J. Food and Dairy Sci., Mansoura Univ., Vol. 2 (7): 369 - 375, 2011

STUDIES ON ZARAIBI GOAT'S MILK IN SEMI- INTENSIVE PRODUCTION SYSTEM

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ABSTRACT

The study was conducted to determine the influence of stages of lactation on milk yield and the chemical composition of Zaraibi goats milk in semi-intensive system. The analysis involved a total of 23 milk samples in various stages of lactation (early, midpoint, late). The results indicated that the total yield was (81.6±3.96 kg) in lactation period of 120 days, the daily yield (0.555±0.027 kg), the peak yield (0.78±0.10 kg) in the fifth week, and milk analysis included determination of average (12.81± 0.14 %) total solids, (4.66±0.14%) fat, (3.17±0.07%) protein, (4.18±0.05%) lactose,(8.12±0.08%) solids-non-fat and (0.80±0.02%) ash.

INTRODUCTION

In Egypt, the total milk production and its annual increase neither satisfy consumption requirements nor the annual growth of human population, which results in a dairy food gap. The main sources of milk production are buffaloes and cows, while goat milk represents not more than 0.45% of the total supply. Since the natural vegetation and the geophysical properties in arid and semiarid areas are not suitable for livestock other than small ruminants, there is a great interest in improving the milk yield from goats. This could be achieved by introducing intensive production systems on the newly reclaimed land, which could supply goats with fodder crops and crop residues. A second change would be to improve the milk producing ability of local goats through crossbreeding programmes using the improved Zaraibi breed or the exotic breeds, especially, the heat tolerant breeds. Milk collecting centres and the small-scale goat cheese industries in every community are important to overcome the constraints facing production of goat milk. Further such facilities could carry out technology research of goats' milk (Soryal *et al.* 2000)

It is important to determine the characteristics of the lactation curve of a milk animal in order to analyze the milk production potential improve milk yield and obtain a more desired lactation curve. Moreover the lactation curve is also useful for assessing the nutritional and health status of milking animals and it helps to determine the suitable time to end milking. Milk composition varies greatly among the different species, which is partly attributed to the inherited capabilities (Mech *et al.* 2008).

At present, there is paucity of information on systematic evaluation of Zaraibi as a milk producing animal. The present study was conducted to establish the variation in milk yield and different milk constituents during the lactation period in Zaraibi.

MATERIALS AND METHODS

The study utilized of flock f 23 Zaraibi does goat that were maintained at south Sinai Research Station belong to Desert Research Center (DRC) , Ministry of Agriculture located in Ras Sudr part of south Sinai during the seasons of 2008. The experimental animals were housed in semi open sheds, feeds were made available comprised clover hay and concentrate mixture comprising of (cotton seed cake, maize mixture, Soya bean , calcium carbonate and sodium chloride) producing 16% crude protein and 3% crude fat with 15% crude fiber average. Water was offered twice daily in early morning and late afternoon. Does were run mating season which starts in October and lasts for middle November about 42 days.

Milk yield was record biweekly for all goats after production till the end of lactation period using hand milking, where kids were separated from their dams for 24 hours during this period goats were milked twice daily in the morning and evening and the milk was measured by graduated cylinder (500 ml capacity) to the nearest 10g. The daily milk yield was considered the sum of both morning and evening measured milk.

Milk samples were collected also biweekly from each goat in clean bottles for chemical analysis

Milk composition (fat, protein, lactose, solid not fat and total solid) of samples was determined using milko-scan apparatus (Foss Electric, Denmark).

