

EVALUATION OF AIR-DRIED *Moringa oleifera* LEAF-BASED DIETS ON MILK SECRETION RATE AND OFFTAKE OF KALAHARI RED DOES IN DRY SEASON

*Sanusi, G.O., *Amosu, S.D., ¹Oderinwale, O.A., ²Oluwatosin, B.O.

^{*}Department of Animal Production and Health, Federal University of Agriculture, Abeokuta, Nigeria.

¹World Bank African Centre of Excellence for Agricultural Development and Sustainable Environment, Federal University of Agriculture, Abeokuta, Ogun State.

²Institute of Food Security, Environmental Resources and Agricultural Research, Federal University of Agriculture, Abeokuta, Ogun State.

Corresponding author: E-mail: sanusiomotayo@yahoo.com, +2348032655408

Abstract

The experiment was conducted to determine the effect of *Moringa oleifera* (MO) leaf-based diets on milk secretion rate and milk offtake of lactating Kalahari Red does in dry season. A total of twenty (20), 4-years old and average weight of 39.14 ± 1.99 kg lactating Kalahari Red does and twenty three (23) kids were randomly allotted to four treatments (A-0%, B-5%, C-10% and D-15% of air-dried MO leaves) for a duration of 94 days (14 days of adjustment period, 84 days for the trial) in a completely randomised design. The milk offtake and milk secretion rate at various weeks of lactation in 5% and 10% inclusion levels of MO leaves were higher than that of their non-supplemented counterparts and 15% inclusion level. The milk offtake in week 6 for 0%, 5% 10% and 15% were 36.66 ± 13.39 ml, 30.00 ± 10.13 ml, 91.75 ± 22.34 ml, and 17.20 ± 1.35 ml ($P < 0.05$) respectively. Milk secretion rate was significantly different ($P < 0.05$) at week 8 where 0%, 5% 10% and 15% had 13.22 ± 3.55 ml, 16.13 ± 6.71 ml, 31.58 ± 5.02 ml and 12.33 ± 1.09 ml respectively. From the results, both milk yields and offtake were consistently highest for lactating Kalahari red does on 10% possibly because the diet had the optimum inclusion level of MO leaves which was essential for milk synthesis. The inclusion of 10% MO leaves in diets greatly enhanced milk secretion and thus recommended for use by resource farmers.

Keywords: *Moringa oleifera*, milk secretion rate, milk offtake, Kalahari Red does

Introduction

The increasing demand for milk and its products in Nigeria has made it imperative to explore means of increasing milk production (Adewumi and Olorunisomo, 2009) and goat milk is of interest due to variation in yield. The production of milk from goats becomes necessary to meet the demand for food of animal origin. Milk is the normal secretion from the mammary glands for the purpose of feeding their young ones. The inability of ruminant livestock producers to feed their animals adequately throughout lactation owing to unavailability of good quality feed or forage throughout the year (Oduguwa *et al.*, 2013) will remain a major technical constraint in meeting future demands for meat and milk during which there is a stiff competition between man and livestock for the available feedstuffs. A potential strategy for increasing this opportunity for smallholders of ruminant animals in the dry season may be through the use of fodder trees and shrub forages that are easily propagated and do not require high management inputs (fertilizer, pesticides, etc.) or advanced technology. One of these potential tree forages is *Moringa* (*Moringa oleifera* Lam.), commonly referred to as the drumstick tree, which grows throughout the tropics. In a trial with goats, the inclusion of 9%,

27% and 36% of *Moringa* leaves in the ration resulted in dry matter intakes (DMI) of 251, 335 and 311 g/day, respectively. Supplementation with *Moringa* leaves at a level of 0.3% of body weight resulted in a milk yield of 5.7 kg day⁻¹, and this was 13% higher than grazing only. Sarwatt *et al.* (2004) found that when cotton seed cake was substituted by *Moringa* leaf meal at levels of 10, 20 or 30% of DM, milk yield was significantly increased by 1.4, 0.9 and 0.8 kg cow day⁻¹ respectively. Some recent reports have focused on different parameters for milk yield improvement in indigenous goats. Akpan and Duru (1999) reported on milk yield and efficiency of estimation of total milk yield using average records in non-suckling Red Sokoto goats. James and Osinowo (2002) examined the relationship between udder dimensions and milk yield in West African Dwarf goats, Red Sokoto and Sahel goats. Bemji (2003) reported on the relationship between 3x8 hours and 24 hours milk yield estimates. From all these reports, no attention has been given to milk secretion rate and milk offtakes. It is therefore necessary to investigate the influence of air-dried *Moringa oleifera* leaf-based diets on milk secretion rate and milk offtakes of Kalahari Red goats in dry season.

