1 (1) December, 2015 ISSN: 2476 - 8650

Milk Yield of Lactating Red Sokot Goat Fed with Graded Levels of Native Browse (*Guiera senegalensis*) in the Sudan Savanna of Nigeria.

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Abstract

A Seventy-two (72) days experiment sub-diVided into three phases was conducted to investigate the effect of feeding *Guiera senegalesis* leaves (Sabara) on intake and milk yield of lactating goats. The treatments evaluated were three phases of lactations using five inclusion levels of *G. senegalensis* leaves. The experimental diets were fed twice daily to the test animals. Mean yield of milk decreased significantly ($P<0.05$) with increase in the length of lactation. Higher milk yield was obtained in the first phase (0.31kg/day) than the other phases evaluated (0.28kg/day and 0.18kg/day for phase II and III respectively). Treatment means in the three phases of lactation evaluated differed significantly ($P<0.05$) between each other in terms of feed intake. Mean milk yield of test ingredients were statistically ($P>0.05$) similar for the control diet (0%) and 30% inclusion level. It was concluded that inclusion of *G. senegalesis* leaves in the diets of lactating Red Sokoto does at 30% maintained milk yield compared to the control diet (conventional diets). It is recommended therefore, that phyto-chemistry assessment be conducted and bioassay for its implication on milk production using dairy cattle. It is hoped that results of the present study stimulates biotechnological investgations on its biodiversified usage., involvement as milk-enhancer and development of strategies for conservation of *G. senegalensis* plant.

Key words: Milk yield, Feed intake, lactation, red Sokoto Goat, Guiera senegalensis

Introduction

World milk yield estimated at 700,000,000 metric tons (MT) as of 2007. Of this quantity, India leads the world (13%) with a current annual output of 91MT (APEDA, 2007). Total domestic production in Nigeria was estimated at 1.3 billion liters in 2006, of which only 600,000 MT entered formal marketing channels within the same year. The rest was either consumed within families or traded informally among the producing communities (Flake and Nzeka, 2007).

The domesticated milk producing livestock species are cattle, buffalo, Sheep and Goats. Globally, goat yields 60% of its value as milk, 35% as meat and 5% as skin (Malau-Aduli *et al*, 2001). Goats play an important role in increasing the low level of animal protein production and supply in many developing countries. Most of the goats in tropical countries are kept for meat production and are rarely milked despite their great potential as producers of good quality milk (Ohiokpehai, 2003) Knights and garcia (1997) reported that 955 of the total goat populations are the tropics and the shortfall in milk production could best be made from goat milk. Globally, goats contribute about 10,144 x 10^3 metric tones to the world milk production (FAO, 1996). Although in the tropics, milk is secondary to meat production; it is extremely important in human nutrition especially among the rural communities where many cannot afford to buy milk and milk-products (Akpa *et al*., 2003).

Browse species have high potentials as important feed resources for ruminant animals during the dry season because they are less susceptible to climate fluctuation (Dzowela *et al*., 1995) and are quite palatable. Fodder trees and roduction in the arid and semi-arid zones (Issa, *et al.,* 1998). Since they are either trees or perennial shrubs, they remain green all year round, thus constituting a ready source of feed during off-season feeding (Oji *et al*., 2007). *Guiera senegalensis*, a browse specie native to the Sudan zone and is called *Sabara* in Hausa language. *G.senegalensis* is a dwarf perennial shrub belonging to the family *Combretaceace*. It grows naturally in the semi-arid and sub-humid zones of West Africa (Le Houèrou, 1980). It is found particularly in the Sudan zone and it thrives throughout the Sahel region from Mauritania to Northern Nigeria and across Africa (Burkill, 1985 and Jones, 1994). Inhabitants in this area hold the belief that *G.senegalensis* is a useful stimulant for milk production among human nursing mothers. This assertion is sometimes held for livestock. However, literature on valifity of the statement with scientific backing is scanty. In Nothern Nigeria, the leaves of *G. Senegalensis* are fed to cattle as a tonic and digestive to increase milk yield. Likewise in Senegal, the plant has been reported as feed to livestock to ensure increase in weight, high fertility and increased milk yield (Burkil, 1985). Thus, this study was conducted to evaluate effect of feeding different inclusion levels of G. Senegalensis leaves on intake and milk yield of lactating red Sokoto does.

