

EFFECTS OF PARTIAL REPLACEMENT OF SOYBEAN MEAL WITH CASHEW NUT MEAL ON HAEMATOLOGICAL INDDICES AND SERUM BIOCHEMICAL PROFILE OF WEANED RABBITS

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ABSTRACT: *Effects of partial replacement of soybean meal with cashew nut meal on haematological indices and serum biochemical profile of weaned rabbits were investigated using 30 weaned rabbits. The rabbits were allocated to 5 dietary treatments. Treatment was replicated thrice using two rabbits per replicate in a Completely Randomized Design (CRD). Five diet were formulated which contained 0% (control), 5, 10, 15 and 20% of cashew nut meal. The trial lasted for four (4) weeks. Results of haematological indices showed that the partial replacement of soybean meal with cashew nut meal resulted in a significant ($P < 0.05$) difference in all the haematological indices and serum profile across the dietary treatments. Rabbits on diet 3 recorded the highest value of Packed Cell Volume while the lowest value (25.50 %) obtained for PVC was noticed in rabbits fed diet 5. The highest RBC (7.29%) was obtained for rabbits fed diet 2 while the lowest RBC (4.25%) was recorded for rabbits fed diet 5. The highest white blood cell of (5.10%) was recorded for rabbits on diet 1 while the lowest WBC of (4.85%) was obtained in diet 4. The highest haemoglobin value of (14.90%) was recorded for rabbits on diet 3 while the lowest haemoglobin value of (8.60%) was recorded for rabbits fed diet 2. Serum biochemical profile of rabbit showed that the Total Protein, Albumin, Globulin and Creatinine shows no significant ($P < 0.05$) different while aspartate amino Transferase (AST) and alamine amino transferase (ALT) were significantly influenced by dietary ($P > 0.05$) treatment. Rabbit fed diet 3 recorded highest total protein (5.03g/dl) while the lowest total protein value (4.31g/dl) was obtain for rabbits fed diet 1. The highest value of Albumin (2.01g/dl) was obtained for rabbits fed diet 5 while the lowest value (1.12g/dl) was recorded for rabbits fed diet 2. Rabbits fed diet 3 recorded the highest Globulin value (3.73g/dl) while the lowest value (2.96g/dl) was obtained for rabbits fed diet 5. It can be concluded that cashew nut meal can be fed to rabbits without having any adverse effect on haematological indices and serum biochemical profile of weaned rabbits.*

KEYWORDS: haematology, cashew nut meal, weaner rabbit

INTRODUCTION

Studies have shown that there is a general famine of protein supply especially of animal origin in the tropics (8). Animal protein is one of the most important components of human diet and its consumption varies from country to country. The level of consumption and production of meat in Nigeria is very low (5,6). Rabbit production like poultry has the potential of improving animal protein consumption by humans in the developing countries including Nigeria (3). The rabbit business is no doubt one of the most attractive fields of agriculture which is witnessing unprecedented acceptance; this is brought about by increasing and persistent demand for rabbit's products such as meat, pelt or fur. Rabbits have a high feed conversion ratio and are efficient converter of plant product and seeds. However, there is the need to urgently incorporate non-conventional feed stuff in rabbit diet for optimum performance and reduction in cost of production to make rabbit consumption viable and solve the problem of scarce and expensive conventional feed stuff. It has become imperative to turn attention to the exploitation of other legumes, particularly those indigenous to the tropics that are non-conventional, relatively cheap and available when compared with conventional feed stuff like groundnut cake, Soya bean which are the main plant protein source for monogastric and are very expensive due to competition between man and livestock

Such alternatives should have comparative nutritive value but cheaper than the conventional protein sources. They should also be available in large quantities. One of such alternatives is cashew nut meal (7). According to Fetuga *et al.* (1974), only about 60-65% of the total cashew production in Africa is utilized while the rest are discarded. (1) observed that cashew nut meal has the following proximate composition viz: protein, 40.9%; fat 1.30%; crude fibre, 1.50%, Calcium, 0.06%; Phosphorous, 1.72%; Ash, 5.30%; Iysine, 0.86%; Methionine, 0.35%; Cystein, 0.32% and Tryptophan, 0.29%.

