

EFFECT OF MORINGA OLEIFERA LEAF MEAL BASED DIET ON TESTICULAR HISTOLOGY OF KANO BROWN BUCKS

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ABSTRACT

A study was conducted to determine the effect of *Moringa oleifera* leaf meal based diet on testicular histology of Kano brown bucks. Twenty (20) Kano Brown bucks aged 10-12 months with average weight of 12.5 ± 1.07 kg were used for the study. The animals were allotted to five dietary treatments in a completely randomized design with four animals per treatment; each animal within a group was housed individually. Animals on treatment one (T₁) were fed the control diet (no *Moringa oleifera* leaf meal supplementation). Animals on treatments two, three, four and five were offered 5, 10, 15 and 20% *Moringa oleifera* leaf meal designated as T₂, T₃, T₄ and T₅ respectively. The experiment lasted for 84 days, at the end of the study, two bucks from each treatment were orchidectomized for testicular histology for both left and right testes, Result of histological examination of the testis reveals alterations in the structural patterns of both testicular tissues when fed with *Moringa oleifera* leaf meal based diet at different inclusion level. From this study, it was concluded that feeding *Moringa oleifera* leaf meal based diet up to 20% inclusion level may have a detrimental effect on testicular histology of Kano Brown bucks; hence, it is recommended that Bucks could be fed up to 5% *Moringa oleifera* leaf meal inclusion level without deleterious effects.

INTRODUCTION

Reproductive performance of the male is an essential economic trait in the management of breeder stock and the evaluation of the ejaculate is an important aspect of the determination of the reproductive status of male animals (Nwoko and Ibe, 2005). It is important to understand and improve the reproductive performance of small ruminants in Nigeria, in order to select bucks of high fertility and for the purpose of using ejaculate that can be relied upon to give a high conception rate for artificial insemination program and increased productivity. Reproduction is one of the main factors which determine the overall productivity of the goat enterprise. It is important that goat keepers are able to manage the reproduction of their goats according to their own objectives, the availability of feed, and the demands of the market. Reproduction dictates not only the rate of expansion of the flock and the number of excess stock for sale, but also the availability of milk for home consumption and sale. It is possible for goat farmers to exert enough control to determine when their goats start breeding, how often they breed and, if required, what season they give birth.

A large number of plants have been tested throughout the world for possible fertility regulatory properties (Bhatia *et al.*, 2010). Some medicinal plants are extensively used as aphrodisiac (agents that arouse sexual desires) to relieve sexual dysfunction, or as fertility enhancing agents. They provide a boost of nutritional value thereby improving sexual performance and libido (Yakubu *et al.*, 2007; Sumalatha *et al.*, 2010). Therefore, the need to feed and evaluate *Moringa oleifera* leaves in Kano Brown bucks with a view to improve the nutritional status thereby leading to improved reproductive performance. Hence, the study was conducted to evaluate the effect of *Moringa oleifera* leaf on semen characteristics, testicular morphometry and histology of Kano Brown bucks.

MATERIALS AND METHODS

Study area

The study was conducted at Teaching and Research Farm of the Department of Animal Science Kano University of Science and Technology, Wudil, Kano State. Wudil is located on latitude 11° 37'N and longitude 8° 58'E and at an altitude of 403 m above sea level within the Sudan savannah region of Nigeria. The annual rainfall ranges from 850 mm – 870 mm with minimum and maximum temperature of 26°C and 36°C, respectively. The relative humidity of the region is always low and ranges between 40% - 51% (Olofin *et al.*, 2008).

Experimental animals and their managements

Twenty (20) Kano Brown bucks aged 10-12 months with an average weight of 12.5 ± 1.07 kg were used for the study. The age was determined by the use of dental eruption pattern as described by Gillespie (2004), the animals were obtained from Wudil weekly local livestock market in Kano State.

