EFFECT OF CATERPILLAR (*BUNAEOPSIS AURANTIACA)* AS REPLACEMENT FOR FISH MEAL ON THE GROWTH PERFORMANCE OF FINISHER BROILERS

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ABSTRACT

An experiment was conducted to evaluate the effect of graded levels of Caterpillar (*Bunaeopsis aurantiaca)* as replacement for fish meal on the growth performance and haematological parameters of finisher broilers. A total of 150 four- week old broilers were randomly allocated to five experimental diets formulated to contain 0, 15, 30, 45 and 60% caterpillar meal. There were 30 birds in each treatment which was replicated three (3) times with ten (10) birds per pen in a completely randomized design. Throughout the experimental period, feed and water were provided *ad libitum* for all treatment groups. The results revealed that average body weight gain (49.23-58.99 g), average feed intake (147.74-151.00 g) and feed conversion ratio (2.53-3.03), all the haematological parameters measured were not statistically (P>0.05) influenced by dietary treatments. The study concluded that up to 60% Caterpillar (*Bunaeopsis aurantiaca)* meal can be included as replacement for fish meal in the diets of finisher broilers without adverse effect on growth performance of birds.

Keywords: *Bunaeopsis aurantiaca,* fish meal, broilers, performance, haematology

INTRODUCTION

Poultry production is an enterprise that can be used to fight poverty and malnutrition. However, feed cost has been on the increase which constituted a major challenge for growth of the industry. Consequently, effective management of costs and benefits must be put in place in order to make profit and remain in business. Factors that affect profitability in poultry production include costs of inputs, rate of growth(weight gain), flock size, disease risks, general management, judicious use of inputs and disease control, among others (Jadhav and Siddiqui, 2010). Feed constitutes 60-70% of the total cost of poultry production (Adebambo *et al.,* 2010). In most tropical countries, fish meal, is very expensive and often scarce. Its scarcity has contributed in the rising costs of poultry feeds (Oluyemi and Roberts, 2013). Caterpillar (*Bunaeopsis aurantiaca)* is one promising candidate due to its high protein content (67.43% DM) and well-balanced amino acid profile (Makinde *et al.,* 2021). Caterpillar (*Bunaeopsis aurantiaca)* has been demonstrated to be an acceptable protein source in animal diets (Li *et al.,* 2013). The nutritional value of Caterpillar (*Bunaeopsis aurantiaca)* was reported to be comparable to fish meal (Ravzanaadii *et al.,* 2012). The research conducted by Adeniji (2007) indicated that insect meal could replace 75% and 100% of groundnut oilcake meal in the diets of broilers without adverse effect on dry matter intake. This study was therefore designed to evaluate the effect of graded levels of Caterpillar (*Bunaeopsis aurantiaca)* as replacement for fish meal on the growth performance of broiler finishers.

MATERIALS AND METHODS

The experimental was conducted at the Poultry unit of the Teaching and Research Farm, Federal College of Wildlife Management, New Bussa, Niger State previously described by Okunade *et al.* (2015). Dried samples of caterpillar and fish meal used in this study were purchased in large quantity from local caterpillar farmers at the big market («Grand marché» in French), Kisangani, Democratic Republic of Congo and transported to Nigeria. One hundred and fifty day old unsexed broiler chicks were purchased from a reputable hatchery. The birds were raised on deep litter pen with wood shaving as litter material. They were fed on a common diet for the first (4) week of the study after which they were randomly allocated into five experimental treatments of thirty birds per treatment, while each treatment was replicated three times (10 birds per replicate) in a completely randomized design (CRD). Feed and water were supplied *ad-libitum.* Management practices and vaccination programme

were followed strictly. Data were collected on average daily weight gain, average daily feed intake and feed conversion ratio. Blood samples were collected from four birds per replicate during the last week of the study. About 5 mls of blood was collected from each bird into bottles containing Ethylene Diamine Tetra Acetic Acid (EDTA) for haematological analysis.

Experimental diets

Five experimental diets were formulated to meet nutrient requirement standards of broilers (NRC, 1994). Diet 1 (0 % caterpillar meal) served as the control while diets 2, 3, 4 and 5 contained 15, 30, 45 and 60 % caterpillar meal respectively. The gross composition of the experimental diets is presented on Table 1.

Table 1. Ingredient Composition of the Experimental Diets

Ingredients, g/kg	**0**	**15**	**30**	**45**	**60**
Maize	55.85	55.85	55.85	55.85	55.85
Soyabean meal	24.15	24.15	24.15	24.15	24.15
Maize offal	6.80	6.80	6.80	6.80	6.80
Palm kernel cake	5.00	5.00	5.00	5.00	5.00
Fish meal (48%)	**1.50**	**1.27**	**1.05**	**0.82**	**0.60**
***Caterpilar**	**0.00**	**0.23**	**0.45**	**0.68**	**0.90**
Limestone	0.65	0.65	0.65	0.65	0.65
Bonemeal	3.00	3.00	3.00	3.00	3.00
Palm oil	2.00	2.00	2.00	2.00	2.00
Common salt	0.25	0.25	0.25	0.25	0.25
L-Lysine	0.25	0.25	0.25	0.25	0.25
DL-Methionine	0.25	0.25	0.25	0.25	0.25
**Vit/Min Premix	0.30	0.30	0.30	0.30	0.30
Total	**100**	**100**	**100**	**100**	**100**
Crude protein	20.94	20.52	20.17	19.84	19.34
Crude fibre	3.24	3.56	4.00	4.41	4.95
Energy (Kcal/Kg ME)	3088	3016	2960	2938	2901
Ether extract	6.12	6.07	6.11	6.18	6.09
Available P.	0.62	0.68	0.64	0.66	0.60

