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

By

SHAIMAA GABER ABO HASIBA
B.Sc. (Dairy Science), Fac. Agric., Cairo Univ., Egypt, 2003

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APPROVAL SHEET

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DEDICATION

I dedicate this work to whom my heartfelt thanks; to my supervisions committee for their patience and help, as well as to my parents, brothers and my fellows for all the support they lovely offered along the period of my post graduation.
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Grateful appreciation is also extended to all staff members of Dairy Science Department, Faculty of Agriculture and Cairo University.

Special deep appreciation is given to my father, my mother, my brothers and my sisters.
دراسات على لبن الماعز الزراعي تحت نظام
الإنتاج الشبة المكثف

رسالة ماجستير
فيالعلوم الزراعية
(البيان)

مقدمة من

شيماج جابر أبوحطيبه
بكالوريوس في العلوم الزراعية (البيان)- كلية الزراعة - جامعة القاهرة 2003

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مصر

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دراسات على ابن الماعز الزرائي تحت نظام
الأنتاج الشبة المكثف

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INTRODUCTION

Part I. Effect of lactation stage on milk yield, milk composition and reproductive performance of Zaraibi goat.

During the last fifty years, the continuous and rapid increase in goat populations and goat products in developing countries (including Egypt) especially among the poorest of these countries, indicates that this animal might provide the tool required to meet some of the needs accompany the continuous increase of human population. This point of view is reinforced by the adaptability of this animal under harsh conditions, namely; adaptability to excessive temperatures, both cold and hot, underfeeding, altitude levels, ability to walk long distance, surviving droughts, etc. (Haenlein, 2001).

In the developing countries, less than 5% of all market milk is obtained from goats while, less than 1% in Egypt (Dubeuf et al., 2004). Rural householders own more than 90% of the goats; they are poor and practice low agricultural input. National investments in goat sector are not sufficient in terms of infrastructure, marketing input and services, as well as research and extension (Lebbie, 2004). In these more extensive regions of the world, prospects for the development of goat farming is positive which requires less investment in comparison with other sectors. However, infrastructure for milk collection and marketing dairy products should definitely be improved (Soryal and Metawi, 2003).

Goat farmers represent the lowest strata of economic development, the non-organized trade in goat products and the consumption which is mainly linked to the local market might be the
reason. However, the goat is the species that has had the most significant growth in population numbers world-wide in recent years (Boyazoglu et al., 2005). During the last 20 years of the 20th century, milk production from dairy goats increased by 69% worldwide while that of cows was 10% and 2% in sheep which means the importance of goat as a promising source of milk in the developing countries.

Goat milk is not only a good alternative to cow milk in many cases, but that in addition to protein, mineral, and vitamin differences, some overlooked differences are in the fatty acid composition of goat milk fat, specifically in much higher contents of short and medium chain fatty acids. These have become established as medical treatments in a variety of malabsorption cases, including beneficial lowering of cholesterol levels, and improvements of digestive and sleep disorders especially of children (Haenlein, 1992)

In Egypt, the human population is increasing progressively and as a consequence the need for more animal protein is growing. Accordingly, the present animal stock and natural vegetation should be utilized properly. The amount of water either from the river Nile or precipitation do not permit the development of pasture capable of meeting the roughage requirements of the dairy cattle which requires the expansion of the irrigated areas allocated for roughage production. This, in turn demands more investment for such projects therefore, it seems to be no better solution than goat to improve the milk and the meat yield of the goats to raise the living standards of the inhabitants. Presently goats are raised in the extensive production system which is not operated at its optimum, the system is undeveloped and also there
are limitations to its development such as lack of knowledge of goat owners, lack of economic and/or social incentives and lack of services to the producer. These limitations need to be lifted with the development of the government policies and programs for breed improvement, teaching better management, input supply, control of infectious diseases, milk collection chains and processing and marketing aiming at transfer to the intensive production system (Yener, 1989).

Among goat breeds in Egypt, Zaraibi or the Egyptian Nubian which occupied in the present study is superior in milk production and prolificacy

Therefore, this part of study was conducted to investigate milk production and composition, reproductive performance, body weight changes of both does and kids during two successive lactation seasons.
REVIEW OF LITERATURE

1. Milk production

There are wide differences in production performance between recognized dairy goat breeds, and the enormous potential genetics and by the improved feeding conditions. In genetic terms the length of lactation varies widely between breeds, which by selecting rams and bucks for longer lactation length in their daughters can significantly improve productivity significantly, because of the relatively high heritability of this trait. Sustaining better productivity requires improved feeding conditions, which can make great differences in milk and fat yield.

