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EVALUATION OF HAEMATOLOGICAL INDICES OF FINISHER BROILER CHICKENS FED DIETS CONTAINING *Calapogonium mucunoides* LEAF MEAL SUPPLEMENTED WITH YEAST (*Saccharomyces cerevisiae*)

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Abstract
A 28-day feeding trial was carried out to evaluate haematological indices of finisher broiler chickens fed diets containing *Calapogonium mucunoides* leaf meal supplemented with yeast (*Saccharomyces cerevisiae*). A total of 150 unsexed Agrited Anak finisher broiler chickens at 4 weeks of age were used for the study. They were divided into 5 treatments of 30 broiler chickens per treatment. Each treatment group was subdivided into three replicates with 10 chickens per replicate. Five experimental finisher broiler chicken diets were formulated such that ground sun-dried *Calapogonium mucuoides* leaf meal supplemented with yeast was used to replace soyabean meal in the control diet at 0%, 10%, 15%, 20% and 25% respectively. The birds were assigned the experimental diets using the Completely Randomized Design (CRD). The blood of the experimental finisher broiler chickens was evaluated. Data obtained were subjected to one way analysis of variance (ANOVA). The result of the red blood cells (RBC) and packed cell volume (PCV) showed that the finisher broiler chickens fed 25% *Calapogonium mucunoides* leaf meal (diet 5) supplemented with yeast were significantly different ($P < 0.05$) and higher than the remaining treatment groups. The RBC (Red Blood Cell) of finisher broiler chickens' diets 5, 25% CLM, diet 3 (15% CLM) and diet 2 (10% CLM) were similar and significantly ($P < 0.05$) higher than the remaining groups in the finisher broiler chickens. The Red Blood Cells (RBC) and the White Blood Cells (WBC) differ significantly ($P < 0.05$) in the finisher broiler chickens. There was significant difference ($P < 0.05$) in the mean cell haemoglobin of the finisher broiler chickens in the treatment diets. The group on the control diet recorded the highest MCH which was significantly ($P < 0.05$) higher than those in other groups. It was concluded in this study that treatment 5(25% *Calapogonium mucunoides* supplemented with yeast) which revealed high white blood cell (WBC), high packed cell volume (PCV), high red blood cells (RBC) could be considered for adoption by farmers in the diets of finisher broiler chickens.

Keywords: Evaluation, Haematological indices, finisher broiler chickens, *Calapogonium mucunoides*, leaf meal, yeast.

Introduction

The prices of conventional protein feed ingredients such as groundnut cake, soyabean meal and fishmeal have soared so high in recent times that it is becoming uneconomical to use them in poultry feeds. There is therefore need, to look inwards for other alternative cheap sources of feed ingredients, which are not consumed by humans for the formulation of balanced ration. One possible source of cheap feedstuff or feed resources is the leaf meal or green leafy products of some tropical legumes and browse plants. The protein from leaves may be recovered and fed to the animals as solution in form of leaf protein concentrates (Onunkwo, 2017).

Calapogonium mucunoides leaf meal-supplemented with yeast can be used as an alternative protein source for broiler chickens. *C. mucunoides* is widely cultivated as a forage and pasture legume, green manure and cover crop. It is also commonly planted as a pioneer species, for fodder/animal feed, forage and as a nitrogen fixing species to reduce erosion and improve soil fertility in tropical and sub-tropical

region (Cook *et al*. 2005). Based on its nutritive value, in-vitro digestibility of leaf DM ranges from 58 to 66% depending on the age of regrowth and level of hairness. Crude protein (CP) content of top growth ranges from 16 to 24% with lower values for older growth.

Nevertheless, the supplementation of the diets with yeast probiotics at 0.15 to 0.3% has been shown to improve the performance of birds to a level achieved by the use of dietary antibiotics levels. It has been recently shown that this kind of effect is due to the bacteriocin – producing effects of yeast probiotics when used single or together with lactic acid bacteria species in the diet of broiler chickens (Mustafa, 2017). This research was carried out to evaluate the haematological indices of finisher broiler chickens fed diets containing *Calapogonium mucunoides* leaf meal supplemented with yeast (*Saccharomyces cerevisiae*)

Materials and Methods

Experimental site

The study was carried out at the poultry unit of the Teaching and Research Farm of Michael Okpara University of Agriculture, Umudike, Abia State in Nigeria. *Calapogonium mucunoides* leaves were collected from nature around Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

Experimental test material

The leaves were air dried, and sun dried to about 10% moisture content and then grounded to powdery form. This was done to reduce the Anti-Nutritional Factors (ANF) present in the forage legume, other feed ingredients like maize, wheat offal, fishmeal, soyabean meal, bone meal, premix, lysine, methionine, salt etc were bought from Jocan Livestock Services, Umuahia, Abia State. The yeast additive (*Saccharomyces cerevisiae*) was brought from a reputable supermarket at Umudike, Umuahia, Abia State.

