

## Research Article

## A Study on Performance of Saanen Goats under Sudan Conditions

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**Abstract:** Saanen goats were imported to Sudan from Netherlands, during the years 2004 and 2006, in order to improve milk yield by crossing with local breeds. Animals were kept in Khartoum state for adaptation and breeding in intensive management system. Data from 440 records of performance of imported and locally born Saanen during the years 2004,2005,2006,2007 and 2008 were studied for total milk yield, lactation length, daily milk yield, birth weight and litter size. The data was rearranged to investigate the effect of place of birth and rearing (imported and local born). The study revealed that the imported Saanen does had lower total milk yield and significantly ( $P<0.01$ ) shorter lactation length than the Saanen does born locally. On the other hand the locally born Saanen had significantly ( $p<0.01$ ) lower average daily milk yield, litter size and kids birth weight than those of the imported Saanen does. Total milk yield was significantly ( $P<0.01$ ) and positively correlated with lactation length and the average daily milk yield. The birth weight was negatively correlated ( $P<0.01$ ) with both lactation length and litter size. But it showed positive correlation with the average daily milk yield. Both milk yield and lactation length tended to increase from the 1<sup>st</sup> up to the 6<sup>th</sup> parity.

**Keywords:** Performance, Saanen and Sudan Conditions.

### INTRODUCTION

Sudan has a unique location explain biodiversity in climate from desert to equatorial. Sudan is located in the northeastern part of Africa between the latitude 4-22 North and longitude 22-38 East. The vegetation in south is forest while the north is dominated by acacia and desert. Goats spread all over Sudan in different climate with high density in rural areas and bred for dual purpose while in towns they are mainly kept for milk supply. Sudan has four main goat breeds Nubian, Desert, Nilotic and Mountain (Epstein, 1971). Devendra and Mc Leory, (1982) reported that Nubian is one of the best dairy goats in Africa. Desert or savanna goat spread south Great Desert from Senegal to Chad Lake and south Egypt (Epstein, 1971), while Mountain goat or Tegri is located on high altitude, while Nilotic (dwarf) goat breed is located in southern Sudan. The recommended breeds that are likely to make the greatest contribution for upgrading milk production by genetic within the tropics and sub tropic regions are Saanen and Anglo-Nubian for high milk yield and Jamnapari ,Barbari , Beetal, Maltese for medium milk yields (Devendra, 1974).

The Saanen breed is considered among the best dairy goats breeds all over the world. It's daily milk yield is about 2.63 kg and the total milk yield is about 720 kg (Mioč *et al.*, 2008). Mature males weight 70 kg, while females weight 50 kg. The average milk production was 750 kg and lactation period was 280 days (Özder, 2006, Ceyhan and Karada, 2009).Saanen and their crossbred goats produced larger amounts of milk ( $614 \pm 142$  kg) in first year,( $558 \pm 87$  kg) in second year and in third year ( $743 \pm 118$  kg). They sustained milk production for a 9 or 10 month lactation (Donkin, 1997).

Demand for milk is play a great roll for establish improvement programs in order to better utilization of available resource, however local breeds have desirable characters such like adaptation and disease resistance, while its milk production were less than needed especially in developing area.(Bembridge, 1987).

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In Sudan first studies 1976 from Kuku Animal Production Research Center (KAPC) showed possibility of adapting European goat breeds and their crosses to local environment, furthermore it showed dominance upon local breeds in milk yield, milking season and kidding interval. Study showed that cross of European goat breeds with local Nubian breed produced more milk than local Nubian (Khalaffalla and Sulieman, 1990). In Sudan demand for milk grow daily with population increase, in addition the weak milk production of local breeds about one litter a day per head expand the gap between supply and demand. The adaptation of Saanen crossbreds with local breed was studied by Ibrahim (2000), but the adaptation of the pure Saanen to Sudan conditions was not studied. The objective of this study to provide scientific information about the performance of Saanen goats under Sudan conditions.

## MATERIALS AND METHODS

### 3.1 Study Area:

Khartoum state is located in central Sudan, where Nile divided area to (3) parts, population is around 5 million according to last estimate (2009), and climate is desert in upper part to savanna in lower part, summer starts from May until June and autumn begin from July to September, while winter from October to April. Temperature ranged from 14 C° in the winter to 45 C° in the summer. Agriculture projects around state supply animal farms by green fodder Alfa Alfa, Abu 70 and pioneer, while main source of concentrate is sorghum grain and oil cakes.

### 3.2 Goat Improvement Farm:

The farm is located in Khartoum state in East Nile district near Kuku agriculture project. It was established in 1991 to improve Sudanese goat breeds by crossing with European dairy goat breeds, the project stopped in year 1995 due to financial problems. In the year 2004 the improvement farm restarted by imports 35 Saanen goats (20 does and 15 bucks). The second batch was 100 Saanen goats (80 does and 20 bucks) in late of year 2004, and batch three in year 2006 (100 Saanen goats (20 does and 80 bucks). All goats were imported from Netherlands, however each batch was from different farm. In 2008 (50 does and 50 bucks) Damascus goats were imported from Cyprus. Immediately after the arrival of the goats they were kept in artificially cooled pens. They have free access to drinking. All does were in late stage of pregnancy.

