Effect of dietary inclusion of *Anthonata macrophyla* meal on the performance of broiler starter chicks

C. S. Durunna , A.B.I. Udedibie and M.C. Uchegbu

Department of Animal science and Technology, Federal University of Technology, Owerri, Nigeria.

Abstract

A 28-day feeding trial was conducted to evaluate the effect of dietary inclusion of *Anthonata macrophyla* meal on the performance of broiler starter chicks. *Anthonata macrophyla* was harvested from the wild, washed, chopped into tablets, sun-dried and milled to produce the test meal. The meal contained on dry matter basis 21.11% crude protein, 1.90% crude fat, 2.00% total ash, 5.03% crude fibre and 54.36% nitrogen free extract. Five (5) broiler starter diets were formulated to contain the meal at 0, 5, 10, 15 and 20% level, respectively. One hundred and eighty (180) day-old Anak broiler chicks were divided into 5 groups of thirty-six birds each and randomly allocated to the five treatment rations in a completely randomized design (CRD). Data were collected on feed intake, weight gain, feed conversion ratio, protein efficient ratio, cost of production of one kilogramme of each test feed among others and carcass characteristics. At 15 and 20% dietary levels, *Anthonata macrophyla* significantly ($P < 0.05$) depressed feed intake, daily weight gain, feed conversion and protein efficiency ratios and final weight gain of the birds. Organ weight parameters showed no significant ($P > 0.05$) differences among the treatments. The results of this investigation suggest that *Anthonata macrophyla* meal can be included in broiler starter ration up to 10% without any deleterious effect on the birds and at this level of inclusion, feed cost was reduced by 10%.

Key Words: Broiler starter, feed, *Anthonata macrophyla*

Introduction

The increasing competition between man and livestock for available grains and tubers for food, feed and industrial raw materials, coupled with Nigeria's sole concentration on the oil sector for revenue to the utter neglect of agriculture, has led to high cost of available food/feed resources (Udedibie and Durunna, 2000). Consequently, the average poultry and pig farmers have been pushed out of production leading to high cost of

available livestock and livestock products. This scenario has since led to closure of a number of livestock farms with its resultant decrease in meat and egg consumption and increase in the number of the unemployed.

There is the need therefore to search for alternative feed materials far removed from human and industrial interests for food and raw materials. *Anthonata macrophyla* is a dicotyledonous shrub that grows about 3 to 5m

tall. It is a member of the family leguminosae. Members of this family are of economic importance as sources of food that supply protein (Omole, 2003). The shrub grows in abundance in the wild in the South East and South-South States of Nigeria. Its seeds, which are dispersed by explosive mechanism, are contained in a pod. A pod measures 16cm in length and 6cm in width on the average. When fresh, each seed, which measures about 2 x 4cm in size, weight 18gm on the average. *Anthonata macrophylla* withstands the slash and burn system of agriculture practiced in the geographical locations where it is found. Except for firewood, the plant or the seed is neither put to use in industry nor for food or livestock production. No work on its agronomic attributes or commercial use is known to have been done. As feed which accounts for between 70 and 80% of total cost of broiler production in Nigeria (Akinwumi *et al* 1979, Okon and Ogunmodede 1995) is the most important input for profitable poultry production, the study herein reported was undertaken to determine the feeding value of *Anthonata macrophylla* meal (called Ububara in Igbo language) for raising broiler starter chicks.

Materials and Methods

The seeds of *Anthonata macrophylla* used for this trial were harvested from Umuogbo Ntu and Eziam Obiato in the Ngor Okpuala and Mbaitoli Local Government Areas of Imo State. They were washed, chopped into tablets and milled using hammer mill with sieve size of 5mm. Samples of the meal were analyzed for proximate composition (Table 1) using standard methods (A.O.A.C., 2000). The meal produced as described above was used to formulate five experimental diets at 0,5,10,15, and 20% level of inclusion (Table 2). One hundred and eighty (180) day-old *Anak* broiler chicks were divided into 5 groups of thirty-six (36) chicks each and randomly assigned to the five treatment diets in

