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NUTRIENT INTAKE AND DIGE STIBILITY OF RED SOKOTO BUCKS FED DIETS CONTAINING GRADED LEVELS OF *Leucaena leucocephala* LEAF AS SUPPLEMENT TO CRAB GRASS *(Digitata horizontalis)*

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ABSTRACT

The study was Carried out to Evaluate the Nutritional Potentials of Sun Dried Leucaena leucocephala Leaves in the Diets of Growing Red Sokoto Bucks. Sixteen (16) Growing Red Sokoto Bucks averagely 8–9Months of age with an average Weight of 10-11 kg ± 0.5 were used for the Study. Four Treatment Diets (0%, 5%, 10% and 15% Leucaena leucocephala) were Formulated, Designated as T_1, T_2, T_3 and T_4 respectively. The Experimental Bucks were weighted at the Beginning of the Experiment and Weekly Thereafter and Feed Intake Recorded Daily. The Experiment was a Complete Randomized Designed (CRD) Experiment. The experiment lasted for a Period of sixty three (63) days after an adjustment period of fourteen (14) days. The data Collected were subjected to Analysis of Variance. The result revealed a Significant ($p<0.05$) different in Dry Matter and Nutrients Intake and Digestibility, Total Weight Gain was Significantly, ($p<0.05$) Higher in Bucks Fed Treatment 4 (2.26kg). Higher Total Feed Intake (824.50g) (818.23g) in Bucks fed Treatments T_1 and T_2 respectively with the Lowest (803.75g) in Treatment 4. Better Feed Utilization was recorded in experimental bucks fed T_4 with 0.35. Conclusively, Leucaena leucocephala leaves contain adequate nutrients required by growing Red Sokoto Goats andInclusion of Leucaena leucocephala at 15% in the Diets of Red Sokoto Goats Improved Nutrient Digestibility of the Animals.

Keywords: Nutrient, Intake, Digestibility, Red Sokoto Bucks, *Leucaena leucocephala*

1.0 INTRODUCTION

Ruminant animals constitute a very important part of the livestock sub-sector of the Nigerian agricultural economy. The potential of small ruminant production in alleviating the low animal protein intake by man in developing nations such as Nigeria has been reported (Fajemisin *et al*., 2019). Recently, more attention has been paid to small ruminant production in the tropics as their advantages are becoming more understood than ever before, particularly for their ability to produce meat, milk and skin, even in hostile environments (Konlan *et al.,* 2022).Goats are the most prolific of all domesticated ruminants under tropical and subtropical conditions (Webb and Mamabolo, 2024) and they play a significant role in livelihoods of the rural populace in most developing countries like Nigeria. Apart from serving as a vital protein source, goats also provide income for meeting household needs (Peacock, *et al.,* 2005). Not with standing, the high cost of formulating livestock feed has been a major constraint militating against the increased production of valuable sources of animal protein (Okoruwa *et al.,* 2013) in Nigeria. *Leucaena leucocephala*is a tree legume noted for its high nutritive value for ruminant production (Babayemi *et al* 2006), being high in proteins, vitamins and minerals (Odeyinka, 2021). Its amino acid pattern is comparable with that of soya bean and fish meal (Vincent *et al*., 2012) and other animal feed sources available in developing nations. *Leucaena leucocephala* is a relatively fast-growing tree in the production of forage. Reynolds & Atta-Krah (2016) reported that the browse plant has the ability of being available all year round because of its drought resistance, persistence, vigorous growth and re-growth and

