

GROWTH PERFORMANCE, ORGANS, CARCASS CHARACTERISTICS AND MEAT QUALITY OF BROILER FED BITTER LEAF (*Vernonia amygdalina*) AND CATMINT (*Nepeta racemosa*) LEAF MEAL SUPPLEMENTS

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Abstract

A 49 days study was conducted to examine the impact of Bitter leaf (*Vernonia amygdalina*) and Catmint leaf (*Nepeta racemosa*) meal supplement on performance, organ, carcass characteristics and meat quality of broiler from day old. 150 day old unsexed Abor-Acer broiler chicks were randomly allotted into five dietary treatments using completely randomized design experiment (CRD). Each treatment was replicated thrice with 10 chicks per replicate. Five experimental diets were formulated such that Diet 1 contained neither bitter leaf nor catmint leaf meal, diet 2 contained 5g of catmint leaf meal per kg feed, Diet 3 contained 5g of Bitter leaf meal per kg of feed, Diet 4 contained 2.5g each of bitter leaf and catmint leaf meal per kg of feed while Diet 5 contained 5g each of both bitter leaf and catmint leaf meal per kg of feed. The result of performance characteristics showed significant differences ($P < 0.05$) only at feed intake and feed conversion ratio. No significant difference ($P > 0.05$) was observed on the carcass parameters except at the thigh proportion, while proventriculus, pancreas, spleen and liver were significant ($P < 0.05$) among the organs. The meat quality was significantly ($P < 0.05$) decreased in term of Colour, Flavour, Juiciness, Tenderness and General acceptability, only bitter leaf compete well with the control. It could therefore be concluded from the study that Bitter leaf and its mixture with catmint leaf meals can be included as supplements in broiler diet up to 5g/1kg at both the starter and finisher phase.

Key words: Catmint, Bitter leaf, Supplement, Broiler

Introduction

Feed additives are ingredients added to poultry diets to enhance feed utilization, improve health, promote growth and reduce morbidity as well as mortality (FAC, 1998). Hence, feed additives are added to diets for reasons other than supply of nutrients to the animals. The economic benefit of plant based feed additive has been the lowering of production cost as a result of their availability in our natural ecosystem and their affordability. These plant materials with bioactive ingredients could be used in diverse forms. Recently, plant based feed additives also known as phytogenic have been advocated to be included in broiler feed as growth promoting feed additives since they do not have residual effects (Ndelekwute *et al.*, 2015). Phytogenic can improve the consumption and conversion of feed, the digestibility and weight gain of broiler chickens (Cardoso *et al.*, 2012). Bitter leaf (*Vernonia amygdalina*) is a shrub or small tree that grows throughout tropical Africa. It is popularly called bitter leaf because of its abundant bitter principle (Ekpo *et al.*, 2007). Proximate composition of *Vernonia amygdalina* shows a chemical composition of 527.83 ME kal/kg, 86.40% DM, 21.50% CP, 13.10% CF, 6.80% EE, 11.05% Ash and the result composition of mineral indicate that *Vernonia amygdalina* has 3.85% Calcium, 0.40% Magnesium, 0.03% Phosphorus, 0.06% Iron, 0.33% potassium and 0.05% sodium (Owen 2011). Research has shown that *Vernonia amygdalina* has some beneficial effects in disease management of poultry, such as anti-coccidiosis, anti-bacteria and anti-parasitic (Dakpogan, 2006), also as an anti-oxidant (Erasto *et al.*, 2017) and as a growth promoter by enhancing the gastro intestinal enzymes thus increasing feed conversion efficiency (Huffmum *et al.*, 1996; Olobatoka and Oloniruha, 2009).

Catmint (*Nepeta racemosa*) contains about 150 species and is largely in the horticulture as ornamental plant. A short essential oil of catmint containing *Nepeta lactonces* is largely responsible for the plants biological activities including lived perennial herbaceous plant, is perhaps the best known species, long recognized as the plant that induces a state of euphoria and stupor in domesticated cats (Clapperton *et al.* 1994; Herron 2003). Catmint has many reported benefits as herbal supplements for both lives stock and man; some of these include treatment for anxiety, insomnia, Coccidiosis and antistress (Debborm *et al.*, 2016). The two beneficial plants were therefore investigated to determine their potential as feed supplements and growth promoters in broiler production.

