



EFFECT OF DIETARY SUPPLEMENTATION WITH *Monodora myristica* ON THE PERFORMANCE AND ECONOMICS OF PRODUCTION OF STARTER BROILERS

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Abstract

This study was conducted to evaluate the effect of dietary supplementation with *Monodora myristica* (African nutmeg) on the growth performance and economics of production of starter broilers. 120 one week old CHI broilers chicks were randomly allotted to five treatment groups in a completely randomized design. Each group was replicated three times with 8 birds per replicate. Five experimental broiler starter diets were formulated such that T₁, T₂, T₃, T₄ and T₅ contained 0g, 5g, 10g, 15g and 20g of *Monodora myristica* respectively. Feed and water was provided *ad libitum*. Parameters evaluated were weight gain, feed intake, feed conversion ratio and cost-benefit analysis. There was no significant ($p>0.05$) difference in feed intake of the birds among the groups. The final body weight, body weight gain, daily weight gain and feed conversion ratio were significantly ($p<0.05$) influenced by *Monodora myristica*. *Monodora myristica* significantly ($p<0.05$) improved the weight gain and feed conversion ratio of the birds. T₂ (5g) recorded significantly ($p<0.05$) the best growth performance. Results also showed the cost of feed consumed and cost of production were comparable across the treatments. Supplementation of African nutmeg reduced the cost of feed/kg weight gain, increased the revenue generated and the net return from the treated birds. It could be concluded that dietary supplementation of *Monodora myristica* at up to 20g/kg feed has the potential to improve body weight gain, efficiency feed, economically viable and could be used as growth promoter.

Keywords: broilers, *Monodora myristica*, performance, supplementation

Introduction

The non-prescriptive use of antibiotics in poultry production to improve poultry performance and health has been banned due to concerns about their residues in animal tissues and subsequent induction of bacterial resistance. This situations has resulted in search for natural and safe alternatives in form of prebiotic, probiotic, enzymes, herbal products, spices, immune modulators, organic acid etc. to maintain optimum growth rates (Kral *et al.*, 2011)

Monodora myristica commonly called African nutmeg is a perennial edible plant of the family Annonaceae that grows wild in evergreen forests of Africa (Burubai *et al.*, 2008). *Monodora myristica* has its common names as African nutmeg, calabash nutmeg, and in Nigeria, it is called “Ehuru” in Igbo, “Abolakoshe” in Yoruba and “Ebenoyoba” in Benin (Okafor, 2003, Burabei, *et al.*, 2008). Its seeds usually embedded in a white sweet smelling pulp, were reported to possess valuable economic and medicinal value (Okafor, 2003). In Nigeria and other African countries, the kernel obtained from the seeds of African nutmeg (*Monodora myristica*) is a popular spicing agent as well as an aromatic stimulating addition to medicine and snuff (Ekeanyanwu and Etienajirhevwe, 2012). The seeds are composed of moisture (14.7 %), protein (9.1 %), oil (29.1 %), food energy (458 kcal / 100 g), fibre (25.9 %) and ash (2.3 %) (Burubai *et al.*, 2008). The seeds are also rich in potassium, phosphorus, calcium and magnesium. Ukoha (2011) reported a proximate composition of toasted *Monodora myristica* to include 25.38% crude protein, 21.54% Ether extract, 6.24% crude fibre, 9.40% ash and 37.44% nitrogen free extract. *Monodora myristica* seed extract contains important pharmacological compounds like alkaloids, flavonoids, and vitamins A and E as well as many important lipids (Eze-Steven *et al.*, 2013). Previous studies have reported the antioxidant properties of *M. myristica* seeds (Moukette *et al.*, 2015). This minty smelling seed has also been investigated to possess cholesterol lowering activity (Nwozo *et al.*, 2015), antimicrobial activity (Esekhiagbe *et al.*, 2009) as well as anthelmintic activity (Ekeanyanwu and Etienajirhevwe, 2012). In view



of the potentials of this plant, and the fact that much work has not been done to evaluate its benefits in poultry nutrition, this study was designed to determine the effect of dietary supplementation with African nutmeg (*Monodora myristica*) on growth performance and economics of production of starter broilers.