palatability. *Leucaena leucocephala* leaves have been found to play a valuable role in providing supplemental nitrogen to goats fed maize residues under the village system of management (Fasae *et al.,* 2011). It is readily available in smallholder settlements in south west Nigeria (Fasae *et al*., 2011), although it has its origins in Central America and the Yucatan Peninsula of Mexico (Vincent *et al*., 2012).Small ruminants suffer scarcity of feed supply and pasture quality in the arid region of West Africa, especially during the dry season when the natural vegetation is of poor nutritive value (Aye, 2017). Specifically, for goat production in Nigeria, Ahamefule and Elendu (2010) identified feed shortage as a major constraint. Native rangelands produce the cheapest source of nutrients for goats, and for a greater part of the year, grasslands do not supply sufficient nutrients to animals for greater productivity (Vincent *et al.,* 2012). Ruminants consuming forage-based diets are fed supplements to conserve forage, improve animal performance, and increase economic returns (Kunkle *et al.,* 2020). A protein supplement alone to low energy diet has no effect on growth rate. The shortage in feed supply due to high cost and seasonality, have caused ruminant livestock farmers to search for alternative feed resources that are inexpensive and readily available which are not directly required as component of human dietaries and can economically supplement the feed ingredients in rations without adverse effects on the rumen microbial fermentation and performance of the animals (Oluremi *et al.,* 2017). Similarly to reduce this nutritional constraints, it is recommended that forage and crop residues be incorporated in Animal Diets (John and Debrah, 2010). The current study is therefore carried out to determine the nutrient intake and digestibility of red sokoto bucks fed diets containing graded levels of *Leucaena leucocephala* leaf as supplement to crab grass *(Digitata horizontalis).*

2.0 MATERIALS AND METHODS

2.1 Study Area

The experiment was conducted at the Livestock Unit of Teaching and Research Farm, Federal College of Horticulture Dadin-Kowa, Gombe state, Nigeria. Dadin-kowa, Yamaltu Deba Local Government Area is located in the savannah zone of North- Eastern Nigeria, on latitude 11^0.30N and longitude 100^0 20E and on altitude of 240m above sea level (Yarima *et al.,* 2024), the area is characterized by short rainy season (4-5 months) with annual rainfall of 760mm to 1100mm, and long dry season (6-7 months). The ambient temperature could be as low as 24^0C during the dry cold season (October-January) and as high as 44^0C during the dry hot season (February-May). (Ibeje and Okoro 2023).

2.2 Experimental Bucks, Housing and Management

A total of 16 Red Sokoto bucks aged between 8–9 months old with an average weight of 10-11 kg ± 1 were purchased from the livestock market within Kuri Town. All the animals were treated against internal and external parasites using Levarmisole (Kepro B.V. Holland, 1ml per 20 kg body weight), sprayed with Triatix (cooper Ltd) and injected with long acting oxytetracycline 20% LA (Invesa Spain 1ml per 10kg body weight) before the commencement of the experiment (Wadda, *et al.,* 2014). The animals were housed individually in separate pens. Experimental supplement were supplied at 3% of the animal's body weight and water was given *ad libitum* and the experimental animals were allotted to four treatments supplements containing *Leucaena leucocephala* leaf meal at inclusion levels of 0, 5, 10, and 15% and designated as T_1, T_2, T_3 and T_4respectively. Daily feed intake and weekly live weight changes was recorded. The trial lasted for 63 days after an adjustment period of two weeks.

2.3 Experimental Diets and Animal Feeding

Leucaena leucocephala leaves were sourced from Orchard Farm, Federal College of Horticulture Dadin Kowa, Gombe State, Nigeria. The leaves were sun-dried on a concrete floors for 48 hours, where it became crispy; it was milled and stored in synthetic bags before incorporation in the diets as described by (Oyewole *et al.,* 2021; Oloche *et al.,* 2014). Four supplements were formulated containing *Leucaena leucocephala* leaf meal at 0, 5, 10 and 15%.

During the adjustment period which lasted for two weeks, the animal were fed the experimental

supplements and the basal diet to enable them adapt to the feeding regimes. The animals were individually fed leucaena leaf meals at varying levels based on treatments levels. Four supplements were formulated in such a way that *leucaena leucocephala* leaf meal was included at different levels as T_1, T_2, T_3 and T_4 comprising of four animals per treatment. During the experiment, feeding was done every morning at about 08:00am. During the feeding trials each animal was offered its respective basal diet of 600g/head/day of *Digitaria horizantalis* (Crab grass) at 08:00am followed by the concentrate at 300g per head per day at 04:00pm. As described by Ocheja, (2020).