Parameters measured

Proximate composition of the fresh (raw) and sundried *Calapogonium mucunoides* leaves were determined according to the method of (AOOC 2003) where the % dry matter %, crude fibre, % Crude protein, % Ether extract, % Nitrogen Free Extract and % Ash were also determined. Gross energy was determined using bomb calorimeter. All analysis was based on 100% dry matter (Table 1). The anti-nutrients such as Tannins, oxalate, phytate, saponins, cyanide and alkaloids were also determined according to (AOOC 2003). Five experimental finisher broiler diets were formulated. Diet 1 (Control) did not contain dried *Calapogonium mucunoides* leaf meal and yeast but 25% soyabean meal as the main protein source, while diets 2, 3,4 and 5 contained 10%, 15%, 20% and 25% of dried *Calapogonium mucunoides* leaf meal supplemented with yeast probiotic as replacing soyabean meal in the control diet as the main protein source. Other feed ingredients remain the same in the diets (Table 2).

Table 1: Proximate composition of fresh (raw and dried *Calapogonium mucunoides* leaf meal

Parameters	Fresh (Raw) *Calapogonium mucunoides* leafmeal	Dried *Calapogonium mucunoides* leafmeal
Dry matter %	84.26	93.06
Moisture %	15.74	6.94
Crude protein %	23.08	17.75
Ether extract %	0.35	1.02
Crude fibre %	25.60	15.30
Ash %	3.39	0.92
Nitrogen Free Extract %	31.84	58.07
Metabolizable Energy (Kcal/Kg)	3181.88	3528.53

Table 2: Ingredients and nutrients composition of the experimental finisher broiler chickens diet

Ingredients	T_1	T_2	T_3	T_4	T_5

	0%	10%	15%	20%	25%
Maize	60.00	60.00	60.00	60.00	60.00
Soyabean meal	25.00	22.50	21.25	20.00	18.75
CLM	0.00	2.50	3.75	5.00	6.25
Palm kernel meal	4.00	4.00	4.00	4.00	4.00
Wheat offal	4.00	4.00	4.00	4.00	4.00
Foreign Fish meal	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Vit-Min Premix*	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Common Salt	0.25	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**	**100**
Calculate nutrients composition of experimental finisher broiler diets					
Crude protein	21.05	20.475	20.1875	19.90	19.6125
ME Kcal/kg	3148.40	3171.50	3183.05	3194.60	3206.15

Yeast additive inclusion rate = 0.15/Kg of diet *To provide per kg of diet: Vit. A, 2,000000 iu; Vit D3: 4,000iu; Vit E, 80g; Vit. K, 0.49g; Choline, 48.00g; BHT, 32.00g; Manganese, 16.00g; Iron, 8.00mg; Zinc, 72gm; Copper, 0.32g; Iodine, 0.25g; Cobalt, 36.00g; Selenium, 16.00g, CLM = *Calapogonium mucunoides* leaf meal

A total of 150 Agrited Finisher broiler chickens at four weeks of age were used for the study. They were divided into five experimental treatment groups. Each treatment group contained thirty (30) finisher broiler chicks. Then, each treatment group was divided into three replicates of 10 birds each. Each replicate was kept in a pen. The floor of the pen was covered with wood shavings. Each group was randomly assigned to an experimental finisher broiler diet in a completely randomized design (CRD) and was fed for four weeks. Feed and water were supplied ad-libitum. Feeding was done once daily around 8am. The birds were weighed at the beginning of the feeding trial and weekly thereafter. Feed intake was recorded daily by weighing the quantity of feed given and the leftover the following morning. The finisher phase of the feeding trial lasted for 4 weeks.