The data were analyzed using the SPSS 11.0.1 software package (SPSS Inc., Chicago, Illinois, USA). Three different lactation stages were defined for the analysis. These were early (1 to 7 week), mid (8 to 14 week) and late (15 to 21 week) lactation stages. To determine whether the effect of lactation stage was significant in explaining the variations in milk yield and compositions, the data were subjected to ANOVA followed by multiple pair wise mean comparisons using Student-Newman-Keuls (SNK) test. The model included stage of lactation as source of variation. To study the variations in milk yield and compositions through out the lactation period, the data for two adjacent weeks were pooled to present the lactation trend at fortnightly intervals and subjected to repeated measure ANOVA. The model included fortnight as source of variation. All data are presented as mean ± SE and a probability value of less than 0.05 was considered significant.

RESULTS

Effect of lactation stage on milk yield and milk composition

The variations of milk yield, TS, fat, total protein, casein, SNF, lactose and ash contents in different lactation stages are presented in Table1.

Fortnightly variations of milk yield and milk composition

Fortnightly variations of milk yield and different milk constituents are presented in Figure 1 and 2. Peak milk yield was recorded as early as on fifth week of lactation. Fortnightly variation of milk yield was found to be significant ($p<0.05$). Then after 5th week there was a gradual decrease till end of lactation (Figure 1).

Table1: Variation (mean ± SE) of milk yield and the content of total solid (TS), fat, total protein, casein, solid-not-fat (SNF), lactose and ash in Zaraibi milk in early (1 to 7 week), mid (8 to 14 week) and late (15 to 21 week) lactation stages

Particulars	Lactation period			
	Early lactation	Mid Lactation	Late Lactation	Average
Milk yield (ml /d)	736.64±45.93	456.17±26.82	362±47.61	555.18±26.94
TS (%)	12.94±0.24	12.42±0.17	12.56±0.31	12.81± 0.14
SNF (%)	8.10±0.06	8.23±0.32	8.11±0.91	8.12±0.08
Fat (%)	4.73±0.18	4.14±0.37	4.93±0.42	4.66±0.14
Protein (%)	3.01±0.15	3.00±0.14	3.60±0.11	3.17±0.07
Lactose (%)	4.37±0.11	4.28±0.03	3.83±0.10	4.18±0.05
Ash (%)	0.73±0.01	0.83±0.07	0.91±0.03	0.80±0.02

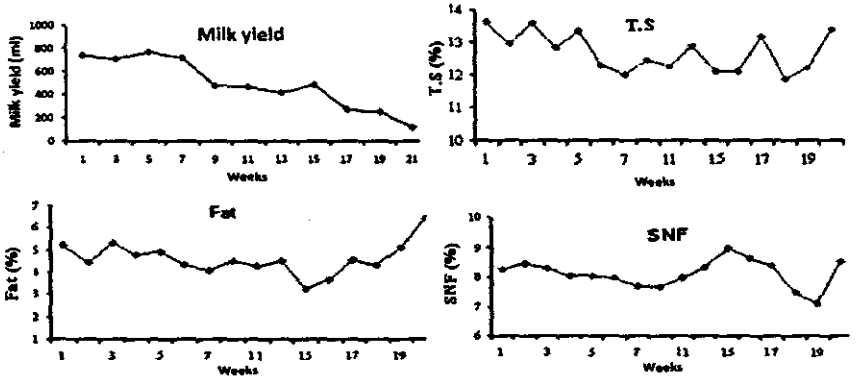

Figure 1: Fortnightly variations (mean ± SE) of milk yield ($P<0.05$) and the content of total solid (TS, $P<0.05$), fat ($p<0.05$) and solid-not-fat (SNF) in Zaraibi goat milk