The animals were weighed at the beginning of the experiment and weekly thereafter. The experiment lasted for a period of sixty-three days after two weeks adaptation period, Ingredients composition and their calculated nutrients analysis are presented below;

Table 1: Ingredients Composition of the Experimental Supplements

	Treatments (kg)			
Ingredient	1	2	3	4
Maize offal (kg)	50.00	50.00	50.00	50.00
Rice bran (kg)	17.00	17.00	17.00	17.00
Groundnut cake (kg)	30.00	25.00	20.00	15.00
Leucaena leaf Meal (kg)	**0.00**	**5.00**	**10.00**	**15.00**
Bone meal (kg)	2.00	2.00	2.00	2.00
Wood ash (g)	0.50	0.50	0.50	0.50
Table salt (g)	0.50	0.50	0.50	0.50
Total (%)	**100.00**	**100.00**	**100.00**	**100.00**
Calculated Nutrients Content				
Crude Protein (%)	18.87	18.24	18.56	18.60
Crude Fiber (%)	13.39	13.79	14.18	14.58
M. E (kcal/kg)	2828.20	2824.89	2821.58	2818.27

2.4 Experimental Design

The 16 Red Sokoto Bucks were allotted to four dietary treatments (T_1, T_2, T_3 and T_4) each treatment was replicated 4 times in a Complete Randomized Design (CRD).

2.5 Determination of Dry Matter intake and Nutrient Digestibility

The experimental animals were fitted with harnesses for fecal collection. The collection lasted for 1 week after an adjustment period of 1 week, the fecal samples was packed, dried and analyzed for their proximate composition Using standard procedure (AOAC 1995), and there after the proximate composition was used to compute dry matter intake(g/day) and nutrient digestibility percentage (%) as described by (Baba, *et al.,*2021). Digestibility was calculated using the formula.

$$\text{Digestibility (\%)} = \frac{\text{Nutrient Intake} - \text{Nutrient in Feaces}}{\text{Nutrient Intake}} \times 100$$

2.6 Data Analysis

Data obtained from the study were subjected to analysis of variance (ANOVA) using SPSS version 23 (2015), and treatment means that are significantly different were separated using least significant difference (LSD).

3.0 RESULTS AND DISCUSSIONS

3.1 Chemical Composition of Experimental supplements, *Leucaena leucocephala* Leaf meal and Forage (*Digitaria horizantalis)*.

The chemical composition of concentrate diet, the forage (*Digitaria horizantalis)* and *Leucaena leucocephala* leaves were presented in Table 2.

The crude protein values of the concentrate diets at different inclusion levels were found to be 11.35% to 12.55 %. While crude protein percentages of *Leucaena leucocephala* leave is 21.85 %. The crude Fibre of the concentrate diet, forage and *Leucaena leucocephala* leaves were ranged from 13.49 to 15.49 % and 14.85 and 12.50% respectively. Acid detergent Fibre (ADF) and neutral detergent Fibre (NDF) ranges from 5.13 to 15.37% and 19.40 to 43.54 across the treatments.

The high crude protein content of the concentrate diet shows it is high enough to meet the optimum microbial need in the rumen (Yahaya *et al*., 2020). The values for all the treatment groups were above the 7% minimum protein requirement for optimum microbial growth in the rumen (Baba *et al.,* 2021). The values also fall within the 10 to 12% crude protein requirement for growth performance of goats (Gatemby 2022).

The results follow similar pattern to the report of Puma (2021) that semi-arid browse plants are high generally in Fibre. Rajendran *et al.,*(2021) also reported values for NDF and lignin contents across different ecological zones as follows; 401 and 117g kg DM in the sahelian zone, 457 and 105 g kg DM in sub humid zone and 436 and 93 g kg DM in the humid zone respectively.

Table 2: Chemical Composition (%) of Experimental Diets, Leucaena leaves and the forage (*Digitaria horizantalis)*

Parameters	T_1	T_2	T_3	T_4	Leucaena leaves	Forage (*Digitaria horizantalis)*
Dry matter	99.17	99.06	99.43	99.55	99.55	98.25
Ash content	3.94	3.55	3.15	2.84	2.30	1.26
Crude fat	0.63	0.24	0.35	0.13	5.05	0.036
Crude Protein	11.36	11.35	11.73	12.55	21.85	3.1
Crude fibre	15.49	15.00	13.65	13.49	12.50	14.85
CHO	67.75	68.89	70.55	70.45	63.51	79
Energy (Kcal/100g)	322.47	321.86	325.51	326.44	295.02	335.58
ADF %	5.13	8.56	12.64	15.37	19.40	32.38
NDF %	9.28	23.62	28.35	34.19	43.54	61.82

CHO means carbohydrates, ADF; Acid Detergent Fibre and NDF; neutral detergent fibre.