*Composition of vitamin premix per kg is as follows: Vitamin A, 8000 iu; Vitamin D_3, 1600 iu; Vitamin E 5 iu, Vitamin K 0.200 mg; Vitamins B, Thiamine B_1 0.5mg; Riboflavin B_2 4mg; Pyridoxine B_6 0.015 mg; Niacin 0.015mg; B_{12} 0.01mg; Pantothenic acid 0.5mg; folic acid 0.5mg and Biotin 0.020 mg; Chlorine chloride 0.02 mg; Anti-oxidant 0.125g and Minerals (Mn, Zn, Fe, Cu, I, Si, Co) 0.156g.

Data Analysis. No mortality was observed during the trial. Data generated were subjected to Analysis of variance (ANOVA) using the general linear model of statistical analysis system, Version 9.3 (SAS, 2015). Significance was accepted at $P < 0.05$.

RESULTS

The results of the effect of Caterpillar (*Bunaeopsis aurantiaca)* as replacement for fish meal on the growth performance (Table 2) and haematological parameters (Table 3) of broiler chickens show that there were no significant differences (P>0.05) in all the parameters measured.

Table 2. Effect of Caterpillar (*Bunaeopsis aurantiaca)* as replacement for fish meal on the growth performance of broiler chickens at finisher phase

Components	**0%**	**15%**	**30%**	**45%**	**60%**	**SEM**	**P-val**
Ave. initial wgt, g	1002.70	1002.26	1002.99	1002.70	1003.00	0.21	0.2582
Ave. final weight, g	2477.68	2380.74	2524.90	2654.67	2624.07	60.12	0.1006
Av. daily wt gain, g	52.68	49.23	54.35	58.99	57.35	2.13	0.1016
Ave daily feed int, g	151.00	149.31	147.74	149.14	147.64	1.43	0.6347
Feed conv. ratio	2.89	3.03	2.73	2.53	2.56	0.11	0.0701

SEM=standard error of mean.

Table 3: Effect of Caterpillar (*Bunaeopsis aurantiaca)* as replacement for fish meal on the haematological parameters of broiler chickens at finisher phase

Components	0%	15%	30%	45%	60%	SEM	P-val
Packed cell vol, %	35.00	34.67	35.67	36.33	36.67	1.61	0.8795
Haemoglobin, g/dl	12.43	12.07	11.23	12.43	11.33	0.63	0.6194
WBC, (X 10^6/mm^3)	7.20	6.98	7.51	6.99	7.97	0.61	0.4192
RBC, (X 10^3/mm^3)	3.46	3.68	3.84	3.76	3.82	0.31	0.9391
MCV, Fl	101.93	97.07	96.08	97.43	96.66	5.27	0.9847
MCHC, %	44.39	45.14	42.14	42.52	44.45	2.51	0.6815
MCH, Pg	36.69	33.68	34.76	33.24	35.84	2.61	0.5466

SEM=Standard error of mean. WBC= White blood cell. RBC= Red blood cell. MCV=Mean cell volume. MCH=Mean cell heamoglobin. MCH=Mean cell heamoglobin concentration

DISCUSSIONS

The search for alternative and sustainable proteins is an issue of major importance that needs viable solutions in the short term, making insect meal an increasingly attractive feed option for poultry. Insects are natural food sources for poultry. Chickens, for example, can be found picking insect larvae from the topsoil and litter where they walk. Caterpillar meal has been included in broiler diets as a replacement for conventional protein sources, notably fish meal. Most trials indicate that partial or even total replacement of fish meal is possible (Mabossy-Mobouna *et al.*, 2013; Mabossy-Mobouna *et al*., 2017; Makinde *et al.,* 2021). The non-significant effect observed on average weight gain, feed intake and feed conversion ratio at finisher phases confirms the reports of previous studies (Atteh and Ologbenla, 1993; Bamgbose, 1999). The research conducted by Adeniji (2007) indicated that insect meal could replace 75% and 100% of groundnut oilcake meal in the diets of broilers without adverse effect on dry matter intake. Also, Atteh and Ologbenla (1993) replaced fish meal with insect meal in a 0-5 week old broilers and reported that insect meal could replace up to 33% fish meal without adverse effect on intake and weight gain. At higher levels however, lower feed intake was reported.

In the current study, no difference was observed in red blood cells, white blood cells, packed cell volume, haemoglobin and other haematological parameters in our study. This may show that dried Caterpillar (*Bunaeopsis aurantiaca*) meal did not affect routine blood indexes. This may be due to the similar main protein source as fish meal. The non-significant difference (P>0.05) in packed cell volume as observed in this study implies that the inclusion of *Bunaeopsis aurantiaca* in broilers diet had little or no effect on the relative quantity of blood cells as compared with the total volume of blood (Health and Olusanya, 1985). All the haematological values obtained were all within the normal range reported by (Makinde, 2015; Makinde *et al.*, 2017) for broiler chickens.

CONCLUSIONS

This study has shown that Caterpillar (*Bunaeopsis aurantiaca)* is a rich source of protein that could serve as alternative feed resource in broiler feeds. It can therefore be concluded that up to 60% Caterpillar (*Bunaeopsis aurantiaca)* meal can be included as replacement for fish meal in the diets of finisher broilers without adverse effect on growth performance of birds.

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