99, 2.19, 2.12 and 2.19 Kg for group A, B, C and D, respectively, reached during the period between 12 – 33, 10 – 34, 9 – 107 and 8 – 72 days of lactation, respectively. The total milk yield per lactation of the four experimental groups was 240.79, 179.63, 196.59 and 181.01 Kg for group A, B, C and D, respectively. The analysis revealed high significant ($P<0.01$) difference among the total yields per lactation in the four groups.

The mean lengths of lactations were 152, 148, 162 and 166 days for group A, B, C and D, respectively. The length of lactation tends to increase as suckling extend. Statistical analysis of the data showed no significant ($P> 0.05$) difference among the four groups.

INTRODUCTION

The goat was believed to have been the earliest ruminant to be domesticated (Zeuner, 1963).

Today half the population of the world is still drinking goat's milk and even in affluent societies new interest in goats is developing because of the dietetic qualities attributed to goat's milk products (Consantinou, 1985).

The Sudan Nubian goat has been and currently is used in several traditional production systems, as a multipurpose breed providing milk, meat, hair and skins. Much of the production data on this breed has been collected from government or universities research stations. Research pertinent to assessment of reproductive and productive potentials of the Sudan Nubian breed are however scant under traditional management system.

The aim of the present work was to provide more information on the effect of different suckling regimes on yield and length of lactation.

MATERIALS AND METHODS

The experiment was carried out at the Small Ruminants Unit, Animal Production Research Center, Kuku, and Khartoum North.

Four mature bucks and 70 Nubian goats were purchased from Abu-hamed Province, River Nile

State, and trucked to the experimental site. On arrival each individual animal was identified by ear tag and treated against internal and external parasites. Three weeks were permitted as an adaptation period before experimental data was considered. From above herd 40 mature goats were selected and divided on a weight and age basis into four groups of 10 does each. The four groups were allocated at random to one of the following treatments:

5) Group A were suckled their kids for 6 weeks (each animal suckling single kid).
6) Group B for 8 weeks.
7) Group c for 10 weeks.
8) Group D for 12 weeks.

Each group was housed separately offered food once daily and allowed free access to water The data was collected on day one of lactation, and continued up to the end of the lactation After kidding and expulsion of the placenta the does and kids were taken to a group pen where they were weighed, kids were ear tagged and in addition to birth weight, the sex of the kids was recorded.

The kids were left with their dams for 7 days, to provide an adequate quantity of colostrum. Then they were separated from their dams, and allowed to suck twice per day till weaning.

Fresh *Medicago sativa* (*Barseem*) and a concentrate ration containing 600 gm ground Dura (Feterita), 380 gm cotton seed meal and 20 gm mineral/vitamin premix per Kg were offered daily, at least 10% in excess of intake. The refusals were discarded daily and recorded. Then the feed intake of each group per lactation was determined.

Total lactation yields were collected by weigh – suck – weigh techniques following procedures out lined by Jenkins and Ferrell (1984). A – 24 – h milk production was estimated as follows:

A kid was weighed, allowed to suckle freely to satisfy, and then reweighed. The difference in the pre and post suckling gave an estimate of milk suckled. The remaining milk, if any, was removed by hand milking and weighed. This together with the suckled milk comprises a 12-h production. The same procedure was adopted in the evening give the other 12-h yield both yields were considered as the 24-h milk yield. This procedure was repeated every day till weaning. Following weaning the does were hand milked twice a day till dry. This procedure of 24-h milk yield was used to estimate parameters descriptive of lactation curves and allowed to predict time of peak lactation and total yield of milk for individual doe during the lactation. Also length of lactation was determined for each doe.

The data were analysed by analysis of variance for a randomized block design, and significant differences between treatments detected by least significant difference (Snedecor and Cochran, 1980).

RESULTS

The ingredients and chemical analyses of the concentrate mix offered to the experimental groups of goats is given in **table 1.**

Table 1. Formulation and composition of the concentrate mix for dams (on DM basis).

Ingredients	%	Composition	%
Sorghum grains	60	Dry matter	96.20
Cotton seed cake	38	Crude protein	21.95
Mineral / vitamine mix	2	Ash	5.02
		Ether extract	6.60
		Crude fiber	7.00

Table 2 provides data on mean dry matter intakes of concentrate and green fodder (*Medicago sativa)* kg per head per month throughout lactation period. Concentrate intakes were higher for all groups compared with green fodder intakes. The intake of goats immediately after kidding was low (19.70, 13.95, 16.21 and 14.76 Kg) for concentrate, and (3.47, 3.30, 4.95 and 4.15 Kg) for green fodder at the first month of lactation. At the 2nd month of lactation the intake reached the maximum level.