3.2 Dry Matter and Nutrients Intake (g/day) of Red Sokoto Bucks fed Supplement Diets containing Graded Levels of *Leucaena leucocephala* Leaf meal.

The results of the dry matter and nutrients intake of the experimental bucks fed supplements containing graded levels of *Leucaena leucocephala* leaf meal is presented in Table 3.

3.2.1 Dry Matter Intake (DMI)

Significant ($p<0.05$) differences were observed in the dry matter intake of the experimental Bucks. The dry matter intake values ranged from 793.12 to 812.56 g/day. The dry matter intake recorded in this study were higher for animals fed diets 1 and 2 (0% and 5% *leucaena leucocephala*) with values 812.56 g/day and 806.03 g/day respectively followed by diet 3 (797.67 g/day) and lowest for those fed diet 4 (793.12 g/day). The dry matter intake values in this study are higher than that reported by Vincent *et al.,* (2021), who recorded dry matter intake values of 288.48 to 354.49 g/day by west African goats fed *Moringa oleifera, Glirici diasepium* and *leucaena leucocephala* as supplement to cassava peels and also higher than that reported by Wada *et al.,* (2014) for Yankasa Rams fed graded levels of *Parkia biglobosa* (1.9 to 2.4 g/kg $W^{0.75}$) and this could be due to breed differences and types of Diets fed.

3.2.2 Crude Protein Intake (CPI)

Significant ($p<0.05$) differences were observed in the crude protein intake of the experimental animals. The values were highest for animals fed diet 4 (15% L.L) (49.89 g/day) and lowest for those on diets 2 (5% LL) (46.98 g/day) and 3 (10% LL) (46.82 g/day) respectively. The CPI in this study (46.82 g/day to 49.89 g/day) is low than 96.32 g/day reported by Olafadehan and Okoye (2017) for Red Sokoto goats fed Urea treated ensiled Cowpea husk Based diets. Devasenaand Rama (2019) reported a Crude protein intake of 138.6 to 146.5 g/day for Goats fed Crop residue based complete rations.

3.2.3 Crude Fiber Intake (CFI)

Significant differences ($p<0.05$) were observed in the crude fiber intake (CFI) of the Animals. The CFI values were highest for Animals on Diet 1 (0% LL) and found to be lowest on Animals on Diet 4 (15% LL) with 124.20 and 115.76 g/day. Chike (2020) reported CFI of 128.87g/day for Red Sokoto Goat fed *Acacia nilotica* leaves milled with charcoal and 164.09 g/day for Red Sokoto Goat fed Sun dried *Acacia nilotica* leaves.

3.2.4 Carbohydrate Intake (CHOI)

The results obtained from this work revealed that carbohydrate intake shows significant difference ($P<0.05$) among the treatments. The overall carbohydrate intake showed that treatment 1 and 2 (0% and 5% LL) 620.64g and 619.89g had the highest intake while treatment 4 (15% LL) 612.37g the lowest. The intake in carbohydrate decreased with increasing levels of *Leucaena leucocephala* leaves in the diets. Osman *et al.* (2016) reported values of 649.1 to 1094.0g and this were higher than 612.37 to 620.64g observed in this study.

3.2.5 Ash Intake

The ash intake observed in this study (14.31 to 17.71 g/day) were lowest than the range (28.50 to 36.84 g/day) recorded by Olafadehan and Okoye (2017). And this could be due to breed differences, size and types of feed offered.

Table 3: Dry Matter and Nutrient Intake (g/day) of Red Sokoto Goats fed Supplement Diets containing Graded level of *Leucaena leucocephala* Leaf meal.

Parameter	T_1 (0% LL)	T_2 (5% LL)	T_3 (10% LL)	T_4 (15% LL)	SEM	LOS
DMI	812.56^{a}	806.03^{b}	797.67^{c}	793.12^{d}	7.73	*
CPI	48.11^{b}	46.98^{c}	46.82^{c}	49.89^{a}	0.64	*
CFI	124.20^{a}	121.90^{b}	117.09^{c}	115.76^{d}	1.42	*
CHOI	620.64^{a}	619.89^{a}	617.70^{b}	612.37^{c}	5.77	*
ASHI	17.71^{a}	16.31^{b}	14.96^{c}	14.31^{c}	0.38	*
ADFI	192.58^{d}	202.54^{c}	212.16^{b}	215.31^{a}	2.96	*
NDFI	366.27^{d}	405.74^{c}	415.69^{b}	423.87^{a}	6.79	