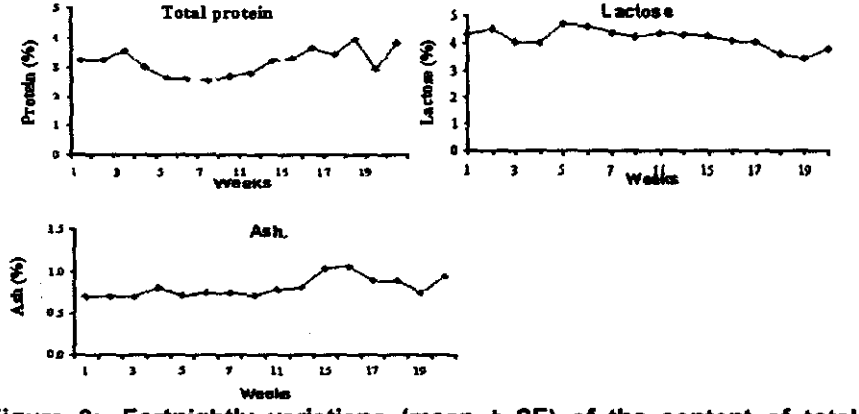

Figure 2: Fortnightly variations (mean ± SE) of the content of total protein, lactose, ash, in Zaraibi milk

Milk yield (ml/d) was found to be significantly ($p<0.05$) higher in the early (736.64) and mid lactation (456.17) stages than the late lactation stage (362). Milk fat content (%) was found to be significantly ($p<0.05$) higher in the early (4.73) and late lactation (4.66) stages than the mid lactation stage (4.14). The content of TS (%) was found to be significantly ($p<0.05$) higher in the early (12.94) stage than and the late lactation (12.56) and mid lactation (12.42) stages. At the early and the mid of lactation period the content of protein (3.01, 3%) were significantly lower with regard to late lactation (3.60%). Lastly, the changes in 2 soluble components of goat's milk, lactose and ash, are presented in Figure 2. These are the major components regulating the osmotic pressure of milk. The lactose content decreased gradually during lactation (4.79 to 3.83%) whiles a slight increase in ash content (0.73 to 0.91%).

DISCUSSION

The lactation milk yield of the Nubian goats in this study summed up to an average total of (81.6±3.96 kg). in lactation period of 120 days (Table1). This estimate was higher than those reported on the same breed in Egypt, by Aboul-Naga and El-shobokshy (1981) being 69.57 kg, Khalafalla and Suleiman (1990) have shown a lactational yield of 72 kg a similar group of goat. Osman and Mukhtar (1970) reported a lactation total yield of 47-73.5 kg. On the other hand a higher milk yield (239.7±11.8 kg) than our findings was reported by Haider (1982) in Egypt, Aboul-Naga et al. (1986) being 103.3 kg, Yener. S. M. (1989) being 86 kg in 19 weeks and Mabrouk *et al.* (1987) being 166.7 kg. Also, the estimated of the present study was lower than those reported by Mohammed et al. (2007) have shown average milk yield of 155 kg in a lactation period of 173±7.1 days. Haenlein (2007) obtained that the production of Nubian in USA was 710 kg in lactation length of 288 days .239.7± 11.8 kg in 197.6 ±4.5 days (Abdel Rahaem ,1998) for Zaraibi does.

The wide difference between the overall average of total milk yield of Zaraibi does in Egypt that reported by various investigators may be due to the difference in managerial condition, in nutritional conditions and in the used model utilized in the concerned studies. Mousa (1996) working on Zaraibi does, mentioned that 65% of the flushed incorporate new technologies (machine-milking, refrigerating tank, taking part in association for genetic improvement and sanitary control, etc.) obtained more superior animals compare to those who keep close to the extensive system.

The average daily milk yield in the present study of 0.555±0.027 kg is greater than that shown lately for daily milk yield and duration of lactation were 0.281±0.01 kg and 183.4±5.77 days respectively by Pariacote (1995).where as those figures were considerably lower than the findings of Mohammed et al (2007)for Sudanese Nubian goats (0.9±0.01 kg) and lower than that shown for a range of 0.76-0.79 kg by Gubartalla *et al* (2002). Daily milk yield of goats were too low may be that because of they fed small amount of fodder and was presented one time per day not as recommended tow times per day

