BAP -06

Comparative Effect of Differently Processed African Star Apple (*Chrysophyllum albidum*) Kernel Meal on Haematological Parameters of Growing Rabbits

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Abstract
The effects of feeding differently processed African star apple kernel meal (ASAKM) on haematological parameters in rabbit were studied. A total of sixty weaner rabbits (mixed breed, average weight, 590 g) were randomly allocated to five dietary treatments comprising of 10 % each of boiled, fermented, roasted and soaked ASAKM as substitute for dietary maize. Diet 1 (0% ASAKM) served as the control diet. Each of the five treatments was replicated thrice. Each replicate had four rabbits in a Completely Randomized Design. The rabbits were fed with the experimental diets for 12 weeks. The results showed that all the parameters measured were not significantly affected by the treatments except white blood cell (WBC) count and monocytes. It was concluded that inclusion of differently processed ASAKM in rabbit diets was well tolerated by growing rabbits without any adverse health condition.

Key word: rabbits, white blood cell, monocyte, African star apple kernel meal

Introduction

African star apple (*Chrysophyllum albidum*) is an indigenous wild fruit tree with enormous potentials for plantation establishment, and the fruit/seed could serve as an alternative carbohydrate or energy foodstuff (Okafor, 1981). *C. albidum* is reported to be an important tree in the agro-forestry system and is cultivated in Nigeria, Uganda, Niger, Cameroon, Ivory Coast republics on commercial scale (Adewusi and Bada, 1997).

Haematological parameters refer to those factors in the blood whose levels are usually determined in order to assess the degree of wellbeing of an animal. They are important in feeding trials because it has been established that feed components affect blood constituents (Harper *et al.*, 1979). Furthermore, for blood analysis, a readily available and fast means of assessing the health status (Anosa, 1983), clinical evaluation for survey of physiological or pathological conditions (Bush, 1991), and a diagnostic/prognostic evaluation of various diseases in animal (Nottidge *et al*., 1999). There is paucity of information on the effect of differently processed ASAKM on haematological status of rabbits. Recently, Annongu *et al.* (2017) reported that broilers could barely tolerate 5% raw ASAKMin their diets with minimum adverse effects. The authors however observed that the values of the blood parameters particularly the red blood cells favoured erythropoiesis, suggesting that the ASAKM had no detrimental effect on the health status of the birds.

This study was therefore designed to investigate the effects of differently processed ASAKM on some haematological characteristics of growing rabbits.

Materials and Methods

The experiment was conducted at the Rabbitry Unit of the Teaching and Research Farm of the School of Agriculture and Agricultural Technology, Federal University of Technology, Gidan Kwano Campus (Permanent site), Minna, Niger State. The seeds of African star apple used for this research were collected from African star apple fruit farmers in Osogbo, Osun State, Nigeria. The seeds were washed thoroughly with water, sundried and dehulled to expose the mesocarp (kernel). The mesocarp was divided into 5 batches as follow: One kilogram of ASAK was fermented in water for 72 h at the rate 1 kilogram kernel to 5 litres of water as described by Agbabiaka *et al*. (2013).One kg of ASAK was roasted at 70^{0}C for 30 minutes using fire wood with iron pot mixed with sand according to the method described by Sola-Ojo *et al.* (2013).One kilogram of ASAK was soaked in cold water for 24 h at the rate 1 kilogram kernel to 5 litre of water as described by Saulawa *et al*. (2014). One kilogram of ASAK was subjected to boiling at 100 °C for 15 minutes at the rate 1 kilogram kernel to 5 litre of water as described by Jimoh *et al*. (2014) after which water was drained off by means of 10mm sieve and the boiled kernels were air dried for three days.

A total of sixty (60) weaner rabbits of composite breeds and mixed sexes, aged between 5 and 6 weeks were procured from the rabbit section of National Animal Production Research Institute (NAPRI), Shika – Zaria, Kaduna State, Nigeria. They were randomly divided into five groups of twelve (12) rabbits per treatment with each treatment replicated thrice (4 rabbits per replicate) in a completely randomized design. The rabbits were pre-conditioned for two weeks, during which they were treated twice (once a week) against parasitic infestation with Ivermectin subcutaneously. They had access to feed and clean water *ad libitum* over 12 weeks experimental period.Five experimental diets were formulated. Diet 1 served as control diet while

Diets 2, 3, 4 and 5 contained 10% Boiled ASAKM, 10% Fermented ASAKM, 10% Roasted ASAKM and 10% Soaked ASAKM respectively as substitute for maize in rabbit diets as shown in Table 1. A known quantity of the diets was served twice daily at 8.00am and 4.00pm and supplemented with 10 g of Groundnut haulm per animal thrice a week.