Materials And Methods

Study Area

The study was conducted at the Livestock Teaching and Research Farm, Faculty of Agriculture, Bayero university, kano. It is located at the new campus of the university in Ungogo Local Government Area of Kano state. Kano 8°42' East. It has a daily mean temperature

Table 1. Gross composition (%) of diets fed to lactating does at graded levels of G. senegalensis leaves

Ingredients	A	B	C	D	E
Wheat offal	50	39	38	35	24
Rice milling waste	8	8	5	0	0
Poultry litter waste	20	23	25	23	26
Cotton seed	21	19	11	11	9
(G.senegalensis) Sabara	0	10	20	30	40
Salt(NaCl)	1	1	1	1	1
TOTAL	100	100	100	100	100
Calculated CP	18	18	18	18	18
Calculated CF	18.1	20.6	21.5	21.4	21.4

of 30^0C to 33^0C and annual rainfall ranges between 787 and 960mm (KNARDA, 2001).

Preparation Of Experimental Feed

The *G.senegalesis* leaves used in the study was harvested, shade-dried and crushed for ease of handling (Plate 1).

Experiment Feed Formulation

Five completed iso-nitrogenous diets were formulated by varying the inclusion levels of *G. senegalensis* leaves at 10, 20, 30 and 40% (Table 1). The experimental treatments were labelled as A for 0% or control, B for 10%, C for 20%, D for 30% and E for 40% level of *G.senegalensis* leaves inclusion in the treatment diets.

Experimental Animals and Design

Twenty (20) Red Sokoto does were used for the feeding trial. The animals were obtained from the University Farm, at 2nd to 3rd parity. Before commencement of the trial they were quarantined and treated for endo and ecto parasites and other prophylactic treatments were given. The experimental animals were balanced by parity before being allotted into five treatment diets. The does were mated naturally with a buck. During the gestation period, animals were managed in a semi intensive system of production. They were fed browse plants and crop residues in the morning hours and allowed to graze in the evenings.

Feeding of Experimental Animals

Animals were fed a ration consisting of 40% experimental diets and 60% rice straw. The treatment combinations evaluated were five diets at three phases of lactation (first, second and third) using randomized complete block design (RCBD). The experiment lasted 72 days which was sub-divided into three phases (each comprising 24 days). Feed was offered twice daily between 0.8hr to 14.00hrs for experimental diets and 50% of the daily roughage requirement given thereafter. The balance was offered at 17.00hrs. Each morning, feed intake was

Table 2. Effects of graded levels of *Sabara* in the diet of lactating Red Sokoto and phase of lactation on feed intake (kg/day/animal)

TREATMENT	Phase of lactation			MEAN
	I	II	III	
A (0%)	0.79	0.98	0.87	0.88 [b]
B (10%)	0.67	0.53	0.77	0.66 [c]
C (20%)	0.51	0.52	0.74	0.59 [cd]
D (30%)	0.93	1.00	1.04	0.99 [a]
E (40%)	0.32	0.52	0.80	0.54 [d]
MEAN	0.64 [c]	0.71 [b]	0.84 [a]	-

abcd means followed with different letter in the same column are significantly different (P<0.05)
LSD for period and treatment are 0.060 and 0.078 respectively.

determined by difference between daily feed offered and ort.

Data Collection

Milking of Does

Upon kidding, each animal was allowed ten days to suckle its kid(s) intensively. Thereafter at 17.00hrs daily, kids were separated from does and confined in separate pens to allow for extraction of milk synthesized overnight in the following morning (Plate 2). Milking was done by hand once daily at 8.0hrs. Animals were brought out of their pens to the milking crate for milking (Plate 3). During milking for each treatment, part of the supplement was offered to the dam in wooden constructed metabolism cage with a feeder (Plate 4). daily milk yield (cm^3) per doe/treatment was measured using a measuring cylinder and recorded.Thereafter, the kids were fed the milk collected using feeding bottles and then allowed to stay with the dams till 17.00hrs when the kids were confined in separate pens overnight.

Data Analysis

Feeding Trial

The data generated from this study were subjected to analysis of variance (ANOVA) using General Linear Model of SAS (1999-2000). Differences between means were compared at P<0.05 using Fisher's Least Significance Difference (LSD) as described by Steel and Torrie (1980).

Results

Feed Intake

Table 2 presents the effect of feeding graded levels of *Sabara* and stage of lactation of Red Sokoto goats on feed intake in the Sudan savannah zone of Nigeria. There were significant differences (P<0.05) between treatment means on feed intake. Animals on 30% inclusion level had significantly higher (P<0.05) feed intake followed by those on control diet. Feed consumption for 20 and 40% as well as 10 and 20% were statistically similar (P>0.05). Feed intake

increased significantly (P<0.05) with advance in lactation. It was higher (P<0.05) at the third phase of lactation followed by the second then first.

