EFFECT OF CATERPILLAR (*BUNAEOPSIS AURANTIACA)* MEAL AS A REPLACEMENT FOR FISH MEAL ON CARCASS AND SENSORY EVALUATON IN BROILER CHICKEN

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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 carcass and sensory 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. Data were collected on carcass and sensory characteristics of the birds. Results revealed that live weight (2380.74-2654.67 g), dressing percentage (84.54-86.14 %) and breast weight (18.17-21.34 %), and all the sensory 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 carcass and sensory parameters of birds.

Keywords: *Bunaeopsis aurantiaca,* fish meal, broilers, carcass, sensory

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 resources 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 cake 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 on carcass and sensory parameters of broiler finishers.

MATERIALS AND METHODS

The experiment 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.

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**
***Caterpillar**	**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 Phosphorus	0.62	0.68	0.64	0.66	0.60

*Composition of vitamin premix per kg is as follows: Vitamin A, 8000 iu; Vitamin D3, 1600 iu; Vitamin E 5 iu, Vitamin K 0.200 mg; Vitamins B, Thiamine B1 0.5mg; Riboflavin B2 4mg; Pyridoxine B6 0.015 mg; Niacin 0.015mg; B12 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 carcass (Table 2) and sensory analysis (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 carcass characteristics of broiler chickens

Components	0%	15%	30%	45%	60%	SEM	P-val
Live weight, g	2477.68	2380.74	2524.90	2654.67	2624.07	60.12	0.1006
Slaughter weight, g	2312.55	2215.63	2359.81	2489.55	2459.01	58.11	0.1006
Dressed weight, g	2109.43	2012.51	2156.73	2286.56	2256.03	57.03	0.1006
Dressing , %	85.11	84.54	85.39	86.14	85.95	0.35	0.1030
Back weight, %	15.80	14.11	18.68	16.03	19.06	1.40	0.2611
Thigh weight, %	13.43	14.63	13.11	13.84	14.15	1.24	0.1263
Wing weight, %	9.51	8.45	10.14	9.74	10.13	0.81	0.1236
Drumstick weight, %	11.03	10.14	10.14	10.93	11.03	0.92	0.6031
Breast weight, %	18.17	18.43	20.27	20.42	21.34	1.60	0.5500

SEM=standard error of mean.

Table 3. Effect of Caterpillar (*Bunaeopsis aurantiaca)* as replacement for fish meal on sensory analysis of broiler chickens

Components	0%	15%	30%	45%	60%	SEM	P-val
Tenderness	7.89	7.94	8.28	8.22	7.67	0.31	0.7509
Juiciness	6.778	7.11	8.06	7.89	7.44	0.42	0.3727
Flavour	7.33	7.56	7.00	7.56	7.56	0.24	0.5933
Taste	8.33	8.39	7.39	8.22	8.33	0.23	0.1205
Overall acceptability	789	8.17	7.56	7.89	8.33	0.25	0.4791

SEM=standard error of mean.

DISCUSSION

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 all carcass parameters measured confirms the reports of previous studies (Teguia *et al.,* 2002). 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. Teguia *et al.* (2002) studied the effect of insect meal supplementation in broiler nutrition and its effect on performance and carcass characteristics in the starter, grower and finisher phases. The species of insect used was not reported though. All the treatment diets were formulated to have similar nutritional values, but the control diet contained no insect meal. Results showed 100% insect meal improved the carcass yield ($p \leq 0.05$), heart percentage ($p \leq 0.05$), liver percentage ($p \leq 0.05$), gizzard percentage ($p \leq 0.05$) and leg percentage ($p \leq 0.05$) at grower-finisher phase. Hwangbo et al. (2009) investigated the effect of housefly meal (HFM) supplementation (0, 5, 10, 15, 20, and 25 %) on carcass characteristics of Ross male commercial broiler chickens. The authors reported that 5% HFM improved dressing percentage ($p \leq 0.05$) and 10% HFM improved breast muscle yield ($p \leq 0.05$) of broilers. Okah and Onwujiariri (2012) however observed a decrease in live weight and dressing percentage of broilers, when maggot meal replaced fish meal at 20% in the diets.

CONCLUSION

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 carcass and sensory parameters of birds.

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