MON -30

Effect of Earth Ball (*Icaciania manni*) Processed in Saline on Hematological and Serum Biochemical Indices of Broiler Chickens

C.A. Essien[1], A.B.I. Udedibie[2] and I.M. Sam[1]
[1]Department of Animal Science, Faculty of Agriculture, Akwa-Ibom State University, Akwa-Ibom State, Nigeria
[2]Department of Animal Science, Federal University of Technology, Owerri Imo State, Nigeria
Corresponding author: I.M. Sam; E-mail:sidorenyin@yahoo.com; Tel: 08029004857

Abstract
Eight – week feeding trial was conducted to investigate the effect of 10% and 20% replacement of maize with *Icacinia manni* meal processed in saline on the haematology and serum biochemistry of broilers. Three experimental diets were formulated in which *Icacinia manni* processed in saline replaced maize at 0% for T_1 (control), 10 and 20% for T_2 and T_3 respectively. The replacements were the same for starter and finisher phases. One hundred and twenty day old chicks of Arbor Acre were randomly allotted to three dietary treatments with 12 replicates of ten birds per replicate in a completely randomized design. Haematology and serum biochemistry analysis showed no significant differences ($p>0.05$) at the end of the experiment except for total protein. The values for 10 and 20% *Icacinia manni* processed in saline group were significantly ($p<0.05$) higher than the control. The study revealed that *Icacinia manni* processed in saline can replace 20% maize in broiler diets without detrimental effect on haematology and serum biochemistry.

Keywords: *Icacinia manni*, broiler, hematological, serum biochemistry, saline

Introduction

The search for alternative energy source in poultry feeding is continuous due to general increase in animal population and the use of cereals especially maize as source of fuel (energy) Akinmutimi *et al*. (2009).Earth balls (*Icacinia manni*) seem to have potential as source of dietary energy for birds in Nigeria. *Icacinia manni* is a shrub with modified tuber which is mostly carbohydrate. It is a common wild field crop, locally abundant in Nigeria especially in humid climate of Akwalbom State (Akobundu and Agyakwa, 1998). *Icacinia manni* contains 3.78%, 2.81%, 4.18%, 2.39% and 86.84%;crude protein, crude fibre, ash, ether extract and nitrogen free extract on dry matter basis respectively (Essien, 2014).*Icacinia manni* has been reported to contain some anti-nutritive substance such as cyanogenic glycoside, phytic acid and gummy substance suspected to be galactomannan gum, that limit its use as animal feed (Fassi et, 1973, Ekpo and Udedibie, 2012). Blood is an important index of physiological and pathological changes in an organism and it is also used in accessing its body's ability to respond to nutritional changes. The hematological and serum biochemical variables of the blood of livestock are known to be positively correlated with protein quality and quantity of diet (Adeyemi *et al.,* 2000; Diana, 2008).

Base on this, the study was done to determine the effect of *Icacinia manni* processed in saline on hematological and biochemical indices of finishing broilers.

Materials and Methods

The experiment was carried out at the Poultry and Research Unit of the Department of Animal Science, Akwa-Ibom State University.Obio-Akpa is located between latitudes $5^{0}17^{1}$N and $5^{0}27^{1}$N and between longitudes $7^{0}27^{1}$N and $7^{0}58^{1}$E with an annual rainfall ranging from 3500mm – 5000mm and average monthly temperature of 250C, and relative humidity between 60-90% (Wikipedia, 2016).

Source of *Icacinia manni* and processing method: Fresh *Icacinia manni* were harvested from fallow land within the university community. The tubers were washed, chopped into pieces and were sundried. The chips were milled thereafter to produce *Icacinia manni* meal. The meal was later soaked in saline prepared by dissolving common salt in water at the rate of 1kg salt to 50 litres of waters and allowed to ferment for 72hours. Thereafter the fermented *Icacinia manni* meal was bagged and the fermented water squeezed out. The meal was boiled with fresh water for one hour and later sundried. The sundried meal was run through a hammer mill using a 2mm sieve to homogenized it and produce *Icacinia manni* meal processed in saline.

Experimental diets: Three (3) experimental diets were formulated at starter (23%CP) and finisher (21%CP) phases. The diets labeled T_1 (control), T_2 and T_3contained 0%, 10% and 20% levels of inclusion of *Icacinia manni* meal process in saline. Ingredient and nutrient composition of experimental broiler diet is represented in table1.