$^{Abc.}$ Means in the same row with different super scripts differs significantly ($p<0.05$), * means at 95% ($p<0.05$), DMI = Dry matter intake, CPI = crude protein intake, CFI = crude fibre intake, CHOI = carbohydrates intake, ADFI = acid detergent fibre intake, NDFI = neutral detergent fibre intake, LL = *Leucaena leucocephala*, SEM = standard error of mean, LOS = levels of significant.

3.2.6 Acid Detergent Fiber Intake (ADFI)

There were significant ($p<0.05$) differences in the ADFI of the experimental animals. The acid detergent fibre values were highest for animals fed Diet 4 (15% LL) 215.31g and lowest for those fed Diet 1 (0% LL) 192.58g. The acid detergent fibre is increasing with the increasing levels of *leucaena leucocephala* leaves in the diet of the animals from diet 1 to 4 with 192.58, 202.54, 212.16 and 215.31 g/day respectively. The values observed in this study (192.58 to 215.31 g/day) were similar to those recorded by Puma (2021). Olafadehan and Okoye (2017) reported ADFI of 173.31 to 217.80 g/day for Red Sokoto Goat fed Urea treated ensiled cowpea husk based diet which is in agreement with that recorded in the present study.

3.2.7 Neutral Detergent Fibre Intake (NDFI)
Significant difference ($p<0.05$) were observed in the NDFI of the animals. Treatment 4 (15% L.L.) had the highest value of 423.87g/day and lowest for diet 1 (0% LL) with 366.27g/day. The NDFI values in this study were higher than (277.32 to 327.16 g/day) reported by Puma (2021). Similarly, Rajendran *et al.* (2021) reported (425 to 551.00 g/day) for sheep fed basal diet of urea treated maize Stover and this could be due to breeds' differences. The NDFI in this study (366.27 to 423.87 g/day) was also higher than (295.14 to 327.65 g/day) recorded by Olafadehan and Okoye (2017).

3.3 Dry Matter and Nutrients Digestibility (%) of Red Sokoto Bucks fed supplement Diets containing Graded Level of *Leucaena leucocephala* Leaf Meal.
The results of the dry matter and nutrients intake of the experimental bucks fed with the graded levels of *leucaena leucocephala* leaf meal is presented in Table 4.

3.3.1 Dry Matter Digestibility (DMD) (%)
Significant ($p<0.05$) differences were observed in the Dry matter digestibility of the experimental animals. DMD value is highest (69.70%) for animals on Diet 2 (5% LL) and lowest (29.16%) for those on Diet 3 (10% LL). The dry matter digestibility recorded in this study (29.16% to 69.70%) was similar to (36.21% to 62.00%) reported by Wadda *et al*., (2014). The DMD result in this study was higher than (54.70%) for West African Dwarf Goat fed graded levels of broiler litter reported by Muhammad *et al.* (2021). Mafindi *et al.* (2018) also reported a DMD of 52.67% to 73.85% for red Sokoto goats fed Cowpea Husk supplemented with graded levels of *Moringa oleifera* leaves. Moore and Jung (2010) and Pattanaik *et al.* (2018) showed that a digestibility coefficient of above 65% indicates good nutritive value and that below this levels intake is limited by low digestibility.

3.3.2 Crude Protein Digestibility (%)
Significant differences ($p<0.05$) were observed in the CPD of the experimental bucks. Animals on diet 3 (10% LL) had the lowest value of 43.90% were those fed diet 2 (5% LL) has the higher value of 94.35%. The CPD recorded in this study (43.90% to 94.35%) tend to be higher than that (48.33 to 64.94%) as reported by Yashim *et al.* (2016) for Red Sokoto bucks fed diet containing graded levels of dried sweet orange peel meal, also higher than (26.44 to 32.27%) reported by Wadda *et al.* (2014). Mafindi *et al*. (2018) reported CPD values of 52.12% to 67.76% for Red Sokoto Goats which were lower than that recorded in this study. Baba *et al.* (2021) reported similar CPD value of 93.18% for two breeds of Goat fed Sorghum Bicolor Husk and Cowpea Haulms.