The distribution of the mean weekly average from week one to 21st week (figure1) depicted a peak of weekly yield at the fifth week at 0.78±0.10 kg which is significantly ($p<0.05$) higher than either of the other values on either of the sides of this peak. Time of peak in this study similar to Banda (1992) how noted a yield peak occurring at the 5th lactational week in the small East African goats and time of the peak different of those reported (2-3 weeks) by Aboul Naga and El-Shobokshy (1981) on Zaraibi, (2nd week) by Abdelsalam *et al* (1994) on Zaraibi and (3rd week) by Abdel Rheem (1998). Such estimate was not in agreement with (4th wk) on Sudanese Nubian by Mohammed et al (2007). This trend adds the effect resulting from difference due to management, age, parity and climatologically influence.

Chemical composition

The concentrations of the main constituents of goat milk of the Zaraibi breed during lactation are given in Table 1. The stage of lactation had significant ($P < 0.05$) effects on the contents of fat, protein, lactose, ash, TS and SNF (Table1).

As it clear from Figure1, a decline in milk yields was accompanied by a decrease in total solids content up to week 6 of lactation. From that point, the decline in total solids content was followed by a steady increase towards the end of lactation, indicating that the milk contents became progressively more concentrated. Such a pattern is very common for goats and is in agreement with the findings Keskin *et al.* (2004).

Variations in 2 main components of goat's milk, fat and protein, are illustrated in Figure 2, 3. Fat and protein contents fell slightly until week 8 of lactation, and then increased over the remaining period, which could be the result of changing in casein content as reported by Brown et al. (1995). The highest fat content was found in the late lactation stage, which might be due to low milk yield.

The changes in 2 soluble components of goat's milk, lactose and ash, are presented in Figure2. These are the major components regulating the osmotic pressure of milk. The lactose content decreased gradually during lactation while a slight increase in ash content was observed. Similarly, Keskin *et al* (2004) reported a decrease in lactose content and an increase in the ash content of milks for Damscus (Shami) goats. A decrease in the rate of lactose synthesis with advancing lactation is the most likely explanation for this behaviour Wilde and Knight (1989).

Lastly, the average content of TS (12.81± 0.14%), fat (4.66±0.14%), protein (3.17±0.07%), ash (0.80±0.02%) and SNF (8.12±0.08%) in Zaraibi milk during all lactation stages was found to be much higher than that the Nubian goat of Sulieman and Shafei (1984) were TS (10.5%), protein (3.1%) and fat (2.9%), on the other hand, this study was considerably lower than the findings of Mohammed *et al.* (2007) have shown average content of TS (13.7%), SNF (9.65%), protein (4.34%), but was similar for fat (4.6%), lactose (4.4%) and ash (0.81%).

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دراسات على لبن الماعز الزرايبى تحت نظام الانتاج الشبة المكثف

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تمت هذه الدراسة لقياس تاثير فترة الحليب على انتاج اللبن وتركيبه الكيميائى للبن الماعز الزرايبى تحت النظام الشبة المكثف والتحاليل شملت ٢٣ انثى زرايبى خلال فترات مختلفة (بداية الموسم – منتصف الموسم – نهاية) واشارت النتائج الى ان الانتاج الكلى كان (٨١.٦±٣.٩٦ كجم)خلال فترة حليب ١٢٠ يوم – بمتوسط انتاج يومى (٥.٥٥±٠.٠٢٧ كجم). وسجلت اعلى انتاج فى الاسبوع الخامس (٠.٧٨±٠.١كجم).

وكان متوسط التركيب الكيمائى للجوامد الكلية (١٢.٨١±٠.١٤%)، ونسبة دهن (٤.٦٦±٠.١٤%)، ونسبة بروتين(٣.١٧±٠.٠٧%)، ونسبة لاكتوز (٤.١٨±٠.٠٥%)، جوامد لادهنية (٨.١٢±٠.٠٨%) ورماد بنسبة (٠.٨٠±٠.٠٢%).

قام بتحكيم البحث

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