The animals were treated for endo and ecto parasites using albendazole (3ml/head) and acaricide (Asuntol), respectively. Antibiotic prophylaxis using oxytetracycline (long acting at 10mg/kg body weight) was given. Animals were housed in clean and disinfected pens and fed their experimental diets in groups for two weeks adaptation period. They were fed with the experimental diets in the morning at 08 hours and in the afternoon at 14 hrs. Basal diet of *Cynodon dactylon* (Kirikiri) and water were provided *ad libitum*. The feeding trials lasted for 84 days (12 weeks). The experimental diets were made of *Moringa oleifera* leaves, cowpea husk, wheat offal, maize offal, bone meal and salt.

Experimental diets

The *Moringa oleifera* (Mo) leaves were sourced from the local markets; air dried and evaluated for proximate composition prior to feed formulation. The other ingredients were sourced from Kurmi market around Kano. Five diets were formulated as follows T1=0% Mo leaf meal, T2=5% Mo leaf meal, T3=10% Mo leaf meal, T4=15% Mo leaf meal and T5=20% Mo leaf meal inclusion levels respectively. The animals were allotted to five dietary treatments in a complete randomized design with four animals per treatment; each animal within a group is housed individually

Experimental procedure

Testicular histopathology determination

At the end of the trial, two bucks from each treatment were randomly selected, restrained and orchidectomized for testicular morphology and histopathology as described by (Hassan *et al.*, 2016). The orchidectomy was done after the animals were placed on dorsal recumbency and restrained by an assistant. The testes were held firmly and liberal area of the caudal part of the scrotum were cleaned with soap and water, shaved and disinfected with chlorhexidine. Two ml of local anesthesia (lidocaine) was infiltrated longitudinally to block the nerve sensation. An incision was made on the scrotum through the tunica albuginea; the testicles were milked out of the incision site. The spermatic cord was exposed, ligated and incised. The subcutaneous tissues were closed with haemostatic forceps and then ligated with size 2/0 chromic catgut and the skin was sutured with nylon. Two ml of antibiotic (pen-strep) was given intra muscularly; diclofenac sodium sulphate and multivitamin were administered at 10 mg per kg body weight while oxytetracycline blue spray was sprayed on the suture immediately and daily for 5 days. The black silk was removed one-week post orchidectomy. The testes were put into a beaker containing 10% formaldehyde solution and then taken to histopathology laboratory of the Department of Veterinary Medicine, Ahmadu Bello University, Zaria for testicular histopathology.

Proximate composition of *Moringa oleifera* (Mo) leaf and the experimental diet

The results of proximate composition of *Moringa oleifera* leaf is shown in Table 1. The Mo leaf was rich in crude protein (23.05%), ash (9.50%), crude fiber (9.08%), dry matter (72.65%) and ether extract (10.73%). The percentage inclusion level and proximate composition of the experimental diets fed to the bucks are presented in Table 2. The crude protein of the diets increases with increased level of Mo leaf meal while that of treatment 4 proportionately reduced. It was observed from the analyzed composition of the diets that as the level of Mo leaf increased, the values of dry matter, oils, and nitrogen free extracts reduced. However, the level of crude fibre increased slightly across the dietary treatments.

Testicular histology of Kano Brown bucks fed *Moringa oleifera* leaf meal based diets at different inclusion level

The result of testicular histology of Kano Brown bucks fed *Moringa oleifera* leaf meal based diets is presented in plates 1-5. The left and right testes, showed some alterations in the histological structural patterns in the testes progressively as the level of *Moringa oleifera* increased across the treatments. The left and right testes, showed some alterations in the histological structural patterns in the testis. Abnormalities observed in testicular tissues were intense intercellular spaces, edema between seminiferous tubule with few spermatids, degenerated seminiferous tubules, and high amount of necrotic cell in the lumen compared with control treatment. This shows that *Moringa* leaf has contraceptive effects in the male bucks. Paul and Didia (2012) had earlier reported the deleterious effect of the root extract on the testis. Traditional and early experimental reports have implied that this plant product has fertility influencing effects such as being abortifascient (Nath *et al.*, 1992; Tarafder 1983), and as a birth control (Shukla *et al.*, 1988; Faizi *et al.*, 1988). While *Moringa* leaf extract would produce deleterious effects on the testis; it has been reported to ameliorate certain induced deleterious

effects on the same organ by certain other agents such as diabetes induced testicular damage (Ebong, 2014); mercury (Asomugha, 2014) and alcohol-induced testicular toxicities (Bassey *et al.*, 2013).

