

TESTOSTERONE PROFILE AND TESTICULAR MORPHOMETRY OF RED SOKOTO BUCKS FED DIETS CONTAINING GRADED LEVELS OF CASSAVA PEELS MEAL AS SUPPLEMENT TO NEEM LEAVES

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ABSTRACT

The study evaluated the testosterone profile and testicular morphometry of red Sokoto bucks fed diets containing graded level of cassava peels meal as supplement to neem leaves. Sixteen (16) Red Sokoto bucks aged about 8 – 9 months old were allocated into four (4) treatments of four (4) bucks each. The bucks were fed neem leaves at 300g/buck/day and a concentrate supplement diet at 250g per buck/day for a duration of fifty (50) days, water was served *ad libitum*, feed intake was monitored and recorded. The experimental design was a complete randomized design. Concentrate, cassava peels and neem leaves samples were analyzed for their proximate composition. At the end of the experiment, testosterone and testicular parameters were analyzed. The values obtained for testosterone and testicular morphometry did not differ significantly ($P > 0.05$) across the groups. It was concluded that cassava peels meal in concentrate diets for Red Sokoto bucks had no adverse effect on testosterone and testicular morphometry. Cassava peels meal can be used in supplement diets for Red Sokoto bucks from 5% - 15% level of inclusion and it is safe for male reproduction.

Keywords: Testosterone, Cassava Peels Meal, Feeds, Testicular morphometry, Neem Leaves, Supplement

INTRODUCTION

Livestock farmers in developing countries are faced with various challenges that lead to considerable fall in the production of certain livestock species like goats, cattle, swine and poultry, which further leads to protein shortage. This is due to high cost of production that originates from increase in prices of conventional feed ingredients and livestock species. There is therefore an urgent need for alternative locally available and cheap sources of feed ingredients particularly those that do not attract competition in consumption between human and livestock or have no direct relevance in human food chain (Shettima *et al.*, 2024).

Nigerian Goats are reared traditionally at subsistence level. They are usually left to scavenge and cater for their own nourishment. A major obstacle to ruminant livestock production in most tropical ecosystem is the seasonal fluctuation in forage availability and quality due to modal rainfall patterns (Garba and Ibrahim, 2019). During the dry season, forage yield and quality reportedly decline drastically, for both cultivated pastures and natural pastures (Phelan *et al.*, 2015).

Cassava peels meal is cheap and readily available, by-product of cassava processing contains 5% crude protein, 5.8% fat, 9.5% crude fibre, 7.2% ash and 2036 kcal Metabolizable energy (Gboshe and Ukorebi, 2020). Exploitation of cheap feed resources for animal production would lower the market price of animals and their products in Nigeria (Ocheja *et al.*, 2023). The relationship between nutrition and reproduction is a topic of increasing importance and concern among farmers, veterinarians, feed dealers and extension workers. The interaction between nutrition and reproduction has long been known to have important implications for the reproductive performance of animals (Butler, 2000; Shettima *et al.*, 2024). The efficiency of sperm production, libido and quality of sperm tend to remain uniform throughout the reproductive life of an animal but may be significantly altered by age, nutrition, environment, health status, drugs and chemicals (Ahemen *et al.*, 2016) and among these factors nutrition is the most prominent. Testosterone profile and testicular parameters are indications of the male animal libido and reproductive performance (Itodo *et al.*, 2022).

The aim of this study therefore was to evaluate the testosterone profile and testicular morphometry of red Sokoto bucks fed diets containing graded level of cassava peels meal as supplement to neem leaves.

MATERIALS AND METHODS

Experimental site

The study was conducted at the Teaching and Research Farm, Faculty of Agriculture, Federal University of Kashere in Gombe State. The state is situated within latitude 9°54'46N and longitude 9° 46'27E and 10°57' E and altitude of 349m above sea level. The annual rainfall of Kashere ranges between 800mm-900mm per annum and is characterized by distinct dry season (October-May) and rainy season (June-September) seasons. The

annual mean temperature ranges from 30-32° C and it experiences a relative humidity of 17-90% (National Geospatial Intelligence Agency, 2019).

Experimental Animal and their Management

Sixteen (16) Red Sokoto bucks aged between 8-9 months were sourced from Kashere Market and housed in individual pens for one week for acclimatization. They were randomly allocated into four (4) Treatments of four (4) goats each (T1, T2, T3 and T4). The Experimental animals were treated with antibiotic (Oxytetracycline L.A) at 1ml/10kg body weight and Ivermectin injection at 1ml/50kg live weight to control ecto and endo-parasites; and bacterial infection prior to the commencement of the experiment.

Experimental Diets

The feed ingredients consist of Bambara nut shell meal, Cassava peel meal (CPM), Groundnut cake (GNC) Maize offal (MO), Egg shell meal (ESM), and Table salt (TS). These components were thoroughly mixed together after pounding and grinding.

Table 1 Composition of Experimental Diet (%)

Ingredient	% T1	% T2	% T3	% T4
Groundnut Cake	25.00	25.00	25.00	25.00
Bambara nut shell meal	15.00	10.00	5.00	0.00
Cassava peel meal	0.00	5.00	10.00	15.00
Maize offal	58.00	58.00	58.00	58.00
Egg shell meal	1.00	1.00	1.00	1.00
Table salt	1.00	1.00	1.00	1.00
Total	100.00	100.00	100.00	100.00
Calculated nutrient content				
Crude Protein %	18.54	18.54	18.49	17.63
Crude Fibre %	13.84	13.12	12.92	12.72
Metabolizable Energy Kcal/kg diet	3182	3145	3150	3122

Chemical Analysis

Samples of the experimental diets, cassava peels meal and neem leaves were analyzed for their proximate composition using the method outlined by AOAC (2000).

