



ORGAN HISTOPATHOLOGY AND TOTAL PROTEIN CONCENTRATIONS IN EPIDIDYMAL / TESTICULAR FLUIDS OF RABBIT BUCKS FED KOLANUT HUSK MEAL AS REPLACEMENT FOR MAIZE

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Abstract

A total of forty cross bred weaned rabbit bucks (5-6 weeks old) were used to determine the effect of replacing maize with kolanut husk meal (KHM) on the organ histopathology, epididymal and testicular fluids protein concentrations. The rabbits were assigned to the test diets using a completely randomized design (CRD) after weight equalization. There were five treatments with eight bucks per treatment. The dietary treatments were designated as T₁, T₂, T₃, T₄ and T₅ containing 0, 20, 40, 60, and 80% replacement levels of kolanut husk meal for maize, respectively. The rabbits were allowed to adjust for two (2) weeks in the rabbitry before the commencement of the experiment. After the adjustment period, the animals were subjected to six weeks feeding trial after which the histopathology of organs as well as epididymal and testicular fluids protein concentrations and were determined. All data obtained from the epididymal and testicular protein concentrations were subjected to one-way analysis of variance. Results showed the gross appearance of the organs (kidney, liver and spleen) from rabbits fed replacement levels KHM for maize to have normal histopathological architecture without obvious abnormalities when compared with the tissues from rabbits fed the control diet. There were no significant differences ($P>0.05$) in the total protein concentrations of epididymal and testicular fluids of rabbit bucks. The study concludes that kolanut husk meal can replace maize up to 80% in diets meant for rabbit bucks without any deleterious effects on organs and total protein concentrations in the testicular and epididymal fluids.

Key words: Kolanut, rabbits, organs, fluids, protein

Introduction

One of the challenges facing livestock industry in Nigeria is the high cost of feeds and feeding stuffs which has led to closure of some livestock enterprises. The use of agro-industrial by-products (AIBs) has been one of the panaceas to high feed cost and the use of different AIBs such as pineapple waste, bambara waste, groundnut waste, poultry waste (chicken offal), rice bran, castor bean, rumen content, sunflower seed cake, shrimp waste meal have been reported (Hamzat *et al.*, 2004). In order to increase the animal protein intake, there is need for expansion of the livestock industry which is the main source of animal protein. This development has led to the renewed interest in micro livestock production. The increasing demand for animal protein has encouraged greater interest in the production of fast growing animals like rabbits with short generation interval. Domestic rabbit production which was neglected in the past has the potential of becoming an important source of animal protein (24.7g) of macronutrients, 6.8g of fat which accounts for 37% of calories compared with beef and pork. Rabbit meat also contain vitamin B₁₂ (17.6%), vitamin B₃ (35.8%) and selenium, a mineral for antioxidants and stimulation of sperm production (Hamzat *et al.*, 2004). With the constant threat of hunger/malnutrition in developing countries like Nigeria, there is an urgent need to source for non-conventional or alternative feedstuffs within our respective localities for incorporation into the diets of our farm animals at least cost. Such alternative feedstuffs should not be in great demand as human food or have any industrial use and should be readily available and not subjected to the dictates of season (Agiang *et al.*, 2004). Hence, this study determined the effect of replacing maize with kola nut husk meal on the organ histopathology and total protein concentrations in epididymal/testicular fluids of rabbit bucks.



Material and methods

The study was carried out at the rabbitry unit of the Teaching and Research Farm, University of Calabar, Calabar, Cross River State, Nigeria. Freshly broken kola nut pod husks were collected from local farmers at Akpabuyo Local Government of Cross River State. The broken pods were washed and sundried to constant weight after which they were bulked and milled to obtain kola nut husk meal (KHM). Five experimental diets were formulated with kola nut husk meal (KHM) replacing maize at 0, 20, 40, 60, and 80% levels in T₁, T₂, T₃, T₄ and T₅, respectively. A total of forty cross bred weaned rabbit bucks (5 - 6 weeks old) were used in this study with eight bucks per treatment assigned after weight equalization using a completely randomized design (CRD). The rabbits were housed individually in wooden cages measuring 76 x 62 x 42cm and raised 25cm from the ground and placed in a standard rabbitry. Basic drinking and feeding troughs were provided in each cage. The rabbits were allowed to adjust for two (2) weeks before the commencement of the experiment and within this period there were placed on the control diet. After the adjustment period, the animals were subjected to six (6) weeks feeding trial after which the epididymal and tubal protein concentrations and gross histopathology of internal organs (liver, kidney and spleen) were determined using standard laboratory methods.

Results

Results of the gross histopathology of the kidney, liver and spleen are summarized in Table 1, while the respective photomicrographs are presented in plates 1-15. The gross appearance of all the organs from rabbits fed KHM as replacement for maize showed normal histopathological arrangements without obvious abnormalities when compared with the tissues from rabbits fed the control diet.