Materials and Method

The experiment was carried out at the Teaching and Research Farm of Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria and lasted for 49 days. The catmint leaf (*Nepeta racemosa*) and bitter leaf (*Vernonia amygdalina*) were sourced from Ladoke Akintola University of Technology, Ogbomoso's farm. The leaves were rinsed with clean water in order to remove foreign materials, and were air dry on a drying slab for 7 days and slightly sundried for 30 minutes, then ground into meal. The meals were kept in air tight containers till commencement of the experiment. A total of one hundred and fifty (150) day old unsexed Abor-Acre broiler chicks were brooded for 10 days and randomly divided into 5 dietary treatments of three replicates per treatment in a completely randomized design. Each replicate had 10 chicks. The chicks were managed on deep litter pens for seven weeks by providing *ad-libitum*, fresh and clean water and weigh quantity of feed when necessary. All routine and occasional management practices were strictly adhered except medication activity that was ceased for those on supplements. The control diet (T1) contained no bitter leaf and catmint leaf meal while diets 2, 3, 4 and 5 (T2, T3, T4 and T5 respectively) contained bitter leaf and catmint leaf meals at 5g of catmint leaf meal (CLM) per kg feed, 5g bitter leaf meal (BLM) per kg feed, 2.5gBLM + 2.5g CLM per kg feed and 5gBLM + 5g CLM per kg feed. Data were collected at the end of every week. Daily feed consumption, body weight gain and feed conversion ratio were monitored. At the end of the experiment the birds were weighed and two birds per replicate were slaughtered for carcass evaluation. Data collected were subjected to analysis of variance (ANOVA) using the general linear model of SPSS, 2010.

Results and Discussion

The performance of experimental birds was presented in Table 1. There were significant difference ($P<0.05$) in mean values obtained from the total feed intake, the average daily feed intake and feed conversion ratio while other growth parameters were not significantly influenced ($P>0.05$) however, only T3 (5g/kg bitter leaf) had feed conversion ratio compare favorably well to control and was in agreement with the report of Tangka (2003). Mohammed and Zakariya'u (2012) used bitter leaf meal at varying levels ranging from 300g to 900g per 100kg from starter phase and reported no significant difference in live weight and the bitter leaf significantly reduced feed intake which was attributed to the high level of the bitter leaf which could have made the feed unpalatable. Similar weight gain at a reduced feed intake resulted to various better feed conversion ratio reported.

Table 1: Growth performance of Broiler Chicken fed with bitter leaf and catmint leaf meal Supplement

PARAMETERS	T1	T2	T3	T4	T5	SEM
Total Feed Intake (g)	4323.35 ^b	4348.83 ^b	4200.69 ^{ab}	4621.64 ^b	4476.19 ^{ab}	57.79
Average Weight Gain (g)	1705.03	1676.54	1687.07	1704.46	1615.96	32.44
Average Daily Feed Intake (g)	88.23 ^b	89.73 ^b	85.71 ^{ab}	94.31 ^a	91.35 ^{ab}	1.18
Average Daily Weight Gain (g)	36.28	35.67	34.47	36.27	34.38	0.69
Feed Conversion Ratio	2.43 ^a	2.51 ^b	2.48 ^{ab}	2.68 ^b	2.66 ^b	0.05

^{ab} means along the same row with different superscripts are significantly different ($P<0.05$)

T2; 5g of catmint/kg feed, T3; 5g of Bitter leaf/kg, T4; 2.5g/kg each catmint and bitter leaf, T5; 5g/kg each of catmint and bitter leaf.

Table 2 show the carcass characteristics of broiler chicken fed experimental diets supplemented with bitter leaf and catmint leaf meals. All parameters measured under carcass characteristics were not significantly ($P>0.05$) different except proportion of thigh. The proportion of primal cuts was numerically enhanced by the bitter leaf meal supplement (breast proportion). Combination of catmint and bitter leaf at 2.5g/kg of feed gave the best live weight. This is in line with the report that inclusion of bitter leaf in broiler diets leads to improvement in body weight, dressing percentage and carcass quality (Chiemela *et al.*, 2015). The hypolipidaemic effect of bitter leaf that ensured the development of leaner meat, could be responsible for better conversion of feed nutrients to meat (Vivian *et al* 2015), as it was observed in the proportion of breast meat of this finding.

Table 2: Carcass characteristics of broiler chicken fed with Bitter leaf and Catmint Supplement

PARAMETERS	T1	T2	T3	T4	T5	SEM
Live weight	1816.33	1768.75	1857.75	1892.75	1748.00	32.43
Carcass weight	1393.00	1218.50	1326.75	1231.25	1167.33	26.20
Carcass (%)	76.52	68.89	71.42	70.34	66.78	0.61
Neck (%)	4.07	5.01	4.03	4.59	4.46	0.14
Wing (%)	13.25	12.93	12.75	12.49	12.82	0.22
Drum stick (%)	15.71	15.59	15.26	15.10	15.32	0.22
Breast (%)	30.51	29.85	31.18	30.96	30.84	0.62
Back (%)	18.42	20.16	19.66	20.82	20.38	0.24
Thigh (%)	18.53 ^a	17.19 ^b	17.12 ^b	16.01 ^c	16.42 ^c	0.24

^{ab} means along the same row with different superscripts are significantly different (P<0.05)

T2; 5g of catmint/kg feed, T3; 5g of Bitter leaf/kg, T4; 2.5g/kg each catmint and bitter leaf, T5; 5g/kg each of catmint and bitter leaf.