Table 1: *Proximate composition of *Anthonata macrophylla* meal (%)

Nutrient	(%)
Moisture	15.60
Dry matter	84.40
Crude Protein (% DM)	21.11
Crude Fat (% DM)	1.90
Ash (% DM)	2.00
Crude Fibre (% DM)	5.03
NFE	54.36
Minerals(%)	
Calcium	0.60
Magnesium	0.03
Sodium	0.10
Potassium	0.12
Phosphorus	0.14
Iron	0.50

* Source: Durunna (2004)

a completely randomized design (CRD). Each treatment group was further subdivided into three (3) replicate of twelve (12) chicks each and each replicate kept in a 2 x 2m pen. Warmth was supplied using electric bulbs. Feed and water were made available *ad libitum*. The chicks were weighed at the beginning of the trial to obtain their initial weights and weekly thereafter. Feed offered and left over on the following day were weighed to obtain feed intake. The experiment lasted 28 days. At the end of the experiment, final body weights were determined.

Three birds from each replicate were randomly selected and eviscerated according to the method described by Salsbury and Salsbury (1962) to extract the internal organs and determine their weights. Data collected were subjected to analysis of variance (ANOVA) according to Snedecor and Cochran (1978). Where significant treatment effects were detected from the

Table 2: Composition of experimental diets for broiler chicks (%)

Ingredient	Dietary levels of <i>Anthonata macrophyla</i> meal (%)				
	0	5	10	15	20
Maize	50.00	50.00	50.00	50.00	50.00
Soyabean meal	23.00	18.00	13.00	8.00	3.00
<i>A. macrophyla</i> meal	-	5.00	10.00	15.00	20.00
Wheat offal	10.00	10.00	10.00	10.00	10.00
Brewers' dried grain	7.00	7.00	7.00	7.00	7.00
Fishmeal	6.00	6.00	6.00	6.00	6.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Oyster shell	0.50	0.50	0.50	0.50	0.50
Salt	0.25	0.25	0.25	0.25	0.25
*Premix (vit./min)	0.25	0.25	0.25	0.25	0.25
Calculated analysis					
Crude protein	22.35	21.68	21.71	21.80	21.51
Crude fibre	4.66	4.71	4.50	4.53	4.60
Ether extract	3.90	3.87	3.64	3.71	3.58
Calcium	1.55	1.53	1.61	1.70	1.57
Phosphorus	0.59	0.56	0.57	0.57	0.58
Met. energy (Kcal/kg)	2860.00	2868.00	2871.00	2884.00	2890.00

*To provide the following per kg of feed: vit A-10000 iu; vit. D3-2000iu; vit.B₁₂-0.75 mg; nicotinic acid-25 mg;cal, panthothenate- 12.50 mg; vit. B₁₂-2.5 mg; vit.K-2.5 gm; vit.E-25 mg; cobalt-0.4 mg; Biotin-0.50 mg; folic acid-1.00 mg; cholin chloride-25 mg; copper-8.00 mg; manganese-64 mg; iron-32 mg; zinc-4mg; iodine-0.80 mg; flavomyacin-100 mg; spriomycin-5mg; DL methionine-50 mg;selenium-0.16mg; L-lysine-120mg.

ANOVA, means were compared according to Steel and Torrie (1980).

Money spent on labour for collecting, milling sundrying and transportation of *Anthonata macrophyla* was recorded. The cost of each experimental ration was computed by adding together the cost of preparation of *Anthonata macrophyla* meal, procurement of soyabean meal and all other common experimental feed ingredients used. Specific cost of incorporated

Anthonata macrophyla and soyabean meals for the investigation were determined based on their per cent inclusion levels. Cost of a kilogram of feed fed each experimental group, was therefore realized by dividing the total sum of money spent on each test ration by the total kilogram of the feed formulated.