3.3.3 Crude Fibre Digestibility (%)
Significant differences ($p<0.05$) were observed in the CFD of the experimental bucks. Animals on diet 1 and diet 4 (0% LL and 15% LL) (60.71 and 60.34%) has a higher CFD values followed by diet 2 (5% LL) with 51.17% while animals on diet 3 (10% LL) had the lowest value of 19.31%. The CFD values (19.31 to 60.71%) recorded in this study were lower than 50.71 to 74.79% reported by Mafindi *et al.* (2018) for Red Sokoto Goats fed Cowpea Husk supplemented with *Moringa oleifera* leaves. Wadda *et al.* (2014) reported lower values of CFD of (21.37 to 45.36%) than that recorded in this present study. The values observed in this study (19.31 to 60.71%) were within the range of 20.77 to 73.12% reported by Yashim *et al.* (2016).

3.3.4 Carbohydrate Digestibility (CHO)
Significant differences ($p<0.05$) were observed in the CHOD of the experimental bucks. Animals on diet 2 (5% LL) (71.06%) had the highest CHOD then diet 1 and diet 4 (0% LL and 15% LL) (68.10 and 66.31%) and the animals on diet 3 (10% LL) the lowest (29.62%). The values recorded in this study, (29.62% to 71.06%) were higher than that (27.60 to 37.64%) reported by Chike (2020). for growing Red Sokoto Goats fed *Acacia nilotica*. The values were lower than 72.2 to 80.9% reported by Osman *et al*. (2016).

3.3.5 Ash Digestibility (%)

Significant differences ($p<0.05$) were observed in the Ash Digestibility of the experimental bucks. Animals on diet 2 (5% LL) had a value of 92.93% were the lowest value of 43.97% was observed in diet 3 (10% LL). The ash digestibility values (43.97 to 92.93%) recorded in this study were higher than (32.91 to 89.09%) reported by Yashim *et al*. (2016) for Red Sokoto Bucks fed Dried Sweet Orange Peel Meal. Mafindi *et al.* (2018) reported ash digestibility of 48.68 to 73.88% for Red Sokoto Goats fed Cowpea Husk supplemented with graded levels of *Moringa oleifera* leaves.

Table 4: Dry Matter and Nutrient Digestibility (%) of the Experimental Diets

Parameters	(T_1) 0% LL	(T_2) 5% LL	(T_3) 10% LL	(T_4) 15% LL	SEM	LOS
DM	68.46^{b}	69.70^{a}	29.16^{d}	67.64^{bc}	5.93	*
CP	92.43^{b}	94.35^{a}	43.90^{d}	89.88^{c}	7.85	*
CF	60.71^{a}	51.17^{c}	19.31^{d}	60.34^{ab}	5.31	*
CHO	68.10^{b}	71.06^{a}	29.62^{d}	66.31^{c}	5.94	*
ASH	90.94^{bc}	92.93^{a}	43.97^{d}	91.86^{b}	7.82	*

$^{Abc.}$ Means in the same row with different super scripts differs significantly ($p<0.05$), * means at 95% ($p<0.05$), DM = Dry matter, CP = crude protein, CF = crude fibre, CHO = Carbohydrates, LL = *Leucaena leucocephala*, SEM = standard error of mean, LOS = levels of significant.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Based on the findings of this study, it can be concluded that, *Leucaena leucocephala* leaves can be included in the supplement of Red Sokoto Bucks fed a basal diet of *Digiteria horizantalis* at up to 15% without any detrimental effect on the growth Performance of the Animals. *Leucaena leucocephala* leaves contain adequate nutrients required by growing Red Sokoto Goats. Inclusion of *Leucaena leucocephala* at 15% gave a Higher Weight of 2.26kg (T_4). Inclusion of *Leucaena leucocephala* Leaves in the Diets of Red Sokoto Goats Improved Nutrient Digestibility of the Animals.

4.2 Recommendations

I. *Leucaena leucocephala* Leaf Meal can be included in the Concentrate supplement of Growing Red Sokoto Bucks fed a basal Diet of *Digiteria horizantalis*.
II. Further Research should be conducted to check the effects of Inclusion of *Leucaena leucocephala* leaves on the Milk Yield and Composition of Red Sokoto Goats.

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