Materials and Methods

Study Area

The study was carried out at the kalahari unit of the institute of food security, environmental resources and agricultural research, federal university of agriculture, abeokuta, ogun state, which is located in the tropical rainforest zone in nigeria within 7°13'47.41"N, 3°23'43.48"E. seasonal distribution of rain is approximately 110.9mm (9.97%) in the late dry season (Jan-March) and 163.1mm (14.66%) in the early dry season (October–December) (OORBDA, 2012).

Experimental Diets

Feed composition (%Dm) of experimental diets fed to lactating kalahari red does consisted of diet A (0kg MO and groundnut cake 29kg), diet B (5kg MO and groundnut cake 24kg), diet C (10kg

MO and groundnut cake 19kg) and diet D (15kg MO and groundnut cake 14kg) while corn bran 65.00kg, molasses 2kg, bone meal 2.00kg, salt 1.00kg and premix 1.00kg were constant in all the diets.

Management and Feeding of Experimental Animals

A total of twenty (20), 4-years old and average weight of 39.14±1.99 kg lactating Kalahari Red does and twenty three (23) kids were used in the experiment for a duration of 98 days (14 days of adjustment period, 84 days for the trial). Prior to the start of the experiment, flock treatment was carried out during which they were administered with broad spectrum antibiotics (Oxytrox 20% Long Acting injection, dose: 1ml per 10 kg) and dewormed using Albidol orally. The animals were managed under semi-intensive system. 20kg of

Table 1: Effect of air-dried *Moringa oleifera* leaf-based diets on Milk offtakes in Kalahari Red Does

Week of Lactation	Moringa inclusion levels in diets				P-Value
	0%	5%	10%	15%	
Week 4(ml)	44.33±11.58	74.40±30.51	101.50±26.67	25.00±3.76	0.0863
Week 5(ml)	17.50±1.08	37.20±10.16	41.00±11.61	58.80±41.61	0.5909
Week 6(ml)	36.66±13.39 ^b	30.00±10.13 ^b	91.75±22.34 ^a	17.20±1.35 ^b	0.0087
Week 7(ml)	30.83±7.66	35.00±12.69	50.00±18.67	24.20±14.22	0.6043
Week 8(ml)	118.66±64.74	34.60±18.57	73.50±27.24	113.40±59.33	0.6226
Week 9(ml)	95.66±41.75	89.20±70.31	38.75±7.13	52.00±34.51	0.7953
Week 10(ml)	29.00±6.94	25.20±6.40	54.75±26.32	28.40±6.63	0.3719
Week 11(ml)	31.50±17.13	63.00±37.24	49.50±18.46	16.20±5.23	0.5066
Week 12(ml)	18.0±4.64	45.2±15.58	54.0±15.09	24.5±8.84	0.9905
Week 13(ml)	28.66±6.82	36.20±12.15	39.00±18.77	41.50±9.17	0.4680
Week 14(ml)	20.16±5.21	18.00±6.09	147.33±116.33	47.00±31.12	0.6193
Week 15(ml)	15.00±3.63	10.00±2.98	23.00±6.35	15.25±4.58	0.6715

a,b Mean values in the same row with different superscripts differ significantly (P<0.05).

Table 2: Effect of air -dried *Moringa oleifera* leaf-based diets on Milk Yield rate in Kalahari Red Does