Results and Discussion

The proximate composition of *Anthonata macrophyla* meal is shown in Table 1, while the

nutrient and chemical composition of the experimental diets are shown in Table 2. This compares favourably with the chemical composition of Bambara nut and Cowpea seeds (Aduku 1993) differently used as livestock feed ingredients. The summary of the performance of the chicks is shown in Table 3. Values for feed intake of the experimental groups were 53.47, 55.17, 54.61, 48.21 and 40.60g for 0,5,10,15 and 20% dietary levels of *Anthonata macrophyla*, meal respectively. It was observed that at 15 and 20% dietary levels, *Anthonata macrophyla* meal significantly ($P<0.05$) depressed feed intake. Data obtained for feed conversion ratio (FCR) and protein efficiency ratio (PER) for the chicks on 0,5, and 10% inclusion levels were significantly ($P<0.05$) better than the value observed for the

chicks on 15 and 20% level. There were no significant ($P>0.05$) differences in daily weight gain between chicks on 0 and 5% levels but highly significant ($P<0.05$) differences were obtained between 0 and 5% levels as a pair and the rest of the inclusion levels (10, 15 and 20%). Similar observation was noted in final weight gain. Chicks on 5% inclusion level of the test material, competed favourably with those on 0% but not statistically different from the performance of the chicks on 10% inclusion level.

The poor performance of the chicks on 15 and 20% inclusion levels of *Anthonata macrophyla* meal, could be due to possible content of unidentified anti-nutritional factor(s) in the

Table 3 Effects of graded inclusion of *Anthonata macrophyla* meal on performance of broiler chicks

Parameters	0	5	10	15	20	SEM
Av. initial weight.(g)	48.60	49.00	48.70	49.20	48.90	0.11
Av. final weight.(g)	540.75 ^a	540.15 ^a	509.73 ^a	453.10 ^b	386.40 ^b	29.58
Av. daily feed intake(g)	53.47 ^a	55.17 ^a	54.61 ^a	48.21 ^{ab}	40.60 ^b	2.75
Av. daily weight gain(g)	30.74 ^a	30.80 ^a	28.39 ^{ab}	20.32 ^b	10.76 ^c	3.87
Feed conversion ratio	1.74 ^a	1.79 ^a	1.92 ^a	3.00 ^b	3.77 ^b	0.38
Protein efficiency ratio	2.30 ^a	2.10 ^a	1.93 ^a	1.39 ^b	1.40 ^b	0.13
Cost of feed production (N/kg)	38.34	36.00	34.34	32.51	29.30	
Organ weights (%live weight)						
Heart	0.25	0.27	0.23	0.21	0.20	0.01
Gizzard	1.58	1.56	1.55	1.44	1.41	0.04
Liver	1.22	1.21	1.31	1.36	1.33	0.03
Intestines	1.91	1.64	1.85	1.93	1.77	0.03
Lungs	0.29	0.27	0.33	0.34	0.30	0.19
Caeca	0.33	0.30	0.31	0.32	0.32	0.01

^{abc} Means differently superscripted are significantly different from the one another ($P<0.05$)

seeds. Consequently, the birds were anatomically undeveloped to handle and generate enough efficacious enzyme, required for its adequate digestion and rapid growth. Similar observation (Esonu *et al* 2003) was reported on broiler starter chicks placed on 10% dietary level of *Microdesmis puberula* leaf meal. Inclusion levels of novelty feed ingredient in the diets of starter chicks should be gradual to avoid poor overall performance due to sudden challenge to the digestive capacity of the birds. No significant ($P>0.05$) differences were observed for organ weights. The cost of feed production was computed from money spent on procuring the feed ingredients, transport and labour. These were summed up and computed (naira per kilogram feed) for each of the five experimental diets (Table 3). The cost of production of the control diet (N38.34) was higher than the cost of any of the other trial rations.

Conclusion

The trial has shown that *Anthonata macrophylla* meal should not be included in the diet of broiler starter chicks beyond 10%. There is the need to investigate and identify the suspected anti-nutritional factor(s) in the test material.

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