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Evaluation of *microdesmis puberula* leaf meal as feed ingredient in broiler starter diets

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Abstract

A 21- day feeding trial was conducted to evaluate the leaf meal of Microdesmis puberula as feed ingredient in broiler starter diets. Microdesmis puberula is a preferred tropical browse plant. The leaves were harvested, chopped to facilitate drying, spread evenly in a room for four days until the material become crispy while still retaining it's greenish colouration. The material was milled using a hammer mill to produce the leaf meal. Microdesmis puberula leaf meal contain 17.32% crude protein, 6.52% ether extract, 12.25% total ash, 24.84% crude fibre, 24.06% NFE and an appreciable percent of minerals. Three broiler starter diets were formulated to contain the meal at dietary levels of 0%, 5% and 10%. One hundred and eighty (180), 14 –day old hubbard broiler chicks were divided into three groups of sixty birds each and randomly assigned to the three treatment diets in a completely randomized design (CRD). Data were collected on feed intake, body weights and feed conversion ratio. There were significant ($P<0.05$) differences in feed intake, body weight gain and feed conversion ratio among the group on the control (0%) diet and the groups on diets containing 5% and 10% inclusion levels of the leaf meal. The group on the control (0%) diet performed significantly ($P<0.05$) better than the groups on the leaf meal diets. The results of this study suggest that dietary inclusion of Microdesmis puberula leaf meal at 5% and 10% levels significantly ($P<0.05$) depressed performance of broiler chicks.

Keywords: *Microdesmis puberula* leaf meal, feed ingredients, broiler starter diet.

Introduction

The animal protein intake shortages in Nigeria observed in the early 1970s has progressively worsened till date. The resultant sub-optimal consumption of animal protein by a large percentage of Nigerian population has challenged not only livestock farmers, but also researchers and policy makers. The increasing competition between man and animals for available grains (Tegbe *et al*, 1984; Madubuike, 1988), the inadequate production of farm crops to meet the needs of man and his livestock (Babatunde *et al*, 1990; Esonu *et al*, 2001) and perhaps the threat of desert encroachment in many parts of West African sub region which had destroyed the vegetation and depleted livestock population (Idufueko,1984; Madubuike, 1992). If we are to save the livestock and poultry industries in Nigeria from total collapse as to provide food especially animal protein for the ever-increasing population, there is urgent need to look critically for other cheap and indigenous sources of protein and energy, particularly those that attract no competition in consumption between man and livestock. One possible source of cheap

protein is the leaf meal of some tropical legume and browse plants. Leaf meals not only serve as protein source but also provide some necessary vitamins such as vitamins A and C, minerals and also oxycarotenoids, which causes yellow colour of broiler skin, shank and egg yolk (Opara, 1996). Considerable attention has been focused on leaf meals from *Leuceana leucocephala* (Mateo *et al*, 1970; Vohra *et al*, 1992; D'Mello and Acamovic, 1987), *Sesbania sesban* (Ash *et al*, 1992), *Prosopis* and *Albizia* (D'Mello, 1992), *Cajanus cajan* (Whiteman *et al*, 1985; Udedibie and Igwe, 1989). *Microdesmis puberula* is a very popular and preferred browse plant for small ruminants in the humid tropics of Southern Nigeria. It is known in Igbo land as "Mkpiri or Mgbugbo" and in Yorubaland as "idiakpata". So far, no work has been reported on the use of the leaf meal of *Microdesmis puberula* as feed ingredient for non-ruminants. The trial herein was designed to evaluate *Microdesmis puberula* as feed ingredients in broiler starter diet.

Materials and Methods

The leaves of *Microdesmis puberula* used for this trial were harvested randomly from bushes around the Federal University of Technology, Owerri. Although abundant in the bush, only the green fresh leafy stands at their bloom stage were harvested. They were chopped to facilitate drying and room dried for four days until they became crispy while still retaining the green colouration. The dried leaves were then milled; using a hammer mill with a sieve size of 3.36mm to produce leaf meal.

Proximate analysis of the leaf meal was conducted using standard methods (AOAC, 1995) to determine the percent crude protein, crude fibre, total ash and ether extract. Mineral analysis were carried out by methods of Grueling (1966), while gross energy was determined with a Gallenkamp oxygen adiabatic bomb calorimeter (Table 1).

The leaf meal so prepared was used to formulate diets for broiler starter chicks at 0%, 5% and 10% inclusion levels respectively (Table 2) One hundred and eighty (180), 14 – day old hubbard broiler chicks were divided into 3 groups of sixty (60) each and randomly assigned to the three treatment diets in a completely randomized design (CRD) each treatment group was further sub- divided into three (3) replicates of 20 birds and kept in a 4m x 6m compartment. Heat was supplied during the brooding stage using electric bulbs feed and water were provided *ad – libitum.* Individual weights of the birds were recorded at the beginning of the experiment and thereafter-weekly basis, while feed intake was recorded daily. Body weight gain and feed conversion ratio were computed weekly and recorded. Data collected were subjected to analysis of variance according to Snedecor and Cochran (1978). When significant differences were observed between treatments, means were compared using Duncan's new multiple range test as outlined by Obi (1990). The trial lasted for 21 days.