Experimental birds and design: One hundred and twenty (120) unsexed day old broiler chicks (Arbor Acre) were bought from a reputable distributor. They were given commercial broilers starter mash for one week and then divided into 3 groups of 40 birds each and each group randomly assigned to one of the three experimental diets using completely randomized design. Each group was further replicated 4 times (10 birds per replicate) and each replicate housed ina pen measuring 2mm by 2mm. Wood shavings were used as their litter material. Normal brooding was carried out for three weeks during experimental period. Feed and water were provided *ad libitum.* All necessary prophylactic medication and vaccination were also provided. The starter phase of the experiment lasted for four weeks. At the end of the starter phase, the diets were changed with the finisher diet. The experiment continued and lasted for another four weeks.

Table 1: Ingredient composition of the experimental diets

Ingredients %	Starter Diets			Finisher Diets		
	T_1 (0%IMS)	T_2 (10%IMS)	T_3(20%IMS)	T_1(0%IMS)	T_2 (10%IMS)	T_3(20%IMS)
Yellow maize	50.00	40.00	30.00	60.00	50.00	40.00
IMS	0.00	10.00	20.00	0.00	10.00	20.00
Soya beanmeal	25.00	25.00	25.00	16.00	16.00	16.00
Blood meal	3.00	3.50	4.00	3.00	3.50	4.00
Fish meal	3.00	3.00	3.00	3.00	3.00	3.00
Palm kernel cake	5.00	5.00	5.00	4.00	4.00	4.00
Wheat offal	10.00	9.50	9.00	10.00	9.50	9.00
Bone meal	3.00	3.00	3.00	3.00	3.00	3.00
Common salt	0.25	0.25	0.25	0.25	0.25	0.25
Tm/ premix	0.25	0.25	0.25	0.25	0.25	0.25
L-lysine	0.25	0.25	0.25	0.25	0.25	0.25
L-methionine	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100
Calculated	chemical	composition	(% DM)			
Crude protein	22.92	22.86	22.88	19.28	19.24	19.26
Ether extract	4.09	4.19	4.29	4.11	4.21	4.31
Crude fibre	3.15	3.68	4.21	2.80	3.34	3.87
Ash	3.57	3.85	4.11	3.12	3.39	3.66
NFE	66.29	65.42	64.51	70.68	69.52	68.40
ME (mcal/kg)	2.74	2.65	2.60	2.91	2.83	2.80

IMS- *Icaciniamanni* tuber meal processed in Saline, NFE- Nitrogen free extract; To provide the following per kg of feed; vitamin A, 10,000, vitamin D3, 2000; vitamin E, 55iv; vitamin K, zinc; Riboflavin, 4.2mg; vitamin B2, 0.01mg; pantothenic acid, 5mg; nicotinic acid, 20mg; folic acid. 0.5mg; choline, 3mg, magnesium, 56mg. Fe, 20mg; Cu, 1.0mg; zinc, 50mg; cobalt, 1,25mg; iodine, 0.8mg.

Hematological and serum biochemical analysis: At the end of the feeding trial, blood samples were drawn from two birds per replicate through the jugular vein using a 5cm needle. Blood samples approximately 5 ml per bird were collected into specimen bottles with and without ethylene diamine tetra-acetic acid (EDTA). 2ml of this blood sample was put into specimen bottle containing EDTA for analysis of hematological parameters which included Pack cell volume (PVC), haemoglobin concentration (Hb), Red blood cell count (RBC), lymphocyte and neutrophils. Mean Corpuscular volume (MCV), mean Corpuscular Haemoglobin(MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated as shown below MCV(%) = PCVX 10/RBC; MCH(%) = HbX10/RBC; MCHC (%) = Hb x100/PCV. The remaining blood samples for biochemical analysis were poured into anti-coagulant free tubes and allowed to clot for two hours at room temperature and centrifuged for ten minutes at 200 rpm to separate the serum. The parameters determined were total protein, urea, creatinine, albumin, globulin and alkaline phosphate.

Data analysis: Data obtained during the study were subjected to analysis of variance (ANOVA) using SPSS, and significant differences among means were separated using Duncan Multiple Range Test at 5% level of probability (Duncan, 1995).

Results and Discussions

The haematological parameters of broilers fed *Icacinia manni* processed in saline and heat are presented in table 2. No significant ($p > 0.05$) differences were observed among the treatments for all the blood parameters investigated. Adejumo

(2004) reported that haematological traits especially PVC and Hb are correlated with the quality of the diet. Also erythrocyte and haemoglobin are known to be positively related to the protein quality and protein levels. Therefore, the non-significant ($p > 0.05$) haematological values observed in all the treatment indicated that the diet was of high quality such that it did not show any negative effect on the birds. Probably, fermentation in saline combined with heat treatment (boiling and sun-drying) used to process *Icacinia manni* was able to reduce the anti-nutritional substance contained in raw *Icacinia manni* to insignificant level whereby increasing or improving the quality of diet. The values for the haematological parameters determined in the study fell within the range recommended by Mitruka and Rawnsley (1977) as normal for poultry. The diet did not have any effect on the serum biochemical indices of the birds in all the treatment except for protein. The values for 10% and 20% IMS group were significantly ($p < 0.05$) higher than the control. The result of this work have shown that fermentation with saline combine with heat treatment is an effective means of detoxifying *icacinia manni* tuber for proper utilization by broilers as a source of dietary energy since the birds could tolerate it even at 20% dietary inclusion.