Table 1: Gross histopathology of the kidney, liver and spleen of rabbits fed KHM diets

Dietary treatment	Kidney	Liver	Spleen
T ₁ (0 % KHM)	showed normal appearance of the kidney section. No pathological lesions were seen.	Normal appearance of liver section, with sheets of connective tissue dividing the liver into many small units (lobules).	Normal appearance of spleen tissue showing a spleen section with white and red pulps with connective tissues.
T ₂ (20 % KHM)	The section normal showed glomerular, containing tubules and other vessels.	Section showed normal appearance of the liver tissue with normal cellularity of the nucleus.	Normal appearance of spleen tissue
T ₃ (40 % KHM)	The kidney section glomerulus and other components with normal cellularity of the nuclei.	Section showed liver tissue with prominent central vein, with normal sinusoids and hepatocytes.	Section showed spleen section with normal cellularity of the component cells..
T ₄ (60 % KHM)	Kidney section showed normal staining intensity of the cytoplasm and nuclei..	Normal appearance of a liver section showed normal parenchymal cell of the liver hepatocytes.	Histological section of splenic tissue showed normal network of reticular tissue.
T ₅ (80 % KHM)	Normal appearance of the kidney section with no level of abnormality seen.	Normal cellularity of the nucleus. No pathological lesions seen.	A normal spleen tissue. Both the white pulp and red pulp appeared normal.



The photomicrographs ($\times 100$ magnification) were as follows:

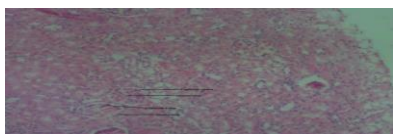


Plate 1: Kidney from T₁ (0% KHM)



Plate 2: Kidney from T₂ (20% KHM)

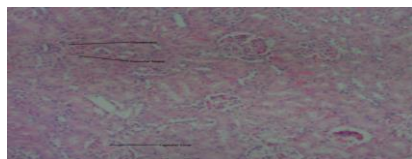


Plate 3: Kidney from T₃ (40% KHM)

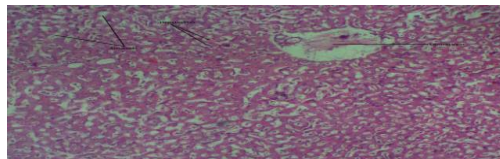


Plate 4: Kidney from T₄ (60% KHM)

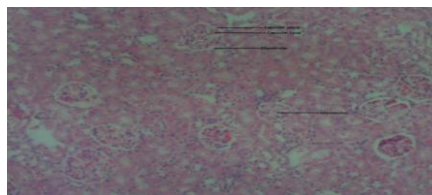


Plate 5: Kidney from T₅ (80% KHM)

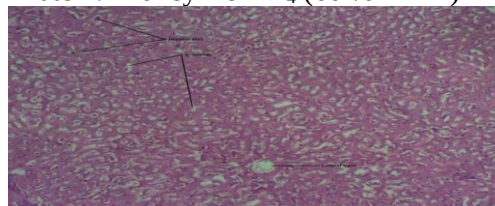


Plate 6: Liver for T₁ (0% KHM)

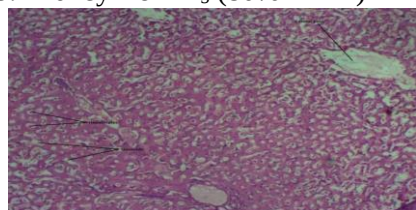


Plate 7: Liver from T₂ (20% KHM)

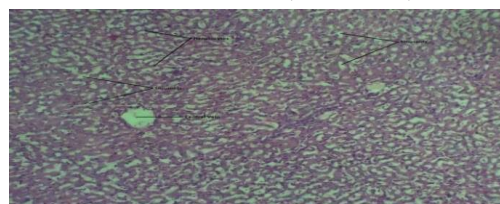


Plate 8: Liver from T₃ (40% KHM)

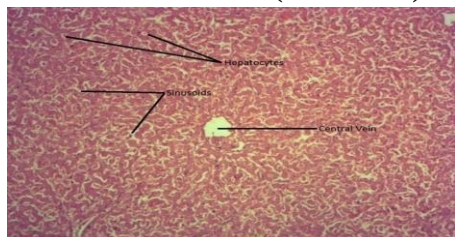


Plate 9: Liver from T₅ (80% KHM)

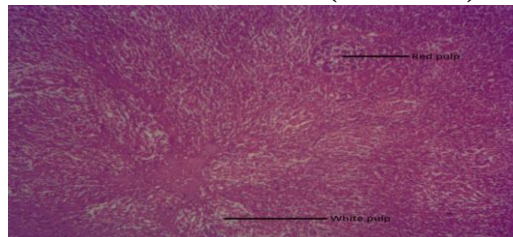


Plate 11: Spleen from T₁ (0% KHM)