Materials and methods

The experiment was conducted at Poultry Research Unit, Department of Animal Science, Ebonyi State University, Abakaliki.

Experimental Diets

Five experimental broiler starter diets were formulated and used for the experiment. *Monodora myristica* powder gotten by grinding/milling the African nutmeg seed to a fine powder was incorporated into the diet such that birds in T₂, T₃, T₄ and T₅ were served feed that contained 5g, 10g, 15g and 20g of African nutmeg/kg of feed respectively. Birds in treatment 1 (T₁) were served 0g African nutmeg per kilogram feed. The ingredient and chemical composition of the experimental broiler starter diets is shown in Tables 1

Table 1: Ingredients and chemical composition of the experimental diets

Ingredients	T ₁ (5g)	T ₁ (5g)	T ₂ (10g)	T ₃ (15g)	T ₄ (20g)
Maize	52.00	52.00	52.00	52.00	52.00
Soyabean meal	24.00	24.00	24.00	24.00	24.00
Wheat offal	10.00	10.00	10.00	10.00	10.00
Palm kernel cake	7.00	7.00	7.00	7.00	7.00
Fish meal	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Lysine	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
<i>Monodora myristica</i>	-	+	+	+	+
Total	100.00	100.00	100.00	100.00	100.00
Chemical Composition					
Crude protein	21.40	21.40	21.40	21.40	21.40
Ether extract	3.83	3.83	3.83	3.83	3.83
Crude fibre	6.45	6.45	6.45	6.45	6.45
ME (Kcal/kg)	2858.7	2858.7	2858.7	2858.7	2858.7

* Premix supplied (Univit 15 Roche) contained: 15001.U, Vit.A;15001.U, Vit.D;30001.U, Vit.E;3.0g, Vit.K;2.5g, Vit.B2;0.3g, Vit.B6; 8.0mg, Vit.B12;8.0g, Nicotinic acid; 3.0, Ca-Panthothenate;5.0mg, Fe;10.0g, Al;0.2g, Cu;3.5mg, Zn;0.15mg, I;0.02g, Cu;0.01g,Sc.

Experimental birds and management

One hundred twenty healthy eight day old CHI broiler chicks were divided and distributed randomly into four groups having three replicates of 8 birds each in a completely randomized design. Feed and water were provided *ad-libitum* throughout the experimental period. The birds were weighed to obtain their initial body weight before the commencement of the experiment. Each experimental unit of the chicks was reared in a separate pen. The birds were kept under similar management conditions like space, light, temperature, ventilation and relative humidity. The pen was provided with electric heaters to adjust the environmental temperature according to the age of the birds. Parameters evaluated were body weight gain, feed intake, feed conversion and economics of production. The trial lasted 28 days. Data were analyzed by using General Linear Model procedure of SAS (2004). Duncan's multiple range test was used to detect the differences ($p \leq 0.05$) among different group means.



Results and Discussion

Results on the growth performance of broiler starter fed *Monodora myristica* are presented in Table 2.

Table 2: Growth performance of starter broilers fed graded levels of *Monodora myristica*

Parameters	T ₁ (0g)	T ₂ (5g)	T ₃ (10g)	T ₄ (15g)	T ₅ (20g)	SEM
Initial body weight (g)	175.00	170.80	179.20	170.80	170.80	6.72
Final body weight (g)	1166.67 ^b	1358.33 ^a	1316.67 ^a	1341.67 ^a	1325.00 ^a	38.91
Body weight gain (g)	991.70 ^b	1187.50 ^a	1137.50 ^a	1170.80 ^a	1154.20 ^a	34.91
Daily weight gain (g)	35.42 ^b	42.41 ^a	40.63 ^a	41.82 ^a	41.22 ^a	1.24
Total feed intake (g)	2691.67	2675.00	2729.17	2695.83	2691.67	38.37
Daily feed intake (g)	96.12	95.54	97.47	96.28	96.13	1.37
Feed conversion ratio	2.72 ^a	2.26 ^b	2.40 ^b	2.31 ^b	2.33 ^b	0.08

a, b, Means with different superscripts along the same row are significantly ($P < 0.05$) different; SEM