Table 3 showed the organ parameters of birds fed with different supplements at varying levels. Significant differences (P<0.05) were recorded from mean proportions of Proventriculus, Spleen, Liver and Pancreas. Others (lungs, Heart and gizzard) were not (P>0.05) significant. The variation or increase in their size recorded from organs, (especially liver at T2) obtained from treatments with supplements may be as a result of extra activities of the organ, like detoxification process to get rid of excess phyto-chemical compounds inherent in the materials.

Table 3: Organ characteristics of broiler chicken fed with Bitter leaf and Catmint supplements.

Parameters	T1	T2	T3	T4	T5	SEM
Proventriculus(%)	0.482 ^c	0.767 ^a	0.583 ^{bc}	0.690 ^{ab}	0.591 ^{bc}	0.28
Gizzard (%)	3.089	3.785	3.093	3.428	3.386	0.116
Spleen (%)	0.103 ^{ab}	0.124 ^a	1.131 ^a	1.075 ^b	0.071	0.007
Liver (%)	2.937 ^a	3.069 ^a	2.767 ^b	2.932 ^a	2.534 ^c	0.118
Pancreas (%)	0.250 ^{bc}	0.296 ^b	0.226 ^c	0.383 ^a	0.271 ^{bc}	0.013
Kidney (%)	0.432	0.434	0.408	0.415	0.371	0.026
Lung (%)	0.535	0.522	0.511	0.537	0.491	0.02
Heart (%)	0.432	0.453	0.462	0.483	0.423	0.012

^{abc} means within row having different superscripts are significant different (P<0.05)

T2; 5g of catmint/kg feed, T3; 5g of Bitter leaf/kg, T4; 2.5g/kg each catmint and bitter leaf, T5; 5g/kg each of catmint and bitter leaf.

Colour, Flavour, juiciness, Tenderness and General acceptable were significant (P< 0.05). The two additives did not support meat quality and only T3 was less affected and similar (P<0.05) to the control in term of meat colour, tenderness and general acceptability. Meat quality was significantly (P<0.05) affected by feed supplementation with catmint and bitter leaf meals (Table 4). All birds placed on catmint (either only or together with bitter leaf) were more affected in term of meat quality measured. Among those fed with supplements, only 5g/kg of feed, bitter leaf had similar quality with the control, indicating that these leaf supplements had negative impact on the organoleptic properties of chicken meat.

Table 4: Meat Quality of broiler chicken fed with Bitter leaf and Catmint supplements.

Parameters	T1	T2	T3	T4	T5	SEM
Colour	7.20 ^a	4.60 ^c	7.20 ^a	5.90 ^b	5.50 ^{bc}	0.177
Flavour	7.30 ^a	5.10 ^b	6.00 ^b	5.20 ^b	5.00 ^b	0.190
Juiciness	6.50 ^a	6.00 ^{ab}	6.50 ^a	6.10 ^{ab}	5.20 ^b	0.159
Tenderness	6.10 ^{ab}	5.30 ^b	6.50 ^a	6.70 ^a	5.60 ^{ab}	0.171
General acceptable	7.50 ^a	6.00 ^{bc}	6.70 ^{ab}	6.30 ^{bc}	5.20 ^c	0.193

^{abc} means along the same row with different superscripts are significant different (P<0.05)

T2; 5g of catmint/kg feed, T3; 5g of Bitter leaf/kg, T4; 2.5g/kg each catmint and bitter leaf, T5; 5g/kg each of catmint and bitter leaf.

Conclusion and Recommendation

The result of this study has shown that catmint leaf and bitter leaf meal could be used to substitute antibiotics. However, catmint and bitter leaf meal supplement only numerically enhance(s) the growth rate of birds and can be utilized as natural growth promoters because of its non-residual effects. Addition of 5g/kg of bitter leaf meal to diets of broilers positively influenced growth and feed intake,

improve the carcass, organs and meat quality of broiler chicken. However, higher utilization level of Catmint leaf meal and Bitter leaf meal supplements above 5g/kg can be investigated in the broiler diet. This will help establish their potentials in reducing the production cost with normal medication potential.

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