PERFORMANCE AND HAEMATOLOGICAL RESPONSE OF FINISHER BROILER CHICKENS FED *ICACINIA MANNI* (EARTH BALL)

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ABSTRACT

One hundred and twenty day–old Anak strain of broiler chickens were used to evaluate the performance and some haematological response of finisher broiler fed diets containing different levels of *Icacinia manni* (Earth Ball) processed in saline for a 35-day feeding trial. Chemical analysis indicated that the NFE content of *Icacinia manni* (Earth Ball) is similar to those of maize and cassava. The birds were raised on deep litter system in a completely randomized design (CRD). Three dietary treatments containing 0 (control), 10 and 20% levels of *Icacinia manni* meal processed in saline were used and presented as diet 1, 2 and 3 respectively. Each treatment had 40 birds, replicated four times with 10 birds each. The results of the performance measured by body weight gain, feed intake and feed conversion ratio indicate that there were no significant ($p > 0.05$) differences among treatment diets. The haematological (WBC, RBC, Hb, PCV, MCHC, Platelet, lymphocyte and neutrophils) responses of the birds fed the control and *icacinia manni* meal processed in saline (IMS) were not significantly ($p > 0.05$) different and were not influenced by IMS inclusion levels in the diets. This study revealed that *icacinia manni* meal fermented in saline (IMS) could be used in broiler finisher diets without any deleterious effects on their performance and haematological indices.

Keywords: *Icacinia manni*, Broiler finisher, performance, haematological response.

INTRODUCTION

In Nigeria, poultry keeping has been one of the most popular enterprises adopted by small and medium scale farmers in rural and urban areas and this has rapidly increase the availability of animal protein which has been a great problem in the last two decades.

Unfortunately, this enterprise is facing series of constraints which invariable affects its production. One of such is the shortage and high cost of feed ingredients which is as a result of the competition that exist between humans and animal in the consumption of most of the feed ingredients especially grains. Poultry feed stands out as a major item of cost in poultry production which accounts for about 70-80% of the cost of production of poultry meat and eggs. Several authors observed that this rising cost and scarcity of energy and protein feedstuffs could only be solved by seeking for new alternatives and non-conventional feed resources for partial and complete replacement of the conventional ones (Idowu, 1999; Esonu, 2006; Obioha, 1992; Igboeli ,2000; Onyimonyi and Onukwofor , 2003). The need for alternative energy supply to promote sustainable broiler production has increase the search for indigenous energy source for least cost formulation, however large number of non-conventional feedstuff with enormous potentials exist in Nigeria. *Icacinia manni* commonly known as earth ball seems to have potentials as source of dietary energy for birds in the country. *Icacinia manni* is a tropical shrub which is native to Africa and widely distributed in

Nigeria. It has modified tubers that can weigh up to 20kg mainly carbohydrates, available all year round and is locally abundant in Nigeria and can be source at no cost. (Ekpo and Udedibie 2012)

Information on the feed value of *Icacinia manni* is limited; however it is reported to contain some anti-nutritive factors such as cyanogenic glycoside, oxalic acid and phytic acid (Fassiet 1973; Isika et al 2005). Ekpo and Udedibie (2012) reported that it contain gummy substances suspected to be galactomannan gum which reduces it digestibility and absorption resulting in some adverse effects such as depressed body weight gain when consume without adequate processing. Fermentation has been reported to reduce cyanogenic glycoside, oxalic acid and phytic acid drastically in *Icacinia manni*, thereby improving nutritive value, digestibility and growth (Umoren, 2003).

Blood is a useful medium of assessing the health status of animals (Taiwo and Anosa, 1995). Numerous authors have describe the use of haematological parameters of blood in assessing the differences in animals expose to varying diets composition and the resultant health implications in our environment (Obun,2007;Oyelola et al 2004;Annongu et al., 2004; Annongu and Olawuyi, 2005). This study was designed to evaluate the effect of feeding graded levels of icacinia manni fermented in saline on growth performance and haematological response of finisher broiler chicken.

MATERIALS AND METHODS

Experimental Site

The study was carried out at the poultry and research unit of the Department of Animal Science, Akwa Ibom State University, Obio Akpa campus. 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 25^{0}C, and relative humidity between 60-90%. It is in the tropical rainforest zone of Nigeria. (Wikipedia, 2016).

