

SOME FACTORS AFFECTING MILK YIELD OF SAHEL GOATS IN SEMI-ARID ZONE OF BORNO STATE

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ABSTRACT

The study was carried out to assess some factors affecting milk yield of Sahel goats raised under semi-intensive management system in the semi arid condition of Borno State. Milk was collected from (201) lactating Sahel goats by hand and the data were subjected to analysis of variance (Anova). The effects of season, year and stage of lactation on average daily milk yield were determined. The result showed an overall mean of 161.40 ± 7.04 g of Average Daily Milk Yield (ADY). Seasons were found to be significant on ADY ($p < 0.05$) where the highest yield was obtained in the dry cold (188.37 ± 19.62 g) and the lowest (145.08 ± 22.17 g) in the dry hot season. Year also had a significant influence on ADY ($p < 0.05$) where the highest was in 1990 (193.43 ± 23.20 g) than in 1991 (155.78 ± 7.15 g). Week of lactation had a significant influence on ADY ($p < 0.05$) highest peak was reached (212.44 ± 32.36 g) in the second week of lactation and declined thereafter. There is a need to exploit Sahel goat milk potential in the tropics. It can be deduced that goats kept for milk should be raised under appropriate management system.

Keywords: Milk yield, sahel goats, semi-arid.

INTRODUCTION

There are about 861.9 million goats in the world and the largest population is found in Asia, followed by Africa, representing about 59.7 and 33.8 percent respectively (FAO, 2011). In Nigeria, FAO (2010) officially reported an estimate of 54 million goats which are mostly found in the Sudan Savannah vegetation zones and constitute over 60 percent of the total population (Adalemo and Baba 1993). Unlike in the temperate region where goats may be kept for milk or mohair, in Nigeria goats milk is rarely use for human consumption (Butswat *et al.*, 2002). According to Mecha and Adegbola (1980), goats are mainly kept for meat in Nigeria, and were known to provide over 25 percent of total lean meat to the populace. Over the past years, most research on ruminant animals were tailored toward improving cattle and sheep production with little attention to goats (Bogoro *et al.*, 1999). This gives evidence for the limited information on milk productivity of goats. However, there is growing awareness on the importance of goat as a source of milk for man (Malau-Aduli *et al.*, 2004). It has also been reported that goat has the potential of bridging the gap between the demand for protein and the actual protein supply in terms of meat and milk

(Williams, 1990). Goats had higher milk yeilds per unit weight of a doe during lactation and high fecundity (Devendra, 2000; Negesse *et al.*, 2001). Dairy goats are the most appropriate enterprise among small scale farmers capable of meeting the protein requirement of the farmers household at low cost (Low, 1986). Since it has been proved that goats have peculiar qualities especially for milk compared to their counterpart dairy animals (Winrock International, 1992), this study will help in elucidating the potentialities of Sahel goats for milk production to the rural people and the nomads in the semi arid zone. The Objective of This study was to assess some factors affecting milk yield of Sahel goats in Maiduguri.

MATERIALS AND METHODS

Experimental Site

The data used in this study were obtained from the production record of flock of Sahelian does at the Teaching and Research Farm of the Department of Animal Science, University of Maiduguri. Maiduguri is situated within the Sahel zone of West Africa, which lies on latitude 11.5° North and Longitude 30.5° West at an altitude of 354 m above the mean sea level. This zone is characterized by short rainfall lasting for

about three months (July- September) with minimum rainfall of 500-600 mm per annum and a long dry and hot period that lasts for about seven months (Ibeawuchi, 1988). The vegetation is described as that of semi-arid which is characterized by sparsely distributed trees and grasses mostly *Faidherbia albida*, *Acacia spp*, *Balanite aegyptica*, *Adropogon gayanus*, *Cynodon dactylon*, *Digitaria spp*, *Cyperus esculentus* *Pennisetum spp* and *Ziziphus spp*.