CONCLUSION AND RECOMMENDATION

The result obtained from the study indicated that feeding *Moringa oleifera* leaf meal based diet up to 20% inclusion level have a detrimental effect on testicular histology. Hence, it is recommended that Bucks could be fed up to 5% *Moringa oleifera* leaf meal inclusion level without deleterious effects. Further investigations should be carried out on feeding bucks with varying inclusion level of *Moringa oleifera* over long period of time to assess its effects on testicular tissues and spermatogenesis at these levels.

Table 1: Proximate composition of *Moringa oleifera* leaf

Parameter (%)	Value
Dry matter	72.65
Crude protein	23.05
Crude fibre	9.08
Ether extract	10.73
Ash	9.50
Nitrogen free extract	20.28

Testicular histology photomicrograph

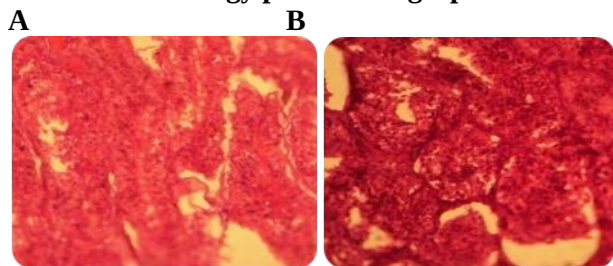


Plate 1: Photomicrograph of left (A) and right (B) testes of Kano Brown Bucks on 0% (control) *Moringa oleifera* leaf meal based diet (H and E x 400)

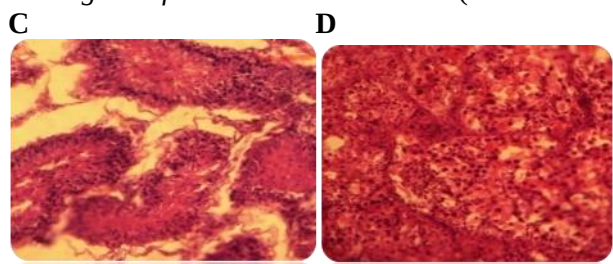


Plate 2: Photomicrograph of left (A) and right (B) testis of Kano Brown Bucks on 5% (T2) *Moringa oleifera* leaf meal based diet (H and E x 400)

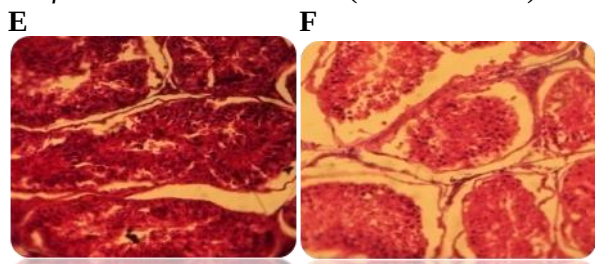


Plate 3: Photomicrograph of left (E) and right (F) testis of Kano Brown Bucks on 10% (T3) *Moringa oleifera* leaf meal based diet (H and E x 400)

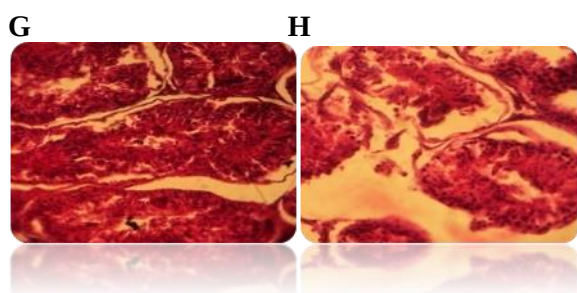


Plate 4: Photomicrograph of left (G) and right (H) testis of Kano Brown Bucks on 15% (T4) *Moringa oleifera* leaf meal based diet (H and E x 400)



Plate 5: Photomicrograph of left (I) and right (J) testis of Kano Brown Bucks on 20% (T4) *Moringa oleifera* leaf meal based diet (H and E x 400)

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