Experimental Procedure

The Bucks were randomly allocated into four (4) treatments after balancing the weight; each treatment had four (4) replicates. Treatment one (T1) contained 0.00% level of cassava peels meal; treatment two (T2) was 5.00% level of cassava peels meal; treatment three (T3) was 10.00% level of cassava peels meal and Treatment four (T4) was 15.00% level of cassava peels meal.

The neem leaves were offered at 300g/buck/day, followed by the concentrate 250g/buck/day 2hours later, and the left over were also weighed and subtracted from the quantity of feed that was served to determine the feed intake of the animal. The experiment lasted for fifty (50) days, after an adjustment period of 7 days.

Testosterone and Testicular Morphometry

At the last day of the feeding trial, blood samples for testosterone analysis were collected via the jugular vein from all the experimental animals using 5ml syringes and needles; and were transferred into a test tube without anticoagulant for testosterone analysis. The blood samples for testosterone analyses were kept at a temperature of 25-26°C for 15 minutes for the blood to clot. The samples were centrifuged at 3000r for 10minutes and the serum samples obtained were refrigerated at -25°C until analysis, testosterone concentrations were determined as described by Oda and Waheeb, 2017.

At the end of the experiment, two bucks from each group were humanely sacrificed, the testes were removed by incising through the investments of the testis, which were; the skin of scrotum, *dartos fascia*, external spermatic fascia (from external oblique muscle), cremaster muscle and its fascia (from internal oblique muscle), internal spermatic fascia (from *transversalis fascia*), *tunica vaginalis* (parietal layer from peritoneum), and *tunica vaginalis* (visceral layer). The length, weight and volume of each testis were determined using a measuring tape, digital weight balance and water displacement method, respectively and the values recorded. Each testis had the tunica albuginea delicately removed with a scalpel blade (Rekwot *et al.*, 1994).

Experimental Design and Statistical Analysis

The experimental Design was Completely Randomized Design (CRD). Data obtained was analyzed using a one-way Analysis of variance (ANOVA), means with significant differences were separated using Least Significant Differences (LSD) with the aids of Statistical Packages identified as Statistical Analysis System (SAS) version 9.04, 2018.

RESULTS AND DISCUSSION

Proximate Composition of Concentrate diets, Neem Leaves and Cassava Peels Meal

Proximate composition of experimental diets, cassava peel meal (CPM) and neem leaves is presented in Table 2. The crude protein values of about 18% for the experimental diets fell within the values of 12.00-18.00% recommended for growing ruminants in the tropics (NRC, 2001) and also above the critical values of 8% required to provide adequate ammonia for normal rumen functions (Lakpini, 2002).

The crude fibre (CF) and Nitrogen free extract (NFE) were within recommended values (Lakpini, 2002). The low levels of NFE in the neem leaves will be compensated for by the high value of NFE in the CPM. The ash content of the experimental diets was within the recommended values reported by (Arigbede *et al*, 2012).

Table 2: Proximate Composition of Concentrate diet Neem Leaves and Cassava Peel Meal (%DM)

(%DM Nutrient)	T1	T2	T3	T4	Neem Leaves Cassava Peel Meal	
Crude Protein	18.3	18.1	18.05	18	9.4	6.5
Crude Fibre	12.8	12.85	12.89	12.9	19.01	10.42
NFE	61.2	60.36	60.96	60.51	59.69	71.98
Ether Extract	3.5	3.1	3	3	2.5	2.8
Ash	4.2	4.95	5.1	5.59	9.4	8.3

Table 3: Testosterone and Testicular Morphometry of Experimental Bucks

Testosterone and Testicular Morphometry of growing Red Sokoto bucks fed diets containing graded levels of Cassava Peels Meal is presented in Table 3. Testosterone and Testicular morphometry parameters were not significantly ($P > 0.05$) different across the groups. The values obtained for length, weight and volume of the testis were not statistically ($P > 0.05$) significant. This finding agrees with the findings of Lakpini *et al.*, (1997), who fed diets containing graded levels of cassava peels meal to pregnant Red Sokoto goats and reported that it had no negative effects on live body weight and pregnancy. The findings of this work disagrees with the findings of Ojebiyi *et al.* (2015), who fed diets containing processed cassava peel/blood meal mixtures to rabbit bucks and reported that it had negative effects on reproductive potentials of rabbit bucks.

Table 3: Testicular Morphometry and Testosterone Profile of Experimental Bucks

Testicular Parameters	Treatments								SEM
	T1		T2		T3		T4		
	RT	LT	RT	LT	RT	LT	RT	LT	
Length (cm)	6.75	7.5	6.75	7.5	6.65	7.0	6.55	7.0	0.45
Plenght (cm)	14.25		14.25		13.65		13.55		0.45
Weight (g)	29.75	30.35	29.65	30.30	29.55	30.25	29.45	30.25	4.09
Pweight (g)	60.1		59.95		59.80		59.70		4.09
Volume (ml)	22.50	23.30	22.50	23.30	22.40	23.00	22.40	23.00	1.84
Pvolume (ml)	45.80		45.80		45.40		45.40		1.84
Testosterone (ng/ml)	1.28		1.18		1.08		1.08		0.17

Means in the same row did not differ significantly ($P > 0.05$); PL = Paired length, PW = Paired weight, PV = Paired volume, RT = Right testis, LT = Left testis, SEM = Standard error of the mean.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Cassava peels meal in the concentrate diet of Red Sokoto bucks had no adverse effect on testosterone profile and testicular morphometry. Inclusion of graded levels of cassava peels meal up to 15% is safe for male reproduction.

Recommendations

Cassava peels meal can be used in supplement diets for Red Sokoto bucks from 5% - 15% level of inclusion. Further research using other breeds of goat is also recommended.

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