Animal management

The animals were managed under semi-intensive system where there was a provision of a well ventilated pen that provide group housing for the goats at night. During the day time the animal have access to water *ad libitum* before going for grazing under the custody of a shepherd. Grazing normally last between 8 am and 5 pm. Most often, the animals usually come back to the farm around 1pm to take some water and leave immediately for evening grazing. The animals were usually fed with minimal supplements notably groundnut haulms, cowpea husk and corn husk mixture during the dry season. Normal routine practices and health care such as vaccination and medication, deworming, ectoparasite control and sanitation were carried out.

Milk Collection

Data were collected from October, 1990 to September, 1991 among the experimental lactating does. Immediately after kidding, dams were confined with their kids in nursing pens. They were allowed together for a period of 3 days in order for the young to suckle colostrum. Milking commenced four days after kidding to ensure that dams have recovered from the pain of parturition. The kids were usually separated from their nannies over night when they must have suckled in the evening.

Dams were hand milked during lactation at 7:00 am which was usually preceded by about one minute suckling by the kid (s) to stimulate the let down process. The two side legs of a doe were usually held by an individual while the person milking squat directly behind the doe to harvest milk from the udder with little pressure. The collected milk were usually weighed with the aid of a weighing scale in grams.

Statistical analysis

The data collected were subjected to analysis of variance with season, years and weeks as factors on average daily milk yield using Statistical Package for Social Science (SPSS) and means were separated using Duncan's Multiple Range Tests (DMRT) (version 16).

RESULTS AND DISCUSSION

The result obtained from the Sahelian does for milk production in this study showed an overall average daily yield of 161.40 ± 7.04 g. The yield was found to be far less than 800-1000 g per day obtained in the same breed when lactating does were supplemented with concentrate (Cisse *et al.*, 2002). The average daily milk yield is also less compared to 213.97 ± 1.49 g (207.74 ± 1.45 ml) partial daily milk yield reported by Zahraddeen *et al.* (2009), who used 18 per cent crude protein concentrates as supplement. The lower yield obtained in the present study could be attributed to poor nutrition because feed quality affect milk production (Ehoche and Buvanendra, 1983). This could also be as a result of management differences. For instance in the present study, kids were allowed to suckled their nanny in the evening implying shortage in harvested milk. The use of oxytocin in other studies to stimulate milk production was completely avoided in the present study. The yield obtained is however greater than 155.4 ± 2.10 g per day (150.9 ± 2.04 ml) for the same breed in the humid zone (James and Osinowo, 2004) and 139.05 ± 17.98 g (135.9 ± 1746 ml) in Zaria (Makun *et al.*, 2008). These lower values of daily milk yield could be attributed to acclimatization failure. This is because the Sahel goats are well adapted and flourished in drier semi arid zone (Egwu *et al.*, 1995). The result showed in Table 1 indicated that both season and year of kidding had a significant influence on average daily milk yield ($p < 0.05$). Greater milk yield (188.37 ± 19.62 g per day) was obtained in the dry cold season (December-January) than yields of 147.29 ± 15.08 g during the wet season and 145.08 ± 22.17 g per day in the dry hot season. Supporting evidence to the present finding on the effect of season on milk yield Zahraddeen *et al.* (2009) who recorded higher yield of 200.63 ± 1.18 g per day (194.79 ± 1.15 ml) for goats kidding after raining season. Highest yield obtained in dry cold season which is just