Pariacote (1995) studied 1136 records of daily milk yield from a single milking, obtained at intervals of <=15 days from 45 goats over a 16 month period in a Criollo goat herd which had no tradition of milking and which had been improved by crossbreeding with Alpine and Nubian goats. Adjusted mean values of daily milk yield and duration of lactation were $0.281\pm0.01$ kg and $183.4\pm5.77$ days respectively; mean daily milk yield being lower than published values for pure Criollo goats. Daily milk yield decreased linearly up to week 20 of lactation by about 9 g/week.

Zeng and Escobar (1995) selected fifteen milking does randomly from the Alpine herd of the Langston University farm, with five each in Parities 1, 2, and 3 (P1, P2 and P3, respectively). Milk production was recorded daily. All experimental does kidded in March and were dried off in October. Milk production was 2.69 kg per doe per day. Does of P1 produced less milk than those of P2 and P3 ($P < 0.05$). Fat content
had a negative relationship with milk production (0.41). As lactation period progressed milk production decreased (P < 0.001).

Das (1996) mentioned that year and season of kidding and age of doe significantly (P<0.05) influenced total milk yield and lactation duration. Also, goats had potential for milk production when management conditions were improved.

Hassanin et al. (1996) maintained thirty female Egyptian Zaraibi goats aged 2 to 3 years and weighting 22 to 34 kg to study the influence of seasonal variations on their lactation efficiency. In both winter and summer seasons the average milk yield reached its peak at third week of lactation (2.35 and 1.98 kg, respectively), then declined gradually thereafter.

Muggli (1996) reported that goats aged 1, 2 and 3 years respectively, 300-day lactation milk yield averages >750, >900 and >1000 kg respectively, and the average fat + protein percentage was >6.5% in all age groups.

Berinstain Bailly (1997) mentioned that approximately 1 million dairy goats exist in the USA, but the quantity of milk produced is comparatively low, since many dairy goats are kept more as a 'hobby' than for commercial production. Most dairy goat production is concentrated in the West, Mid-West and North-East of the US. No reliable statistics exist for the total goat population, with estimates varying between 2 and 5 million, of which a significant proportion are Angora. Milk production costs are higher than for cows and the milk prices is unregulated and vary significantly. Prospects for the industry are perceived to be optimistic, with a growing market for goat milk and
milk products. The main dairy breeds are Alpine, Lamancha, Anglo-
Nubian, Oberhasli, Saanen and Toggenburg.

Goromela et al. (1997) mentioned that average daily milk yield
recorded/doe ranged from 0.2-1.1 liters. Mean daily milk yield
increased from 0.6 liters at parturition to a peak of 0.7 liters at the 4th
week of lactation, after which there was a decline to about 0.3 liters at
the 12th week. From birth to 4 weeks of age, the kids had the highest
weight gains after which there was a decrease.

Goonewardene et al. (1999) obtained data from a commercial
dairy in Alberta (Canada) from 1992 to 1996; records of 104 Anglo-
Nubian does were analyzed. Kids were separated from their dams at
birth, hand-fed colostrum, and reared on pasteurized goat milk. Milk
yield and milk fat and protein percentages were analyzed. Does that
gave multiple kids produced significantly (P<0.01) more milk (milk
yield over 250 days, 807.6 kg; yield over 305 days, 972.6 kg; yield
corrected to 4% fat, 781.2 kg) compared with does that produced single
kids (yield over 250 days, 664.6 kg; yield over 305 days, 800.9 kg;
yield corrected to 4% fat, 628.3 kg). Multiple births had no effect on
milk composition.

Crepaldi et al. (1999) evaluated the adaptation of a newly
introduced breed and a production system (the effects of herd-year,
season of kidding, parity, and, where appropriate, prolificacy) on milk
yield, lactation length and prolificacy of Alpine goats in the Italian
region of Lombardy. Analysis of two consecutive years, 1298 lactation
records, from 34 herds, gave mean values (±SE) of 567±6 kg for milk
yield, 231±1 days for lactation length. Milk yield and lactation length
were primarily influenced by the herd-year factor (p<0.001, partial R2 0.68 and 0.55, respectively) which mainly reflects differences in herd management. Milk yield was also affected by season of kidding (p<0.001, partial R2 0.4), parity (p<0.001, partial R2 0.03) and litter size (p<0.001, partial R2 0.01). Lactation length was also affected by parity (p<0.001 R2 0.16) and season of kidding (p<0.001 R2 0.06). Prolificacy was affected by parity and by herd-year factor (p<0.001, partial R2 0.09).