MATERIALS AND METHODS

Experimental site: The experiment was carried out in the rabbitary unit of teaching and research farm of Oyo State College of Agriculture And Technology, Igboora which is located within 7°15' North and 3° East of the equator with annual temperature of 27°C (9).

Experimental ingredients: Cashew nut was procured from the cashew nut processing company limited Ilorin, Kwara State, and sundried for one week.

Cashew nut processing: The processing of cashew nut as done industrially at the cashew nut processing company "OLAM Nigeria Limited", Ilorin, Kwara state

Experimental animals and management: A total of (30) weaner rabbits were used for the experiment, they were randomly assigned to five dietary treatments of six rabbits each in a completely Randomized design (CRD), each group was divided into three replicate of two animals each. The diets were formulated such that diet 1 had 0% CNM, diet 2 had 5% CNM, diet 3 had 10% CNM, diet 4 had 15% CNM and diet 5 with 20% CNM.

The rabbits were assigned to individual pen and dietary treatment was given to them on commencement of feeding trial. The animals were acclimatized for a period of one week using commercial diet to feed the animals before which the dietary treatment was introduced.

Table1: Proximate composition of cashew nut meal.

Nutrients	Value
Crude protein (%)	22.7
Crude fiber (%)	4.50
Dry matter (%)	99.41
Ether extract (%)	5.67
Ash (%)	2.11
Moisture content (%)	0.59
Nitrogen free extract (%)	64.43
Energy (MeKcal/kg)	3591

Table 2: Gross composition of experimental diets (CNM)

Percentage	0% T1	Replacement 5% T2	Levels 10% T3	15% T4	20% T5
Ingredients					
Maize	44.0	43.07	42.1	41.16	40.23
Soybean meal	19.25	18.29	17.32	16.36	15.40
Wheat offal	1.51	1.51	1.51	1.51	1.51
CNM	0.00	1.89	3.83	5.73	7.64
Rice bran	24.59	24.59	24.59	24.59	24.59
PKC	6.5	6.5	6.5	6.5	6.5
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.65	1.65	1.65	1.65	1.65
Salt	0.25	0.25	0.25	0.25	0.25
Grower premix	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Determined analysis					
Crude protein (%)	15.51	15.42	15.34	15.25	15.17
Crude fibre (%)	12.03	12.04	12.05	12.053	12.06
Ether extract (%)	5.67	5.67	5.67	5.67	5.67
Calcium (%)	0.100	0.102	0.093	0.093	0.098
Phosphorus (%)	0.300	0.318	0.341	0.370	0.394
Ash (%)	4.37	4.35	4.34	4.32	4.29
Energy (MEKcal/kg)	2524.67	2533.85	2544.00	2554.05	2564.08

Key: CNM- Cashewnut meal, PKC-Palm kernel cake

Blood collection

At the end of the 6th week, three rabbits per treatment were randomly selected for hematological parameters and serum analysis 3ml of blood were collected using sterilized needle and syringe through the heart (left side) of the animal into vials containing Ethylene Diamine Tetra Acetic Acid (EDTA) bottles and plane bottle for hematological and serum analysis respectively and are transported to laboratory.

Haematological parameters include: packed cell volume, red blood cell, white blood cell, haemoglobin, eosinophil, neutrophil, lymphocyte monocyte platelets

Serum biochemical profile parameters determined include: albumin, globulin, total protein, creatinine, AST, ALT

Statistical analysis

All data collected were subjected to Analysis of Variance (ANOVA) using Statistical Package System Software (1999) and where differences exist between the means Duncan's Multiple Range Test used to separate the means at 5% level of probability.