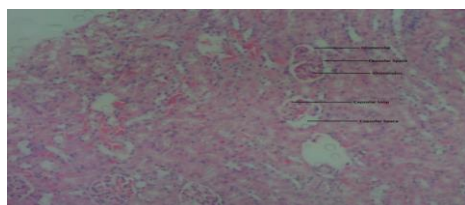


Plate 10: Liver from T₃ (60% KHM)

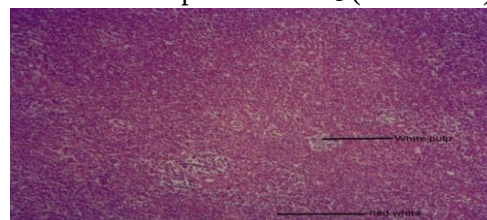


Plate 13: Spleen from T₃ (60% KHM)

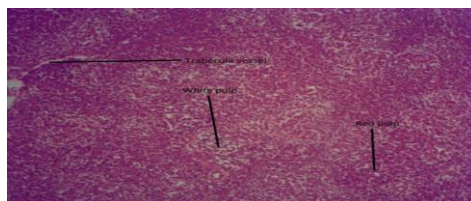


Plate 12: Spleen from T₂ (20 % KHM)

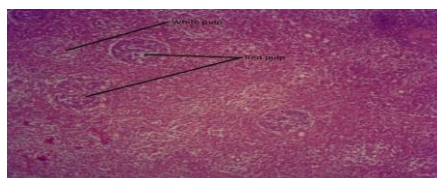


Plate 14: Spleen from T₄ (60 % KHM)

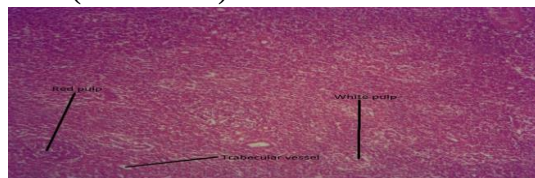


Plate 15: Spleen from T₅ (80% KHM)

The results of the total protein concentrations in the testicular and epididymal fluids of rabbit bucks fed kolanut husk meal based diets are summarized in Table 2. There were no significant differences ($P > 0.05$) in the testicular and epididymal fluids total protein concentrations of rabbit bucks.

Table 2: Total protein concentrations in testicular and epididymal fluids of rabbit bucks

Parameter (g/100ml)	T ₁ 0%	T ₂ 20%	T ₃ 40%	T ₄ 60%	T ₅ 80%	SEM
Testicular fluid	5.87	6.07	5.13	5.07	5.10	2.35 ns
Epididymal fluid	5.70	2.10	2.10	5.23	5.30	2.33 ns

Discussion

The outcome of the histopathological evaluation of kidney, liver and spleen of rabbits fed diets containing kolanut husk meal (KHM) (Table 1) and the photomicrographs (plates 1-15), revealed that there was no major damage to the organs evaluated histopathologically. Treatments showed normal appearance of the kidney sections with equally normal cellularity of the glomerulus and no pathological lesions found. The sections also showed glomeruli, containing tubules and other vessels. Also the gross examination affirmed that the kidney sections showed normal staining intensity of the cytoplasm and nuclei with no noticeable vacuole or displacement of the nuclei. The liver showed normal appearance with sheets of connective tissue and also with the histological section of splenic tissue showing network of reticular tissue, indicating normal general tissue architectural structures with no noticeable inflammatory exudates. Findings in this study have affirmed that kolanut husk meal has no significant effect ($P > 0.05$) on the total protein concentrations in the testicular and epididymal fluids (Table 2). Result for testicular fluid for this study (5.07 - 6.07g/100ml) was higher for T₂ and lower in T₅. This perhaps indicated that kolanut husk diet has no adverse effect on testicular fluid. This present finding was in line with that of Bakshi *et al.* (2006) who reported a range of 5.20-5.90g/100ml as protein concentration in testicular fluids of rabbits fed neem leaf meal while total protein concentrations in epididymal fluids in the present study appear to be in agreement with the report of Bitto *et al.* (2006) who fed rabbit bucks with pawpaw peel meal without any deleterious effects.

Conclusion and recommendation

Results obtained from this study have shown that the epididymal and testicular fluid protein concentrations as well as histopathology of some organs (liver, kidney and spleen) were not impaired by the replacement of maize with kolanut husk meal (KHM) in diets. It is therefore, recommended that up to 80% kolanut husk meal KHM could replace maize in the diets of rabbit bucks without fear of compromising reproduction and internal organ physiology of the animals.



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