Table 2 showed *Monodora myristica* had significant ($P < 0.05$) effect in the final body weight, body weight gain, daily weight gain and feed conversion ratio of the birds among the treatments. Birds fed African nutmeg supplemented (T₂, T₃, T₄ and T₅) diets had significantly ($p < 0.05$) higher weight gain than birds fed unsupplemented T₁ diet. There was no significant difference ($P > 0.05$) in body weight gain and feed conversion ratio of the groups (T₂, T₃, T₄ and T₅) fed *Monodora myristica* supplemented diets. *Monodora myristica* significantly enhanced the weight gain and feed conversion ratio of the birds fed the treated diets. The improvement of body weight gain and feed conversion are due to the active materials (phenols and flavonoids) found in *Monodora myristica*, causing greater efficiency in the utilization of feed, resulting in enhanced growth (Ogunmoyole *et al.* 2013). The increase in weight gain of broilers fed *M. myristica* diets over the control is in line with the report by Ukoha (2011), who reported an increase in body weight gain of broilers fed African nutmeg. There was no significant ($P > 0.05$) difference in the feed intakes of the birds fed the supplemented diets and the control. The similarity in feed intakes of the birds are in line with the finding of Bozkurt *et al.* (2012) who observed that inclusion of the natural herbal growth promoters in broiler ration did not improve feed consumption.

Economics of Production for Starter

The Economics of production of starter broilers fed African nutmeg (*Monodora myristica*) is shown in Table 3

Table 3: Cost Effectiveness of feeding *Monodora myristica* supplemented diets to starter broilers

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅
Cost of bird procurement (₦)	240.00	240.00	240.00	240.00	240.00
Cost of feed/kg (₦)	150.00	150.00	150.00	150.00	150.00
Total feed consumed/bird (g)	2691.67	2675.00	2729.17	2695.83	2691.67
Medication and miscellaneous (₦)	60.00	60.00	60.00	60.00	60.00
Body weight gain (g)	991.70 ^b	1187.50 ^a	1137.50 ^a	1170.80 ^a	1154.20 ^a
Cost of feed consumed/bird (₦)	403.75	401.25	409.38	404.37	403.75
Feed cost (₦)/kg weight gain/bird	407.12	337.90	359.89	345.38	349.81
Total cost of production (₦)	703.75	701.25	709.38	704.37	703.75
Cost of bird (meat)/kg (₦)	1000.00	1000.00	1000.00	1000.00	1000.00
Revenue generated /bird (₦)	1166.67	1358.33	1316.67	1341.67	1325.00
Net return/bird (₦)	462.92	657.08	607.29	637.30	631.25
Cost benefit ratio	1.52	1.07	1.17	1.11	1.11

The result of the economic effectiveness of feeding African nutmeg supplemented diets to starter broilers showed that the cost of feed consumed and cost of production were comparable across the treatments. Supplementation of African nutmeg reduced the cost of feed/kg weight gain, increased the revenue generated and the net return from the treated birds. Birds in T₁ recorded the highest cost of feed/kg



weight gain, least revenue generated and net return. The decrease in the cost of the feed/kg gain of birds fed supplemented diets is attributed to enhanced weight gain of birds fed supplemented diets which resulted to high sales of the product and thus net returns from the supplemented groups. The results of the present study are in line with the findings of Ahmad (2005), who reported that dietary inclusion of polyherbal in the rations was more beneficial in broiler production. Increase in the profit margin of the birds fed rations supplemented with *Monodora myristica* may be attributed to the better efficiency of feed utilization, which resulted in more growth and better feed conversion ratio, ultimately leading to higher profit margin in the broiler reared on *Monodora myristica* supplemented diets.

Conclusion

From the findings of the present study it can be concluded that supplementation of broiler starter diets with *Monodora myristica* at up to 20g per kg of feed significantly increased body weight gain and feed conversion ratio as compared to that of control group of broiler. Thus, *Monodora myristica* supplementation in the broiler rations may be useful for the safe, economical and efficient production of broiler. The findings of this study indicated that inclusion of *Monodora myristica* in broilers diets should be encouraged since it does not have any adverse effect on the birds performance and is economically viable.

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