Milk Yield

Feeding graded level of *G.senegalensis* leaves significantly (P<0.05) influenced the milk yield of red Sokoto goats. Inclusion at 30% produced the highest milk yield which was similar to the control diet. This was followed by the 10% and least was 40% inclusion levels. Yield obtained for the three phases evaluated were significantly (P<0.05) different from each other. The first phase had the highst yield 0.31 followed by second phase 0.28 then the third phase 0.18kg/day/animal (Table 3).

Table 3. Effects of feeding graded levels of Sabara in the diet of lactating Red Sokoto goats and phase of lactation on milk yield (kg/day/animal) in the Sudan savannah zone of Nigeria.

TREATMENT	Phase of Lactation			MEAN
	I	II	III	
A (0%)	0.42	0.39	0.21	0.34 [a]
B (10%)	0.33	0.31	0.22	0.29 [b]
C (20%)	0.18	0.10	0.15	0.14 [d]
D (30%)	0.38	0.40	0.25	0.34 [a]
E (40%)	0.27	0.18	0.08	0.18 [c]
MEAN	0.31[a]	0.28 [b]	0.18 [c]	

Means followed with different letter superscript in the same column and row are significantly different (P<0.05)
LSD for period and treatment are 0.016 and 0.021 respectively.

Discussion

Feed Intake

From the result of the study, feed intake increased by 67.8% as the inclusion level increased from 20% to 40% level of Sabara in the diet of lactating goats. However, higher intake was noted in goats fed 30% inclusion level compared to toher treatments.

There was no definite trend in the feed intake as a result of phase of lactation, intake however increased with advancement in phase of lactation from phase I-III (31.25%). The higher intake could perhaps account for higher nutrients that could sustain the animals for higher productivity in their physiological states. (Adeloye, 1998 and Otaru, 2002). Nursing animals normally have reduced feed intake upon parturition. However, after parturition, feed intake gradually increases before stabilizing.

Milk Yield of Lactating Goats fed Graded Levels of *G.senegalensis*

The mean value of milk yield obtained for control treatment was comparable with the yield obtained from 30% level of *Guiera senegalensis* leaves inclusion. Increased level of inclusion after 30% resulted in decline in milk yield. The decrease in yield above 30% inclusion level could be attributed to presence of anti-nutritional elements in the native browse used. This suggested that 30% level of inclusion could be the optimum for milk production in goats. This is in agreement with report from Senegal where the plant was used in livestock feeding for increase in milk yield (Burkil, 1985).

Milk yield showed decreasing pattern from phase I to phase III of lactation irrespective of treatments evaluated. The trend obtained in the present trial was in harmony with report by Gall (1996) who reported 2 – 5 weeks post-partum in 12-17 weeks lactation as the peak milk yield in goats. Similarly, the mean values which revealed a decrease from phase I to phase III is in consonance with Akpa *et al.* (2003) and Steele (2006) who reported that peak milk production in Red Sokoto goats and dairy goats, respectively was at the 4th week. Milk yield in lactating animals is known to decrease with increase or advance in lactation.

Conclusion

The inclusion of *Sabara* in the diet of lactating Red Sokoto does at 30% maintained milk yield when compared to conventional diet (control) and also enhanced feed intake. It is recommended therefore, that phyto-chemical analysis of nutritional and anti-nutritional factors in the native browse be evaluated to ascertain its implication in milk

Plate 1: Some bags of Sabara leaves collected from the neighboring bush in preparation for formulation of experiment diets

Plate 2: Kids separated from the does overnight to allow for collection of milk.

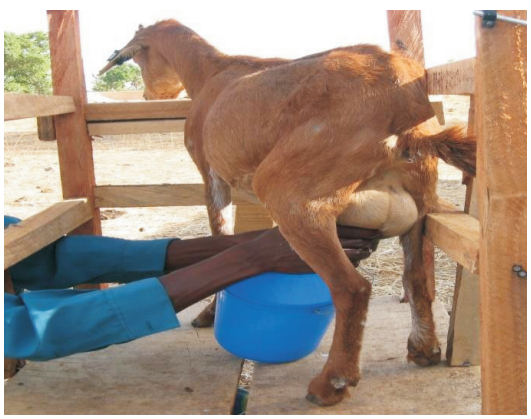

Plate 3: Hand-milking of a lactating doe in the course of the experiment.

Plate 4: A doe being fed in a milking crate to allow for proper milking.

production.
Furthermore, haematological studies of the experimental animals should be carried out to determine if feeding the native browse has deleterious effect(s) on the animals.

Acknowledgement
The authors are grateful to the Vice Chancellor, Bayero University, Kano for funding this research through grant number (BUK/URC/06/006).

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