Table 2: Hematological parameter of broiler chickens fed *icacinia manni* meal processed in saline

Blood parameter	Diet 1 (0%)	Diet 2 (10% IMS)	Diet 3 (20% IMS)	SEM
WBC $(mm)^2$	$7.21x10^5$	$7.27x10^5$	$7.57x10^5$	$3.95x10^5$
RBC (10^6/ul)	$2.37x10^6$	$2.56x10^6$	$2.58x10^6$	$1.02x10^6$
Hb(g/dl)	9.33	10.13	9.90	1.23
PCV(%)	31.13	34.10	33.27	1.53
MCV(fl)	131.13	133.20	128.97	22.16
MCH (pq)	39.33	39.57	38.37	0.76
MCHC (g)	29.97	29.71	29.76	4.01
Lymphocyte (%)	96.80	97.13	96.37	12.01
Neutrophils (%)	91.10	90.67	92.07	3.41

IMS –*Icaciniamanni* meal fermented in saline

Table 3: Serum biochemistry of broiler chicken fed *Icacinia manni* meal processed in Saline

Blood parameter	Diet 1 (0%)	Diet 2 (10% IMS)	Diet 3 (20% IMS)	SEM
Total protein (g/dl)	4.79^b	6.52^a	6.59^a	1.30
Albumin (g/l)	2.58	3.57	3.92	0.34
Globulin(g/L)	2.21	2.70	2.60	0.25
Urea(mg/dl)	4.03	4.17	4.11	1.10
Creatinine(mg/dl)	1.58	1.59	1.47	0.23
Alkaline phosphate(IU//l)	242.77	247.94	253.24	2.71

Conclusion

Icacinia manni meal when processed by fermenting in saline, boiled and sundried can replace 20% of maize in broilers diet without affecting their haematological and serum biochemical parameters.

References

Adejumo, D. O. (2004). Performance, organ development and dermatology of rats fed sole diet of graded level cassava flour and soya bean flour as substitute for energy and protein concentrates. *Tropical Journal of Animal Science*, 71: 57-63.

Adeyemi O.A., Fasina O.E. and Balogun, M.O. (2000). Utilization of full fat Jatropha seed in broilers diets: Effects of haematological parameters and blood chemistry. *Proceeding aft h 25th Annual conference Nigerian Society of Animal Production, Micheal Okpara University of Agriculture, Umudike Nigeria*, 19-23 march Pp 108-109.

Akinmutimi, A.H. and Onen, G.E. (2008). The response of broiler finisher fed graded levels to yam peel meal in place of maize-based diets. *Int.J. of poultry Science, 7* (5): 474-479.

Akobundu, I.O. and Agyakwa, C.W. (1998). *A hand book of the West African weed*. NTEC Printers, Ibadan, Nigeria.

Coles, E.H. (1986). Veterinary clinical pathology. (4th edition). Publisher, W.B Saunders co., Philadelphia, 457pp.

Diana,S.S.S.(2008). Utilization of sesame seed meal as a source of methionine broilers in layers. Ph.D.Thesis Tafawa Belewa University Bauchi, Nigeria

Duncan, D.B. (1995). Duncan Multiple Rage Test. *Biometrics,* 11:1-43.

Ekpo, K.O. and Udedibie, A.B.I. (2012). Moist-heat treatment as a method of improving the nutritive value of *Icacinia manni* for broilers. *Int. J. Agric* and *Rural Development,* 15:1154-1161.

Fassiet, D.W. (1973). Oxalates. In:*Toxicant occurring naturally in foods*. Academy of Science, Washington D.C.

Essien, C.A. (2014). Phytochemical and nutritional evaluation of *Icacinia manni* tuber meal as source of dietary energy in poultry production. Ph. D. Thesis, Federal University of Technology Owerri, Imo State Nigeria.

Mitruka, B.M. and Rawnsley, N.M. (1997). Clinical biochem. and haematological. Ref. In Normal Exptal. Animals Masson Publishers, N.V.

Schalm, O.W., Jain. N.C. and Carol, E.J. (1995). *Veterinary haematology,* 3rdEdn. Lea and Fabinger, Philadelphia.