### 3.3 Farm Management:

Animals were allocated in pens according to sex, weight and physiological status (pregnant or empty). Green fodders (Alfa Alfa) and pellets of concentrate (sorghum grain base) were offered twice a day depending on animal's body weight, milk yield and physiological status. Fresh clean water was offered ad-libitum. Animals were weighed weekly, while kids were weighed immediately after birth and left with their

dams to suckle (colostrums) for one week. Artificial suckling by milk replacer or fresh milk was practiced. Weaning of kids depend on their weight despite of their age. Milking goats were milked twice a day by portable milking machine. Each goat was milked once a week by hand so as to estimate its yield.

Annual vaccination protocol and prevention drugs were applied to control endemic diseases, internal and external parasites. Artificial insemination and ultrasonography were used for fertilization and pregnancy diagnosis respectively.

### 3.4 Data Collection:

Data was collected from year 2004 to 2008 from Saanen dairy goats. Data of 440 records were collected from records of milk yield, lactation length, litter size, parity and kid's birth weight. The data was re-arranged according to the dam's place of birth (imported and locally born), and according to season (summer, autumn and winter).

### 3.5 Statistical Analysis:

Statistical Package for Social Science (SPSS) was used in the data analysis, Student T test (independent), ANOVA and correlations were used. Separation of mean difference was done by LSD according to Triola (1989).

## RESULT

The study results showed that total milk yield of locally born Saanen was higher ( $p < 0.06$ ) than that of the imported Saanen goats (Table, 1). In addition the lactation length of the locally born Saanen goats was significantly ( $p < 0.01$ ) longer than that of the imported goats (Table, 1). While the average daily milk yield of the imported Saanen was significantly higher ( $p < 0.01$ ) than that produced by the locally born Saanen. Furthermore the imported Saanen goats had slightly higher litter size than the locally born Saanen, however place of birth had significant ( $p < 0.01$ ) effect on litter size (Table, 1). The kid's average birth weight of the imported Saanen goats was significantly ( $p < 0.05$ ) higher than the locally born.

The present study showed that, total milk yield was significantly and positively correlated with lactation length and average daily milk yield, while no significant between lactation length and average daily milk yield (Table, 2). Birth weight was negatively correlated ( $P < 0.01$ ) with lactation length and litter size. On the contrary birth weight showed a positive ( $P < 0.01$ ) correlation with the average daily milk yield (Table, 2). The present study showed that, the highest total milk yield was in parity number six and it tended to increase with parity, however a slight decrease in parity number three and four were observed, while the lactation length was showed a continuous increase with the advancement of parity (Chart, 1).

**Table (1): Effect of place of birth on lactation yield and length, average daily yield, litter size and birth weight of Saanen goat**

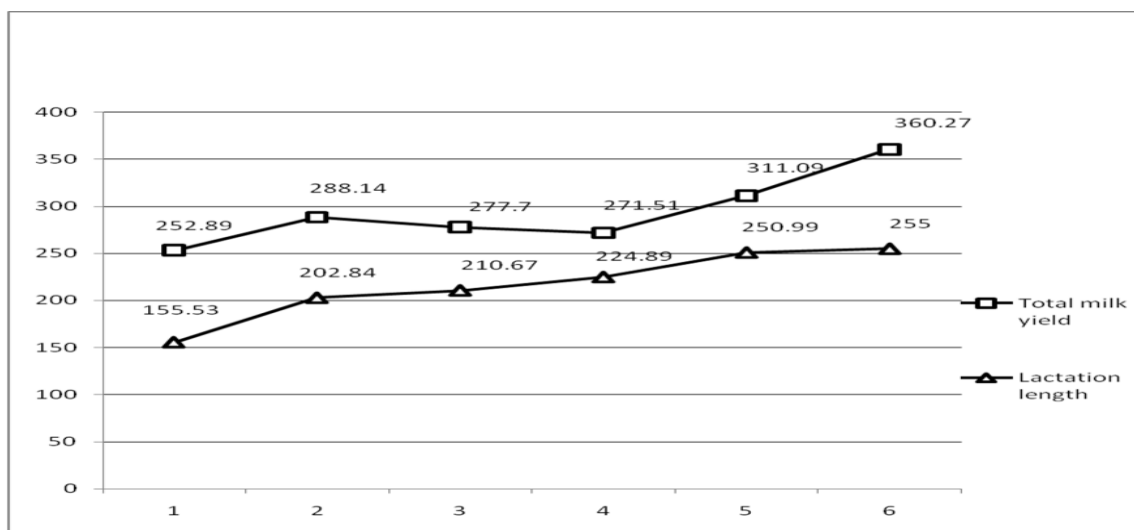
Place of birth	Total milk Yield (kg)	Lactation length (day)	Average daily milk yield (kg/day)	Litter Size	Birth weight (kg)
Imported	260.37±150.89	182.88±74.24	1.42±0.56	1.66±0.62	2.04±1.61
N	(278)	(278)	(278)	(263)	(396)
locally born	286.40±153.35	230.39±82.87	1.20±0.44	1.49±0.62	1.76±1.55
N	(210)	(207)	(207)	(154)	(241)
<b>Significance</b>	<b>0.060</b>	<b>0.000</b>	<b>0.000</b>	<b>0.009</b>	<b>0.030</b>