Source and Processing of *Icacinia manni*

Fresh *Icacinia manni* tubers were harvested from fallow land within the university community. The tubers were washed, chopped into pieces and sundried. The chips were milled thereafter to produce *Icacinia manni* tuber meal. The meal was soaked in saline prepared by dissolving common salt in water at the rate of 1kg salt to 50 liters of water and allowed to ferment for 72 hours. Thereafter the meal were washed boiled for 1 hour and sundried to produced *Icacinia manni* meal processed in saline (IMS).

Experimental Diets

Three experimental broiler finisher diets were formulated such that diet 1 (0% control) contained maize as the main source of energy (no IMS). Diet 2 and 3 contained *Icacinia manni* meal processed in saline at 10% and 20% levels respectively, partly replacing maize in the diet. The experimental diets were maintained from day 35 – 63 days. Ingredients composition of the experimental diets is shown in Table 1.

Management of the Birds

One hundred and twenty (120) broiler chickens (Anak Strain) were obtained from a local hatchery. The birds were raise in a brooder for (2) two weeks and fed *Icacinia manni* free diet.

At 35 day of age, the birds were randomly divided into three treatment groups of forty birds each, replicated four times (10 birds each) in a completely randomized design(CRD) raised in deep litter system of management with pens measuring 2m by 2m. Each diet was offered ad libitum to the birds until termination of experiment at 63 days. All routine management operations applicable to broilers were strictly followed.

Parameter Measured

At the beginning of the experiment, the chicks were weighed as individual replicate group. Weekly feed intake and weight gain were recorded from which Fed Conversion Ratio was calculated.

Blood Collection and Analysis

At day 63, two birds from each replicate were randomly selected. Blood samples were collected from their Jugular veins (2mls each) into a sterilized glass tube containing ethylene diamine tetra acetic acid (EDTA) for haematological assay (Bermudee and Stewart-Brown, 2003). The blood samples were labeled according to treatment and replicate.

Haematological Tests

Haematological parameters such as white blood cell (WBC) mean cell haemoglobin (MCH), mean cell volume (MCV), mean cell haemoglobin count (MCHC), lymphocytes and Neutrophils were determined by routine method (Campbell, 1988). The percentage Packed Volume (PCV) was determine by centrifugation of capillary tubes for 5min at 1200rpm, the haemoglobin content (HB) was determined by the methods of Jain (1986). The Red Blood Cells(RBC) was determine using the Hendricks fluid in an improved Neubaur ruling counting chamber.

Proximate Composition

The *Icacinia manni* meal moisture was determined by following the method of Rajaran and Janardhanan (1990). Nitrogen content was determined according to Kjeldahl method and the percentage crude protein was calculated using the factor 6.25. The crude fibre, crude fat and Ash were determined in accordance with the standard methods of AOAC(1990). Carbohydrate was obtained by difference. The energy value of the meal was estimated (in KJ) according to Siddhuraju et al (1996) by multiplying the percentage of crude protein, crude fat and carbohydrates by the factors 16.7, 37.7 and 16.7 respectively.

Data Analysis

Data generated from this study were subjected to analysis of variance (ANOVA). The treatment significant means were separated using Duncan New Multiple Range Test as outlined by Obi (1990).

Table 1: Ingredient Composition of the Experimental Diets

Ingredients	Diets		
	1(0%)	2(10%)	3(20%)
Yellow maize	60.00	50.00	40.00
Icacinia manni meal	0.00	10.00	20.00
Soya beanmeal	16.00	16.00	16.00
Blood meal	3.00	3.50	4.00
Fish meal	3.00	3.00	3.00
Palm kernel cake	4.00	4.00	4.00
Wheat offal	10.00	9.50	9.00
Bone meal	3.00	3.00	3.00
Common salt	0.25	0.25	0.25
Tm/ premix	0.25	0.25	0.25
L-lysine	0.25	0.25	0.25
L-methionine	0.25	0.25	0.25
Total	100	100	100
Determined chemical Analysis (% of DM)			
Crude protein	19.28	19.24	19.26
Ether extract	4.11	4.21	4.31
Crude fibre	2.80	3.34	3.87
Ash	3.12	3.39	3.66
Nitrogen free extract	70.68	69.52	68.40
ME (mcal/kg)	2.91	2.83	2.80

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; Cv, 1.0mg; zinc, 50mg; cobalt, 1,25mg; iodine, 0.8mg.