The first month of lactation. At the 2nd month of lactation the intake reached the maximum level (39.60, 27.90, 32.40 and 29.52 Kg) for concentrate, and (6.74, 6.60, 9.90 and 8.28 Kg) for green fodder for groups A, B, C and D respectively. Following that the intake decreased gradually till the end of lactation. The milk yield of goats was positively correlated with feed intake.

The data in table (3) portrayed the milk yield of the experimental groups at different levels of the production cycle. The highest mean daily milk yield (1.58 Kg) was obtained from group A, while the least value was secured by group D. Group B and C produced intermediate yields of 1.21 Kg for each.

The mean maximum daily yield followed approximately the same trend whereby the highest mean maximum daily yield was recorded in group A (2.99 Kg). Groups B and D maintained intermediate values of 2.19 Kg while the least value (2.12 Kg) was obtained in group C.

The data in **table (3)** also showed the days to peak yield. The figures indicated 12 – 33, 10 – 34, 9 – 107 and 8 – 72 as the intervals to peak yield for group A, B, C and D, respectively.

Table 2. Mean dry matter intakes (kg) per head per month**.**

Month of lactation	Feed	Groups			
		A	**B**	**C**	**D**
1st	Concentrate	19.70	13.95	16.21	14.76
	Barseem	3.47	3.30	4.95	4.15
2nd	Concentrate	39.6	27.90	32.40	29.52
	Barseem	6.74	6.60	9.90	8.28
3rd	Concentrate	35.48	5.11	29.20	26.58
	Barseem	6.25	5.94	8.92	7.74
4th	Concentrate	29.57	20.62	24.33	22.14
	Barseem	5.27	4.95	7.53	6.22
5th	Concentrate	28.78	19.53	22.71	20.67
	Barseem	4.86	4.60	6.80	5.80
6th	Concentrate	25.00	18.50	21.08	19.19
	Barseem	4.50	4.30	6.54	5.33
7th	Concentrate	19.00	13.98	16.26	14.78
	Barseem	3.62	3.33	4.90	4.24
Total intake	Concentrate	197.13	139.49	162.19	147.64
	Barseem	34.71	33.02	49.54	41.49
Cost, Sudanese Dinars		8507.2	6724.7	8747.8	7662.6

When the total milk yield was partitioned to weekly yields, the data indicated that the highest yield during the second to the sixth weeks was secured by group A (17.10 Kg) followed by group B (12.21Kg). Group C and D maintained yields of 11.11 and 11.24 Kg, respectively. The subsequent yields during the 7^{th} to the 12^{th} week were 12.37, 8.67, 9.73 and 9.70 Kg for the four groups, respectively.

The corresponding values of yield tend to decrease as lactation progresses whereby the values during the 13^{th} to 28^{th} week of lactation were 5.07, 4.16, 5.17 and 4.16 Kg for group A, B, C and D, respectively.

Table 3. Milk yield of goats during lactation.

	A		B		C		D	
The mean milk yield, kg/day	1.58							
The mean maximum yield, kg/day	2.99							
Days to peak yield	12-33							
The mean milk yield per week, kg at different stages of lactation								
2–6 weeks of lactation	17.10	decrease %	12.21	decrease %	11.11	decrease %	11.24	decrease %
7-12 weeks of lactation	12.37	27.6%	8.67	28.9%	9.73	12.42%	9.70	13.7%
13-28 weeks of lactation	5.07	59%	4.16	52%	5.17	46%	4.16	57%
Total suckled milk (kg)	40.60		45.58		64.62		83.13	
Total marketed milk (kg)	200.19		134.05		131.97		97.88	
Total milk yield per lactation (kg)	240.79		179.63		196.59		181.01	
Price (Sudanese Dinars)	27088.9		20208.4		22116.4		20363.6	

Considering the percentage decrease in milk yield as lactation progress linked to the weaning protocols adopted in the experiment (6, 8, 10 and 12 weeks), it was evident that there was a decreased rate of % drop in milk yield with extended suckling. In other words suckling periods were inversely proportional to % drop in milk secretion indicating that suckling promotes persistency of lactating goats.

The % drop in milk yield for the four groups was 27.6%, 28.9%, 12.42% and 13.7% for groups A, B, C and D which were suckled for 6, 8, 10 and 12 weeks, respectively.

The total milk per lactation produced by the four experimental groups was 240.79, 179.63, 196.59 and 181.01 for group A, B, C and D, respectively (Table 4). The analysis

revealed high significant (P<0.01) difference among the total yields per lactation in the four groups.

The milk sucked was 40.60, 45.58, 64.62 and 83.13 Kg for group A, B, C and D, respectively. The remainder milk after suckling (200.19, 134.05, 131.97 and 97.88 Kg) represent marketable milk for group A, B, C and D, respectively.

The data in **Table (4)** showed the milk yields per lactation for the four experimental groups. The highest milk yield was obtained by animal No. 2 in group C (377.95 Kg), and the least yields were recorded by animals No. 7 and No. 6 (112.40 Kg) in groups B and C, respectively.