RESULTS AND DISCUSSION

There were significant ($P < 0.05$) difference in the haematological parameters measured across the dietary treatments. Results of haematological indices showed that the partial replacement of soybean meal with cashewnut meal resulted in a significant ($P < 0.05$) difference in all the haematological indices and serum profile across the dietary treatments. Rabbits on diet 3 recorded the highest value of Packed Cell Volume while the lowest value (25.50 %) obtained for PVC was noticed in rabbits fed diet 5. The highest RBC (7.29%) was obtained for rabbits fed diet 2 while the lowest RBC (4.25%) was recorded for rabbits fed diet 5. The highest white blood cell of (5.10%) was recorded for rabbits on diet 1 while the lowest WBC of (4.85%) was obtained in diet 4. The highest haemoglobin value of (14.90%) was recorded for rabbits on diet 3 while the lowest haemoglobin value of (8.60%) was recorded for rabbits fed diet 2

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Table 3: Haematological parameters of weaner rabbits fed cashewnut meal

Parameters	T1	T2	T3	T4	T5	SEM
PVC (%)	33.00 ^b	27.00 ^d	42.00 ^a	31.00 ^{bc}	25.50 ^e	2.60
HB (g/dl)	11.70 ^b	8.60 ^e	14.90 ^a	10.50 ^{bc}	9.20 ^d	0.10
RBC(10 ⁶ u/l)	5.22 ^b	4.31 ^{cd}	7.29 ^a	4.67 ^c	4.25 ^e	0.50
WBC (10 ³ u/l)	5.10 ^a	2.50 ^{cd}	4.98 ^{ab}	1.60 ^e	2.85 ^c	0.62
Lymp (%)	66.00 ^a	55.00 ^e	62.50 ^c	64.00 ^b	59.00 ^{cd}	1.74
Neutrol (%)	39.00 ^b	41.50 ^a	33.00 ^{de}	34.00 ^d	37.00 ^c	1.40
Mono (%)	1.00 ^b	3.00 ^a	1.00 ^b	3.00 ^a	3.00 ^a	0.44
EOS (%)	4.00 ^a	2.00 ^c	3.00 ^b	1.00 ^d	1.00 ^d	0.52
Platelet	103.00 ^b	69.50 ^{cd}	121.50 ^a	63.50 ^e	71.00 ^c	10.10

abcde: means on the same row but with different superscript as significantly difference ($P < 0.05$)

WBC = White blood cell, RBC = Red blood cell, PVC = Pack cell volume, HB = Haemoglobin,

EOS = Eosinophils, Mono = Monocytes, Lymp = Lymphocytes, Neutro= Neutrophil

Table 4: Serum biochemical profile of weaner rabbits fed cashew nut meal

Parameters	T1	T2	T3	T4	T5	SEM
TP (g/dl)	4.31	4.73	5.03	4.49	4.72	0.11
ALB (g/dl)	1.21	1.12	1.32	1.19	2.01	0.15
GLOB (g/dl)	3.13	3.63	3.73	3.30	2.96	0.13
CRT (mg/dl)	0.82	0.63	0.37	0.50	0.70	0.07
AST (i.v/L)	31.19 ^a	15.23 ^b	13.82 ^e	13.98 ^{ed}	14.15 ^c	3.03
ALT (i.v/L)	51.00 ^a	33.47 ^b	20.63 ^e	31.63 ^c	25.69 ^d	4.61

A,b,c,d; means on the same row but with different superscript are statistically ($P < 0.005$) significant

TP: Total protein, ALB: Albumin, GLOB: Globulin, CRT: Creatinine, AST: Aspartate amino transferase, ALT: Alamine amino transferase, SEM: Standard error of mean

Discussion

The crude protein value of cashew nut meal in this study (22.7%) was higher but lower in crude fibre. A number of factors may be responsible for this difference. In addition to processing, storage may also be a factor. White blood cell (10³u/l) differed significantly ($P < 0.05$) among treatment groups. The value obtained were within normal range ($5-8 \times 10^3$) for weaner rabbits. Higher WBC counts is usually associated with microbial infection or the presence of foreign body or antigen in the circulating system. The neutrophil (%) values obtained were significantly ($P < 0.05$) difference from all treatment means, the value obtained were also within the normal range for rabbits (35.02-43.2). Lymphocyte (%) was influenced by dietary treatment. The values obtained were however within the stipulated range (53.5-65.8) for rabbits. The higher values of haematological indices observed in this study is an indication that the animals did not pose to any disease condition and this also tends to indicates a better utilization of cashew nut meal by the treated rabbits. In conclusion, inclusion of cashew nut meal in rabbits was found to be effective without adverse effect on haematological parameters of weaner rabbits.