N: Number of animals a,b: means within the same column followed by different superscripts are significantly (P<0.05)different.

**Table (2) Correlation matrix of some productive and reproductive traits of Saanen goats**

	Total milk yield	Lactation Length	Litter size	Average daily milk yield
Total milk yield				
Lactation length	0.726 **			
Litter size	0.102	0.046		
Average daily milk yield	0.621 **	0.022	0.010	
Birth weight	0.004	- 0.196 **	- 0.138 **	0.248**

\*\* Significant at (P<0.01)



**Chart (1): Total milk yield (kg) and lactation length (day) of parity number of Saanen goats**

**DISCUSSION**

The total milk yield in this study was higher in locally born Saanen compared to the imported goats. On the other hand the lactation length of the locally born was significantly higher than that of the imported does. The higher total milk yield of the locally born does might be due to the higher lactation length of those does.

Although the total milk yield of the locally born does is higher than that of the imported does but the average daily yield of the imported Saanen was significantly higher than that of the locally born. The total and the daily milk yield in this study was lower than the yield of the same breed reported South Africa (614 and 2.16 kg), Turkey (312 and 1.35 kg), Greece (540 kg/lactation), Italy (551 kg/lactation) (Serradilla, 2001). Differences could be due to differences in the environment and management system. Serradilla,

(2001) reported that the exotic high yielding breeds have better milk yield than local breeds but lower than in their country of origin, depending on production system and environmental conditions.

The lactation length in this study ranged between (221.9 to 137.1 days), which is lower than that reported by Mioč *et al.*, (2008) who stated that, Saanen breed had lactation length (266.81± 1.95 days) and Alpine breed (264.51± 0.57days). And slightly higher than that of Sudanese Nubian goats (204.31 ± 55.26 days)reported by El-Abid and Abu Nikhaila, (2010). This could be attributed to the effect of environment and breed.

The litter size of Saanen goats in the current study is similar to that reported by Duygu, (2010) for the same breed and Gu'ney *et al.*, (2006) for Damascus goats. Moreover litter size of imported Saanen was

higher than that of locally born Saanen ( $1.66 \pm 0.62$ ), ( $1.49 \pm 0.62$ ) respectively. Similar results are reported by Montaldo, *et al.*, (1995) for Saanen bred in Mexico and Ahuya *et al.*, (2009) for Toggenburg in Kenya.

In the present study Saanen birth weight was ( $2.2 \pm 1.53$  kg). These values are in line with Wenzhong Liu *et al.*, (2005) who reported that, Angora goat birth weight was ( $2.26 \pm 0.01$ ). The birth weight obtained was lower than the findings of Duygu, (2010) who reported (3.06 kg) as Saanen kids' birth weight, Ahuya *et al.*, (2009) who reported an average birth weight of Toggenburg goat was (3.27 kg) and Chunyan *et al.*, (2008) who found an average birth weight for Boer goat- in China to be ( $3.87 \pm 0.85$  kg). These differences might be due to differences in breeds and management systems applied.

The correlation matrix obtained in this study revealed a significant positive correlation between total milk yield and both lactation length and average daily milk yield (Table, 2). It is obvious that as days in milk increases the total yield increase and it is also known that total milk yield increase by the increase in daily milk yield. The results revealed a negative correlation between birth weight and both lactation length and litter size (Table, 2). As lactation length increases the metabolizable energy allowed for pregnancy and fetal growth decreases. The number of fetuses also affects the birth weight as the energy allowed for fetal growth and development will be divided and distributed for the fetuses and hence resulted in reduction in birth weight. Birth weight in the present study was positively correlated with the average daily milk yield (Table, 2). This could be due to good nutrition which resulted in better fetal growth and more energy is deposited as fat which is reflected in high milk yield and reduces the negative energy balance occurred in the first stages of lactation.

#### CONCLUSION AND RECOMMENDATIONS:

- Saanen goats are well adapted to Sudan tropical conditions.
- local born Saanen are performed better for milk yield and lactation length than imported .
- Further research are recommended on litter size and birth weight of local born saanen.
- Conservation of the local breeds is highly recommended.

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