Week of Lactation	Moringa inclusion levels in diets				P -Value
	0%	5%	10%	15%	
Week 4(ml)	17.72±2.63	18.40±4.71	29.91±5.54	21.06±2.84	0.1750
Week 5(ml)	30.22±5.96	26.46±8.75	41.75±12.12	33.06±4.54	0.6115
Week 6(ml)	27.11±5.23	28.73±9.23	41.66±9.14	20.20±1.87	0.2397
Week 7(ml)	18.59±2.94	19.86±6.39	32.50±4.25	16.61±2.17	0.0922
Week 8(ml)	13.22±3.55 ^b	16.13±6.71 ^b	31.58±5.02 ^a	12.33±1.09 ^b	0.0410
Week 9(ml)	20.83±5.31	18.46±6.03	25.16±3.95	21.60±6.99	0.8964
Week 10(ml)	16.61±3.94	16.01±5.58	18.50±4.28	15.30±4.24	0.9710
Week 11(ml)	16.11±4.46	16.93±6.41	19.75±6.93	14.86±3.64	0.9391
Week 12(ml)	13.38±3.59	11.73±3.97	12.44±3.85	12.33±4.29	0.9905
Week 13(ml)	8.77±2.29	15.60±4.15	15.11±6.63	11.66±1.73	0.4680
Week 14(ml)	7.75±2.94	12.80±4.05	13.52±6.32	13.29±2.42	0.6193
Week 15(ml)	7.88±3.01	12.06±4.05	13.00±6.25	13.83±3.05	0.6715

a,b, Mean values in the same row with different superscripts differ significantly (P<0.05).

the concentrate were offered to the animals at 08:00 hours every morning before allowing them to graze around 10.00am on *Brachiaria ruziziensis* and *Stylosanthes hamata* as the basal diet and water was given *ad libitum*. The does were randomly divided into four different diets A to D.

Milking of Goats

Milking was done from 4 weeks post-partum in order for the kids to have access to colostrum and good quantity of milk. Does were milked once every week for 12 weeks. The kids were separated from their dams at 8:00 am and milked dry by hand to evacuate the residual milk which is the first one as the off-take and consequently at 11:00 am to obtain the 3-hour milk yield, after which the kids were returned to their dams. The extractable milk was measured using measuring cylinder. Milk secretion rate was obtained on hourly basis by dividing the 3-hour milk yield by 3.

Statistical Analysis

All data collected from parameters investigated were based on completely randomized design and subjected to one way analysis of variance using the procedure of statistical analysis software SAS 9.1 (SAS, 2003) and treatment means were compared using Duncan's procedure of the same software. The statistical model focused primarily on inclusion level effect as the main treatment. The following model was thus used: $Y_{ij} = \mu + M_j + e_{ij}$; where Y_{ij} is the dependent, continuous variable; μ is the overall mean; M_j is the fixed effect of the j th postpartum inclusion of air-dried *Moringa oleifera* leaves ($j = 0\%, 5\%, 10\%, 15\%$) and e_{ij} is the residual error.

Results

Table 1 shows the effect of air-dried *Moringa oleifera* leaf-based diets on milk offtakes in lactating Kalahari Red does while Table 2 shows the effect of air-dried *Moringa oleifera* leaf-based diets on milk yield rate in lactating Kalahari Red does in this study.

Discussion

The higher daily milk offtakes and milk secretion rate at various weeks of lactation in 5% and 10% inclusion of air-dried *Moringa oleifera* leaf-based compared to that of their non-supplemented counterparts and 15% inclusion level is probably a response to biological value of the extra dry matter intake, energy and nutrients consumed. These findings suggest that supplementary feeding of grazing stock with air-dried *Moringa oleifera* leaf meal improves the supplies of fermentable energy and digestible protein which

are needed for optimizing the efficiency of rumen functions and utilization of low quality forages available during the dry season (Olafadehan and Adewumi, 2009). The significant differences observed in milk offtake and milk secretion rate is a reflection of the quality of concentrate rations. These observations are consistent with previous report (Kumaresan *et al.*, 2008) who indicated the pronounced influence of feed quality on the milk offtake and secretion rate. Both milk secretion rate and offtake were consistently highest for lactating Kalahari Red does on 10% possibly because the diet had the optimum inclusion level of air-dried *Moringa oleifera* leaves which was essential for milk synthesis. There was a higher milk production for the treatment groups than the control. The general decline in milk secretion rate and milk offtakes observed as the week progresses is due to both loss of secretory tissue and decrease in the rate of secretion per cell.

Conclusion

Based on the results obtained in this study, it is therefore concluded that the inclusion of air-dried *Moringa oleifera* leaves at 10% has good nutritional potentials and could constitute the main component of goat rations especially during dry season when there is feed scarcity with much effect on the milk secretion rate and offtake.

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