Mumba et al. (2003) performed a study to compare milk yield from 23 indigenous Malawi goats and 10 Malawi local x Saanen crosses from January to March 2000. Results showed that the average milk yield from the crosses (102.0±11.21 kg) was higher (P < 0.01) than that from the indigenous goats (37.1±4.79 kg).

Greyling et al. (2004) investigated the milk potential of Boer goat and South African local indigenous goat does, under intensive and extensive nutritional regimes. Overall Boer goat and indigenous does produced more (P<0.05) milk under the intensive, compared to the extensive nutritional regime (3.1±1.5 l per day versus 0.8±0.7 l per day and 1.4±1.4 l per day versus 0.7±0.6 l per day for the Boer and indigenous does, respectively). The intensively reared Boer and indigenous goat does reached peak lactation earlier (week 5). Level of nutrition had a significant (P<0.01) effect on milk production, with the intensively fed does producing more milk. In the intensively maintained groups, feed intake was significantly (P<0.01) correlated to milk production, irrespective of the breed. Boer goats had the highest mean live weight (45.0±8.7 kg) and also produced the most
milk. Principally the Boer goat doe can fulfill the function of providing milk to the rural, poorer communities or alternatively be used to upgrade the indigenous goat for increased milk production especially under improved nutritional management systems.

Abd El Gadir and El Zubeir (2005) estimated the milk yield and persistency of lactation of 8 crossed does between Saanen and Nubian (50%) for 120 days in second kidding under Sudan condition. The average milk yield was 1.237± 0.339 L while the maximum milk yield recorded was 1.359 L, which was obtained during 40-50 days following kidding. The minimum milk yield (0.968 L) was reported during the first 10 days. The average persistency of lactation curve illustrated that milk production started at level of 0.968 L during first 10 days and it raises to the maximum level (1.359 L) in 42 days. Then it showed a slight gradual decline from 50 days and continued to be below from 75 days till 120 days.

Güney et al. (2006) evaluated the Damascus goat for milk yield. Average daily milk yield, lactation milk yield and lactation length of Damascus does were 1.90 ± 0.04 kg, 489.4 ± 12.78 kg and 254.7 ± 2.36 days, respectively. Average of 73.4 ± 3.5 kg extra marketable milk was obtained by using our recommended system (30 days suckling + 30 days milking and residual suckling). By this way, milk yield increased 39% in the first 90 days (259.0 kg) and 16% on the whole lactation period.

Haenlein (2007) presented in Table1 the comprehensive reviews of the latest aspects of production and technology of goat milk (4% fat-corrected milk).
Table 1. Average performance of dairy goat breeds originating in several countries by lactation length, yield of milk, fat, and 4% fat-corrected milk

<table>
<thead>
<tr>
<th>Breeds</th>
<th>Lactation length (days)</th>
<th>Yield (kg)</th>
<th>Milk Fat 4%</th>
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<tbody>
<tr>
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<td>Damascus</td>
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<td>520</td>
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<tr>
<td>Native</td>
<td>230</td>
<td>160</td>
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Continue
Mohammed et al. (2007) studied the milk yield and composition in the Sudanese Nubian goat under farm conditions. An overall average milk yield of 155±5.10 kg was obtained for an average lactation period of 173±7.20 days. An average lactation peak of 1.4±0.20 kg milk day⁻¹ was noted after 4 weeks. Age of dam, season and type of birth of kid had significant effects on total milk yield with older does (p<0.05), dry summer (p<0.001) and does with triplets (p<0.05) having the greatest yield of lactation milk within their contrasting groups. While lactation period was similarly influenced by the aforementioned effects. The mean daily milk yield was significantly greater (p<0.001) only for the dry summer effect compared with that of wet summer or winter.

Gustavo-Paz et al. (2007) estimated the production parameters of goat milk and evaluated the influence of some management factors on milk production in an intensive production system in Santiago del Estero, Argentina. General productive parameters included milk/day, lactation days, kg of milk/real lactation and kg of milk/210 days lactation during three production periods. It was observed that kidding (multiple gestations associated to higher milk production) and goat