The highest mean milk yield per lactation was recorded in group A (240.79 Kg) while the least value (179.63 Kg) was obtained in group B. Groups C and D produced intermediate yields 196.59 and 181.01 Kg, respectively.

The data in **Table (5)** showed the length of lactation per days for the four experimental groups. The longest lactation (221 days) was secured by the animal No. 2 in group C, while the shortest lactation (113 days) was shown by the animal No. 5 in the same group.

The mean lengths of lactations were 152, 148, 162 and 166 days for groups A, B, C and D, respectively. The length of lactation tends to increase as suckling extend. Statistical analysis of the data showed no significant (P>0.05) difference among the four groups.

Table 4. Milk yield per lactation (kg).

Animals *	A	B	C	D	Significance
1	232.90	118.50	320.20	191.60	
2	263.85	227.80	377.95	140.8	
3	333.55	237.70	186.46	144.05	
4	212.25	157.60	103.15	209.45	
5	207.15	143.60	133.30	242.60	**
6	232.60	200.95	112.40	169.65	
7	272.65	112.40	141.25	148.10	
8	196.65	206.80	262.85	249.10	
9	223.60	165.50	188.45	148.10	
10	232.65	157.60	139.85	166.60	
Average	240.79	179.63	196.59	181.01	

***** *Each group contains a set of different animals.*
*** Significant at p<0.01*

Table 5. Length of lactation (days).

Animals	A	B	C	D	significance
1	167	122	173	154	N.S
2	190	178	221	136	N.S
3	184	155	158	131	N.S
4	124	89	141	180	N.S
5	155	159	113	168	N.S
6	120	143	177	198	N.S
7	126	165	190	184	N.S
8	134	183	141	172	N.S
9	193	140	174	185	N.S
10	124	142	135	149	N.S
Average	152	148	162	166	N.S

N.S = not significant (P> 0.05)

DISCUSSION AND CONCLUSION

The lactation performance of the experimental goats portrayed in this study indicated higher milk yield when compared with those reported by El-Naim (1979), Kudouda (1985), Khalaffala and Suleiman (1990) and Tewfik (1997). The discrepancy in milk yield may be referred to the different environmental, nutritional and managerial conditions adopted in the different studies. It was observed that immediately after weaning there was a decline in milk production in the four experimental group. The rate of decline was higher in the short suckling groups (A and B) compared to the long suckling groups (C and D). The short suckling group reached their peak lactation yield earlier than the prolonged suckling group. This could be attributed to the suckling stimulus. Similar postulations were reported by Louca and others (1975) and Zygoyiannis (1987).

In conclusion, the results obtained in this study indicate that suckling duration may one of the many factor which influence the milk yield and lactation length traits of lactation animal. The suckling process is a strong stimulant for secretion and excretion of milk which will permit the Nubian goat to exhibit her full lactation potential. The farmers income can be increased markedly by decreasing the amount of milk consumed by suckling kids.

REFERENCES

Constantinou, A. (1988) Selection methods applicable to the improvement of goats in arid zones with special reference to the Damascus goat in Cyprus. International symposium on the exploitation of goats in arid zones, Canary Islands. December 9 – 13, 1985.

El Naim, Y. A. (1979). Some productive trait of Sudan Nubian goat. M.Sc. Animal Production, U. of K.

Jenkins, T. G. and Ferrell, C. L. (1984). A note on lactation curves of crossbred cows. Anim. Prod. 39: 479 – 482.

Khalaffalla, A. M. and Sulieman, Y. R. (1990). Some notes on the performance of Sudan Nubian and exotic goats in Sudan. Sudan J. Anim. Prod. Vol. 3, No. 2: 115 – 119

Kudouda, M. E. M. (1985). Reproductive and productive traits of Sudan Nubian goats. M.Sc. Anim. Prod. thesis, U. of K.

Louca, A; Mavrogenis, A. and Lawlor. M. J. (1975). The effect of early weaning on the lactation performance of Damascus goats and growth rate of the kids. Anim. Prod., vol. 20(2): 213 – 218.

Sendecor, G. W. and Cochran, W. H. (1980). Statistical Methods. 7th ed., Iowa State, University Press. Anges Iowa, USA.

Tewfik, E. M. (1997). The effect of traditional and intensive system of feeding on milk production and some productive parameters of Sudanese Nubian goats. M.Sc. Anim. Prod., thesis U of K.

Zeuner, F. E (1963). A history of domesticated animals. London: Hutchinson Co. (Publishers) Ltd., page 129.

Zygoyiannis, D. (1987) The milk yield and milk composition of the Greek Indigenous Goat (*Capra Pisca*) as influenced by duration of suckling period Anim. Prod., vol. 44(1): 107 – 116.