Table 1: Gross composition of experimental diets

Ingredients (%)	0%	$BASAKM_{10}$	$FASAKM_{10}$	$RASAKM_{10}$	$SASAKM_{10}$
Maize	40.00	36.00	36.00	36.00	36.00
BASAKM		4.00			
FASAKM			4.00		
RASAKM				4.00	
SASAKM					4.00
Maize offal	25.00	25.00	25.00	25.00	25.00
Rice offal	18.00	18.00	18.00	18.00	18.00
Soyabean meal	2.00	2.00	2.00	2.00	2.00
Fish meal	1.20	1.20	1.20	1.20	1.20
Groundnut cake	10.00	10.00	10.00	10.00	10.00
Limestone	1.00	1.00	1.00	1.00	1.00
Bonemeal	2.00	2.00	2.00	2.00	2.00
Salt	0.20	0.20	0.20	0.20	0.20
*Premix	0.30	0.30	0.30	0.30	0.30
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated Nutrients					
Crude protein (%)	16.41	16.85	16.85	16.85	16.85
Energy (Kcal/kg ME)	2647.50	2604.03	2604.03	2604.03	2604.03
Crude fibre (%)	10.35	10.05	10.05	10.05	10.05
Ether extract (%)	4.08	4.11	4.11	4.11	4.11
Ca (%)	1.05	1.12	1.12	1.12	1.12
Avail. P (%)	0.69	0.51	0.51	0.51	0.51

*Premix in diets provided per kg: Vit. A 10000 IU, Vit. B 2000 IU, Vit. E 13000 IU, Vit. K 1500mg, Vit. B12 10mg, Riboflavin 5000mg, Pyridoxine 1300mg, Thiamine 1300mg, Panthothenic acid 8000mg, Nicotinic acid 28000mg, Folic acid 500mg, Biotin 40mg, Copper 7000mg, Manganese 48000mg, Iron 58000mg, Zinc 58000mg, Selenium 120mg, Iodine 60mg, Cobalt 300mg, Choline 27500mg

At the end of the study period, 5ml of blood was collected from six rabbits per treatment through the jugular vein and put into bottles containing Ethylene Diamine tetra-acetic Acid (EDTA) for haematological analysis. Similarly, blood samples meant for serum biochemical studies were collected into plain bottles (without anticoagulant) to enhance serum separation. Serum was obtained by centrifugation and the harvested serum samples were used for analysis. All the analysis was done at the General hospital, Minna according to the methods described by (Kohn andAllen, 1995). Proximate composition of roasted ASAK and experimental diets were analysed using the methods described by (AOAC, 2006).

Data collected were subjected to analysis of Variance using SAS software (SAS, 2008) while significant means were separated with Duncan multiple range test at 5% level of significance.

Results and Discussion

Table 2 shows the result of the effect of differently processed ASAKM on haematological profiles of growing rabbits. There were no significant ($p>0.05$) differences in the haematological parameters measured except the WBC and monocyte ($p<0.05$). The blood parameters analyzed in this study were within the normal range established by (Research Animal Resource, 2009) for growing rabbits. Therefore, it can be interpreted that the dietary treatment did not cause any nutritional anaemia and can supply the needed nutrients to the rabbits. The RBC counts according to Swenson (1990) are influenced among other factors by nutrition, physical activities and volume and its reduction indicates anaemia. In this study, there was no clinical state of anaemic condition. This result is an indication that the differently processed ASAKM had no negative effect on the blood parameters but instead has the ability to improve these parameters. Ologboho *et al.* (1986) observed that an increase in WBC

count above normal is an indication of the presence of exogenous substances and foreign bodies in the body. In this study, there was no case of such abnormal rise in values of WBC.

Table 2:Comparative effect of differently processed African star apple kernel meal on haematological parameters of growing rabbits

Parameters	Control	$BASAKM_{10}$	$FASAKM_{10}$	$RASAKM_{10}$	$SASAKM_{10}$	SEM	P-val
WBC, $X10^3/mm^3$	8.37^{b}	11.60^{a}	12.50^{a}	8.09^{b}	13.27^{a}	1.10	0.001
RBC, $X10^6/mm^3$	4.95	5.08	6.06	6.44	6.06	1.03	0.755
Haemoglobin, g/dl	11.14	11.02	11.62	11.78	9.67	2.02	0.641
PCV, %	38.44	42.31	44.67	43.60	40.86	5.81	0.890
MCH, pg	22.61	22.29	19.24	18.92	16.15	5.17	0.756
MCV, fl	77.37	85.54	74.94	70.36	68.67	17.53	0.958
MCHC, g/dl	29.39	26.63	26.52	27.19	23.82	5.29	0.876
Basophils, %	1.33	1.40	1.37	1.54	1.34	0.40	0.756
Neutrophils, %	40.87	42.68	44.41	46.51	46.52	5.09	0.949
Monocyte, %	2.56^{c}	3.46^{bc}	4.73^{ab}	4.74^{ab}	2.74^{c}	0.74	0.003
Lymphocyte, %	47.98	60.97	61.42	55.46	57.57	7.47	0.062

abc= mean with different superscripts on the same column are significantly different (P<0.05), SEM= Standard error of mean, P = Probability value. LOS = Level of significant. MCHC= Mean corpuscular haemoglobin concentration, MCH= Mean corpuscular haemoglobin, WBC= White blood cell, RBC= Red blood cell, PCV= Packed cell volume, MCV= Mean corpuscular volume

Conclusion

It was concluded that inclusion of differently processed African star apple kernel meal in rabbits diet was well tolerated by growing rabbits without any adverse health condition.

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