The Serum Total Protein and albumin of the rabbits used in this study were not affected ($P < 0.05$) by the CNM (cashew nut meal inclusion). This showed that the protein levels contained in the diets was enough to support normal protein reserves across the groups. The similarity in the albumin content could be attributed to the comparable protein intake across the groups. Albumin content to be specifically influence by protein shortage. The albumin and total protein observed in the study were within the normal ranges for rabbit reported by Mitruka and Rawnsley (1997). Total protein values increase slightly as the level of CNM increased though not at a significant level. This observation suggested good quality of test diet since the higher the value of Serum Total Protein, the better the quantity of the feed stuff. Inclusion of cashew nut meal in weaner rabbit was found to be effective without adverse effect on serum biochemical profile of weaner rabbit at 20% inclusion level.

CONCLUSION AND RECOMMENDATION

Conclusion

The result of the research showed that cashew nut meal is a good conventional protein source that could replace soybean meal up to 20% replacement level without any adverse effect in the haematological indices of weaner rabbits fed experimental diets.

Recommendation

Based on the result of this research, it could be recommended that, cashew nut meal could be included in weaner rabbit ration up to 20% replacement level. Since cashew nut meal could effectively replace soybean meal in diets for rabbit, extensive cultivation of the crop, cashew nut should be encouraged to make cashew nut meal more available.

References

1. Aduku, A.O., 1993. Tropical Feedstuff analysis table Ahmadu Bello University Samaru, Zaria Nigeria, p: 1
2. Agaie, B. M., & Uko, O. J. 1998. Effect of season, sex, and species difference on the packed cell volume (P.C.V.) of Guinea and domestic fowls in Sokoto, Sokoto state of Nigeria. *Nigerian Veterinary Journal*, 19, 95-99.
3. FAO ,1990. Food and Agriculture organization: Helianthus, arthropod and protozoa of domesticated annuals. Pp32-40 F.U.T, Student Handbook. 2009/2010 session
4. Fetuga, B.L., G.M. Babatunde and V.A. Oyenuga, 1974. The feeding stuff potential of cashew nut scrap kernel meal. Proc. of tropical products Institute on animal feeds of tropical and subtropical origins. Tropical products Institute, London, (UK) pp: 208-214. Fetuga, B.L., G.M. Babatunde and V.A. Oyenuga, 1975. The feeding stuff potential of cashew nut scrap kernel meal. Proceedings of the conference on animal feeds of tropical, subtropical origins. Tropical products Institute, London, (UK) pp: 201-207.
5. Obioha, F.C (1992a). A guide to poultry production in the tropics. Acena publisher, Enugu – Nigeria pp1-10.
6. Obioha, F.C 1992b. Alternative source of feed ingredients. Intend paper. *Nigeria society for Animal production (NSAP) symposia*, NSUKKA.

7. Odunsi, A. A., Onifade, A. A., & Babatunde, G. M. 1999. Response of broiler chicks to virginmycin and dietary protein concentration in the humid tropics. *Arch. Zoot.*, 48(183), 317-325.
8. Okai, D.B., Abora, P.K.B., Davis, T. and Martin, A. 2005. Nutrient composition, availability, current and potential uses of “Dusa”: A cereal by-product obtained from “koko” (porridge) production. *Journal of Science and Technology*. 25:33-38.
9. Sanusi, W.A. 2011. Effect of poverty on participation in the nonfarm activity in Ibarapa Local Government Area of Oyo State Nigeria. *International Journal Of Agriculture And Apiculture Research* Lautech (1 and 2) 86- 95.