RESULTS AND DISCUSSION

The mean value of the proximate composition for the *Icacinia manni* meal processed in saline is shown in Table 2. The nitrogen free extract value is similar to that of cassava which makes it a good and potential energy source. The diet did not have any significant effect ($p>0.05$) on body weight gain, feed intake and feed conversion ratio (Table 3). The feed intakes of the experimental birds were similar. The weight gain and feed conversion ratio of birds in 10% and 20% IMS group were numerically higher than the control. 20% IMS group had the best feed conversion ratio (Table 3).

Table 4 shows haematological response of broiler finisher as influenced by IMS, hematological values such as WBC, lymphocyte and neutrophils did not differ significantly ($p>0.05$) between diets groups. RBC, PCV and Hb followed the same trend. MCHC, MCH, MCV of the 20% IMS recorded lower values than the control group but did not indicate significant ($p> 0.05$) difference in their values.

Haematological components are used in monitoring toxicity of feeds particularly when they affect blood formation (Ofawoye and Ogunkunle, 1998). Haematological constituents usually reflect the physiological responsiveness of the animal to its external and internal environment

and thus serve as a veritable tool for monitoring animal health. Jean, 1993 reported that the number of Red blood corpuscles and white blood corpuscles of animals in good health varies between species and individuals, and are influenced by many factors including diets. Therefore, the non-significant ($p > 0.05$) haematological range values observed in the present study are within the normal range of values recommended by Mitruka and Rawnsley (1997) as normal for poultry and indicate a normal health condition of the birds.

The values of the white blood cells and their differential counts were within normal range. It has been reported that bacterial and viral illness affects the number of white corpuscles and the ratio between the different types of white corpuscles and the percentages of the various types in healthy animals vary little but are greatly modified in sick animals (Jean, 1993). The results of the white blood cell, neutrophils and lymphocytes in this study clearly show that the birds were not at stress and had no bacterial and viral illness.

CONCLUSION

The results of this present study indicate that *Icacinia manni* processed in saline did not have any deleterious effects on the birds at inclusion level of 10 and 20% and it did not have any negative effect on the hematological components of the birds. The result of this study also indicated that the level of poisonous substances found in *Icacinia manni* that limit its usage as feed ingredient had been greatly reduced.

Table 2 : Proximate Composition of fresh and processed *Icacinia manni* (%DM)

Component	IMR	IMS
Moisture %	11.33	13.59
Crude protein, %DM	3.45	3.78
Crude fiber, %DM	2.53	2.81
Ash, %DM	3.81	4.18
Ether extract, %DM	2.56	2.59
Nitrogen free extract %DM	87.69	86.84
Caloric value (Kcal)	387.52	359.11

IMR – Raw *Icaccina manni* meal, IMS - *Icacinia manni* meal fermented in saline

Table 3: Performance of finisher broiler fed *Icacinia manni* meal fermented in saline

Performance parameter	Diet 1 (0%)	Diet 2 (10% IMS)	Diet 3 (20% IMS)	SEM
Average Initial Weight (g)	7110.10	1112.0	1189.30	36.59
Average Final Weight (g)	2705.03	2728.11	2801.10	24.05
Average body weight gain (g)	1595.10	1616.00	1616.21	31.71
Average daily weight gain (g)	56.95	57.71	57.57	1.03
Average Feed Intakke (g/d)	130.00	133.11	139.07	2.11
Feed Conversion ratio(gfeed/ggain	2.32	2.30	2.28	0.17
Mortality	0.00	0.00	0.00	0.00

IMS - *Icacinia manni* meal fermented in saline

Table 4: Effect of *Icacinia manni* meal fermented in saline on hematological indices of broiler chicken

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
Platelets (mm^3)	$1.70x10^4$	$1.70x10^4$	$1.63x10^4$	$1.01x10^4$
MCV(fl)	131.13	133.20	128.97	22.16
PCV(%)	31.13	34.10	33.27	1.34
MCHC (g)	29.97	29.73	28.81	4.01
MCH (pq)	39.33	39.60	38.40	0.76
Lymphocyte (%)	96.80	97.13	96.37	12.01
Neutrophils (%)	91.10	90.67	92.07	3.41

IMS - *Icacinia manni* meal fermented in saline

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