Results and Discussion

The proximate composition of *Microdesmis puberula* leaf meal is presented in Table 1. The nutrient and chemical composition of the experiment diets are shown on Table 2, while data on the performance of the chicks are summarized on Table 3.

Table 1 *Proximate Composition of Microdesmis puberula leaf meal.*

Nutrients	
Moisture	15.01
Dry matter (%)	84.99
Crude protein (% DM)	17.32
Crude fat (% DM)	6.52
Ash (%DM)	12.25
Crude fibre (%DM)	24.84
NFE	24.06
Minerals (%DM)	
Calcium	1.61
Magnesium	1.66
Sodium	2.00
Potassium	0.39
Phosphorus	0.24
Iron	1.90

Table 2 *Composition of the treatment diets of starter broilers*

Ingredients	Dietary level of *Microdesmis puberula* leaf meal (%) 0	5	10
Maize	50.00	50.00	50.00
Soybean meal	19.00	15.00	15.00
Microdesmis puberula leaf meal	0.00	5.00	10.00
Wheat offal	4.50	2.50	1.00
Brewer's dried grains	10.00	10.00	8.00
Palm kernel meal	8.00	8.00	7.50
Fish meal	5.00	5.00	5.00
Bone meal	3.00	3.00	3.00
Vit/Min premix*	0.25	0.25	0.25
Common salt	0.25	0.25	0.25
Calculated chemical composition			
Crude protein	22.01	21.86	21.06
Crude fibre	4.06	5.53	6.21
Ether extract	3.78	4.36	4.43
Calcium	1.46	1.46	1.84
Phosphorus	0.58	0.57	0.56
ME (kcal/kg)	2850.0	2780.0	2698.0

*To provide following per kg of feed: Vitamin A- 10,000iu; Vitamin D3- 2,000iu; Vitamin B1- 0.75mg; nicotinic acid- 25mg; Calcium pantothenate- 12.50mg; Vitamin B12- 2.5mg; Vitamin K3- 2.5mg; Vitamin E- 25mg; Cobalt-0.40mg; Biotin-0.50mg; Folic acid- 1.00mg; Choline chloride-25mg; Copper- 8.00mg; Manganese-64mg; Iron-32mg; Zinc-4mg; Iodine-0.8mg; Flavomycin-100mg; Spiromycin-5mg; DL Methionine-50mg; Selenium-0.16mg; L-Lysine-120mg.

Table 3 *Effect of different inclusion levels of Microdsmis puberula leaf meal on the performance of broiler chicks.*

Parameters	Dietary level of leaf meal (%)			
	0	5	10	SEM
Initial body weight (g)	213.00	206.50	225.00	4.55
Final body weight (g)	600.00	550.00	551.00	3.42
Body weight changes (g)	387.00[a]	343.50[b]	326.00[b]	5.30
Daily body weight gain (g)	18.43[a]	16.36[b]	16.02[b]	1.53
Daily feed intake (g)	57.89[a]	60.89[b]	65.65[b]	2.77
Feed conversion ratio (g fed/g gain)	3.14[a]	3.72[b]	4.10[b]	0.25
Mortality (Number)	0.00	1.00	0.00	-

[ab] means within a row with different superscript are significantly ($p<0.05$) different

Feed intake of the groups were 57.89g, 60.89g, and 65.65g, for 0%, 5% and 10% respectively. The feed conversion ratio for the groups was, 3.14, 3.72 and 4.10 respectively. There were significant ($P<0.05$) differences between the groups on 0% diet and the groups on *Microdesmis pubrula* leaf meal in feed intake, body weight gain and feed conversion ratio. The inclusion of *Microdesmis puberula* in the diets increased the fibre content of the diets, which had an energy dilution effect on the feed and a consequential increase in feed intake. These results agrees with the report of D'Mello and Acamovic (1989) that graded additions of *Lueceana leucocephala* leaf meal induced depressions in growth of chicks even when maize oil was used to compensate for low metabolizable energy value of the leaf meal. Also with older broiler birds, D'Mello *et al* (1987) reported that diet containing 100g of leaf meal significantly reduced growth without affecting dry matter intake. The poor performance of the birds on diets containing *Microdesmis puberula* was however understandable. These diets had low energy values and high fibre content. Enzyme production, efficacy and system of the birds at this stage(starter) is not yet fully developed to handle such high fibre material resulting in low digestibility of nutrients particularly, protein and energy required to sustain rapid growth (Opara, 1996).

There is need to decrease the dietary level of *Microdesmis puberula* leaf meal below 5% to determine its optimal dietary level.

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