after the rainy season could be due to available forages as well as relatively moderate temperature and humidity that favours grazing activities (Gubartalla *et al.*, 2002 and Mohammed *et al.*, 2007). The lower yield in the dry hot (145.08 ± 22.17 g/day) could be as result of higher ambient temperature that causes reduction in feed intake (Rodrigues *et al.*, 1985). This could also be as result of decline in forage digestibility which results in poor animal performance (Ikhatua and Adu, 1984). The lower milk yield (147.29 ± 15.08 g per day) in the wet season observed in this study could probably be due to increased humidity and rainy days which impede grazing activities (Mohammed *et al.*, 2007). This result does not agree with Norris *et al.* (2011) who reported higher milk yield (1090.00 ± 150.0 g per day) in does kidding at the onset of the wet season and lower value (870.00 ± 130.00 g) for those kidding during the dry cold in Limpopo province, South Africa. The result obtained has indicated higher milk yield ($p < 0.05$) 193.43 ± 23.20 g per day in 1990 than 155.78 ± 7.15 g in 1991. Similar trend was noted by Goonewardene *et al.* (1999) who observed a decline in the second year of lactation (2893.4 g per day in 1992 and 2270.4 g in 1993) among Nubian goats. The influence of year on milk yield could be as result of management difference or change in weather condition which may or may not favour milk production (Crepaldi *et al.*, 1999). The result showed in Table 2 indicated a significant influence of week of lactation on average daily milk yield ($P < 0.05$). As lactation progressed, it reached a peak in the second week (212.44 ± 32.36 g per day), although the result showed no statistical difference between the yield in the first four weeks. Similar peaks were also reported in the second week of lactation by Mfdau *et al.* (2010) and Norris *et al.* (2011). It has been reported that low producing animals normally attained their peak milk yield very early (Cole and Van Raden, 2006). A trend was noted for continuous decrease in milk yield from the peak up to the end of lactation. This agree with the reports of Appuhamy *et al.* (2007) who reported that low milk producers are characterized by continuous rate of decline from peak milk yield. The present study is not in accord with the reported peak milk yield in the third week (Sahel goats) and fourth week

(Sudanese Nubian goats) by Zahraddeen *et al.* (2009) and Mohammed *et al.* (2007), respectively. It is also worthy of note that a particular goat lactate up to 18 week which is closer to reported 5 month persistency for the same breed (Mason, 1996).

CONCLUSION

The milk yield obtained in this study depicted that productivity of the Sahel goats for milk production can be improved with good management system. It is possible to maintain high persistency at higher peak from the early week of lactation up to mid lactation. Despite the climatic conditions of the semi arid and some shortcomings associated with the management practices, the result showed that a considerable quantity of milk can be obtained with sufficient feed stuffs. There is a trend for persistency in lactation as noted among those that continued to lactate up to four months. There is a need for further studies in aspect of dairy goat milk production in the tropic so as to exploit the milk production potentials of sahel goats.

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Table 1 Least squares means of average daily milk yield (ADY) g by season and year of Sahel goats

Factors	Subclass	N	Average daily yield(g)
Overall		201	161 ± 7.04
Season			
	Dry cold= Oct.-Jan.	85	188.37 ± 19.62 ^a
	Dry hot= Feb.- may	56	145.08 ± 22.17 ^b
	Wet = Jun.-Sept.	60	147.29 ± 15.08 ^b
Year			
	1990	70	193.43 ± 23.20 ^a
	1991	131	155.78 ± 7.15 ^b

a b c d Means with different superscript within the same subset differ significantly from each other (p < 0.05) * = p < 0.05 n = number of observation

Table 2 Least square means of average daily milk yield (ADY) by week of lactation.

Factors	N	Average Daily Yield(g)
Week of lactation		*
1	25	206.05 ± 31.99 ^{ab}
2	20	212.44 ± 32.36 ^a
3	19	210.84 ± 23.07 ^a
4	18	182.79 ± 18.22 ^{ab}
5	18	162.57 ± 21.20 ^{bc}
6	18	164.56 ± 19.71 ^{bc}
7	16	138.52 ± 18.23 ^{bcd}
8	14	135.41 ± 19.45 ^{bcd}
9	12	150.82 ± 23.70 ^{bc}
10	11	134.50 ± 32.55 ^{bcd}
11	6	112.61 ± 16.19 ^{cd}
12	6	111.68 ± 30.31 ^{cd}
13	6	109.40 ± 31.89 ^{cd}
14	5	100.26 ± 21.84 ^{cd}
15	4	61.58 ± 13.25 ^d
18	3	35.15 ± 5.79 ^d

a b c d = Means with different superscript within the same subset differ significantly from each other
* = p < 0.05 n = number of observation NS = not significant