At the end of 28 days, 2 finisher broiler chickens from each replicate within each treatment were randomly selected and blood samples collected for haematological assessment such as Packed Cell Volume (PCV), Red Blood (Erthrocytes) count (RBC), Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH), Haemoglobin (Hb) and White Blood Cell (Leukocyte) count. Data obtained in each measured parameter were subjected to Analysis of Variance (ANOVA) according to Snedecov and Cochran (1989) in a Completely Randomized Design (CRD) and difference between treatment means were separated using the Duncan's New Multiple Range Test (Duncan, 1955).

Results and Discussion

Haematological indices of finisher broiler chickens fed diets containing *Calapogonium mucunoides* leaf meal supplemented with yeasts (Saccharomyces cerevisiae) was showed on (Table 3). The result of the Packed Cell Volume (PCV) showed that there was no significant difference ($P > 0.05$) across the treatment groups. However, the Packed Cell Volumes (PCV) obtained were within the normal ranges of 22 – 35% reported by Jain (1993).

The result of Haemoglobin (Hb), White Blood Cells (WBC), Mean Cell Volume (MCV) and Mean Cell Haemoglobin concentration (MCHC) showed that there was no significant difference ($P > 0.05$) across the treatment groups. The Hb values obtained ranges from 7.07 – 7.34 g/dl and were within the normal range of (7.0 – 13.0 g/dl) reported by Jain (1993). Haemoglobin concentration of the blood has been associated with availability of nutrients to the animal body (Esonu, 2001). The finisher broiler chickens on the control diet recorded the highest MCV of 123.99 fl followed by those in diet 3(15% CLM and diet 5 25% CLM) (100.64fl) while those on diet 2 (10% CLM) supplemented with yeast recorded the least

MCV. The MCV obtained was within the normal ranges of (90 – 130fl) as reported by Mitruka and Rawsley (1997).

The white blood cell (WBC) result ranges from 15.67 – 19.60 x 10^3/µl. There was no significant difference ($P > 0.05$) in the White Blood Cells. The values of the white blood cells increased with increase in the level of *Calapogonium* leaf meal supplemented with yeast in the diet. The values obtained in WBC fell within the normal reference values reported for birds by Cole (1980). The WBC of the finisher broiler chickens fall within the normal range, it means that the diets and the feeding pattern did not affect the immune system. There was no significant difference in MCHC of the finisher broiler chickens. Numerically, finisher broiler chickens on diet 3 (15% CLM) and diet 2 (10% CLM) supplemented with yeast recorded similar MCHC values but were higher than those in other treatment groups. The result of the feeding trial showed that the diet did not have any negative effect on the finisher broiler chickens because the result was in line with the normal range of haematological values for broiler chickens recommended by Mitruka and Rawsley (1997).

Table 3: Haematological indices of finisher broiler chickens fed diets containing *Calapogonium mucunoides* leaf meal supplemented with *Saccharomyces cerevisiae* (0.15g/kg diet)

Parameters	Diet 1 0% CLM	Diet 2 10% CLM	Diet 3 15% CLM	Diet 4 20% CLM	Diet 5 25% CLM	SEM	
PCV%	30.83	28.00	27.33	27.83	29.33	0.56	NS
HB g/dl	7.07	7.34	7.23	7.15	7.12	0.09	NS
RBC x 10^6/ml	2.50^b	2.87^a	3.10^a	2.82^{ab}	2.92^a	0.07	SD
WBC x 10^3/ml	15.67	17.47	18.80	18.80	19.60	1.39	NS
MCV fl	123.99	97.60	109.42	99.31	100.64	4.91	NS
MCH Pg	28.41^a	25.68^{ab}	23.34^b	25.45^{ab}	24.41^b	0.60	SD
MCHC g/dl	23.00	26.42	26.49	25.74	24.30	0.57	NS

^{abc} Means on the same rows with different superscripts differ significantly at $P < 0.05$; SEM: Standard Error of the Mean, RBC: Red Blood Cell; PCV: Packed Cell Volume, Hb: Haemoglobin; WBC: White Blood Cell, MCV: Mean Cell Volume; MCH: Mean Cell Haemoglobin, MCHC: Mean Cell Haemoglobin Concentration CLM: *Calapogonium mucunoides* leaf meal.

Conclusion

It was concluded from this study that Diet 5 (25% CLM) supplemented yeast which revealed the highest Packed Cell Volume (PCV), Red Blood Cell (RBC), White Blood Cell (WBC), Count could be considered for adoption by farmers in the diet of finisher broiler chickens.

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