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Gliricidia Leafmeal in Layer's Diet: Effect on Performance, Nutrient Digestibility and Economy of Production

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Abstract: A feeding trial was conducted to assess the nutritional value of Gliricidia Leaf Meal (GLM) on performance, nutrient digestibility and economy of production of layer chickens. GLM was used partially to replace maize and soyabean at 0, 5, 10 and 15% in diets A(control), B, C and D, respectively. Performance characteristics interms of Hen day production, feed intake, body weight gain, feed efficiency and feed cost were monitored. Chemical analysis revealed that GLM contains 24.38 Crude Protein (CP), 1.75 Ether Extract (EE), 12.45 Crude Fibre (CF), 8.64 Ash and 45.36% Nitrogen Free Extractives (NFE). Only egg weight showed no significant difference ($p>0.05$) while Henday production, feed intake feed efficiency and body weight were significantly different ($p<0.05$) among dietary treatments. Feed cost (N/kg feed) was significantly different ($p<0.05$) across the diet. Nutrient utilization studies (dry mater, crude protein and ether extractives) were not significantly influenced ($p>0.05$) due to dietary treatments. It therefore appears that up to 15% of GLM can be incorporated into laying chicken ration without any adverse effect.

Key words: Gliricidia, digestibility, nutrient and feed intake

INTRODUCTION

The limitation of poultry keeping in Nigeria has been widely studied and cost of production is prominent among others such as inadequate supply of day old chicks, feed raw materials, poultry equipment, credit facility, managerial skills, presence of endemic disease and keen interest shown by man in available raw materials for food and industrial use. Feed cost alone account for about 60-80% at total cost of production[1-5]. This has derived many farmers away out of the industry with resultant low protein intake of 10 g per day of minimum daily intake of 25 g of recommended by Food and Agriculture Organization[6,7].

The crusade is to produce animal protein at minimal input in order to make it available at affordable price to the growing population. Therefore the use of non- conventional feed stuff could help to reduce cost of production and alleviate the problem of direct competition between livestock and humans for some high cost conventional feedstuff[8-13].

Leafmeals are gaining acceptance as feed stuff in poultry diet, they are locally available and considered to be non-conventional feeding stuff. The nutrient profile of these leafmeals compare favourably well with some conventional feeding stuffs. Satisfactory performance have been reported of various leaf meal tested in the diet of some classes of poultry birds. Wild sunflower[14,15], centrosema pubscens[16], cassava leaf meal[17] Microdesmus puberla leaf meal[18], Vernonia amygdaliana leaf meal[19].

Gliricida sepium under investigation in this study is a browse plant and is generally used as a high protein supplement to low quality basal feeds such as grass, straws and other crop residues for ruminant animals. Supplementation levels vary but are usually in the range of 20-40%. There are numerous reports of increase in weight gain and milk production in both large and small ruminant when Gliricidia forage is used as supplement. However, there is paucity of information on its use on monogastric animals such as chicken and others.

The objective of this study was to evaluate the nutritional value of Gliricidia leaf meal on performance, nutrient digestibility and economy of production, therefore it is expected that this study would provide a tentative recommendation of possible optimal level of Gliricidia leaf meal in layer's diet.

MATERIALS AND METHODS

The site of the study: The study was carried out at teaching and research farm Lautech, Ogbomoso. The area

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Table 1: Ingredient composition of the experimental diet and calculated analysis

Ingredients (%)	Diets A (Control)	Diets B	Diets C	Diet D
Maize	45	42.1	39.2	36.3
SBM	20	17.9	15.8	13.7
GLM	-	5	10	15
Wheat offal	19.25	19.25	19.25	19.25
Fish meal	3	3	3	3
Oyster shell	9	9	9	9
Premix *	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated analysis				
Crude protein	19.17	19.11	19.04	18.98
Energy (Kcal kg^{-1})	2609.36	2607.98	2601.03	2596.87
Lysine (%)	0.011	0.009	0.009	0.008
Methionine (%)	0.253	0.253	0.253	0.253

*To provide the following per kg: vit. A 1500iu; Vit D3 1600iu; Ribovlavin, 9.0 mg; Biotin, 0.25 mg; Panthothenic acid, 11.0 mg; Vit. K 3.0 mg, Vit. B2 2.5 mg, Vit. B6 0.3 mg, Vit. B12, 8.0 mg; nicotinic acid 8.0 mg Fe, 5.0 mg, Zn 4.5 mg, Mn 10.0 mg, Co 02 mg, Se 0.01 mg

is situated approximately 600 m above sea level with mean annual rainfall of 1247 mm, 28-30°c temperature and 80-90% relative humidity. It falls within longitude 4^0 15^0E and latitude 8^0 08' N[20]. The vegetation is an interphase between the tropics rainforest and derived savannah[21].

Processing of test ingredients: The leaves of young branches of Gliricidia sepium were manually harvested from pasture introduction plot Ladoke Akintola University of Technology, air dried to reduce moisture content of fresh leaves, to prevent fungal growth and easy milling of the material. After milling, a product called Gliricidia Leaf Meal (GLM) was obtained.

Management of experimental birds and digestibility study: There were four dietary treatments each consisted of 12 layers of 4 replicates at 3 birds each. The Gliricidia leaf meal (24.38% CP) was incorporated into diet at 0, 5, 10 and 15% for diets A, B, C, D, respectively (Table 1).

Feed and water were provided ad libtum. Body weight of each birds were taken at the beginning of the experiment and two weeks interval subsequently, the parameter monitored were egg production, egg weight, feed intake and feed efficiency.

A digestibility study was carried out by selecting one bird from each replicate making four birds per treatment and further divided into two replicate of two bird each, they were housed in metabolic cages. It involved feeding the birds with known q uantity of feed which lasted for 4 days. Total excreta voided were collected daily and oven dried to determine moisture content. Representative sample of dried feaces were taken for proximate analysis. The digestibility coefficient of DM, CP and EE was calculated as nutrient intake minus nutrient excreted over nutrient intake.

The prevailing market price at the end of the study was used for the economic appraisal of feed conversion. Proximate analysis of test ingredients and diets were carried out according to methods of [22].

Statistical analysis: Data collected were analyzed using one way analysis of variance and significant means were separated using Duncan's multiple range test[23].

RESULTS AND DISCUSSION

Proximate analysis of the experimental diet and test ingredient is presented in Table 2 and 3, respectively, the value for crude protein ranged from 17.8 (control diet) to 18.24 (diet C). The crude protein of test ingredient (GLM) was 24.38% which is very close to that reported by[24] (26%). It is however higher than value got by[25]. The variation observed could be attributed to age of gliricidia at time of harvesting and processing method. Crude protein value of GLM also compares to literature value for other leaf meal used in poultry feeding[14,18].

Table 4 represents the performance characteristics of the birds in the experimental diet, hen day production decreases significantly ($p<0.05$) as the level of GLM increases in the diet, the trend is related to feed intake as it also decreases ($p<0.05$) with increased GLM inclusion in the diet. The reduction in feed intake can be attributed to tannin (an antinutritive factor) content of Gliricidia[26] reported depressed intake, weight loss and foetal diet in rats offered a diet containing 20%, GLM. The poor weight gain ($p<0.05$) observed with increased level of GLM inclusion in the diet can be related or attributed to reduction in intake and thus agrees with reports of other workers[27] that dry matter intake is one of the factors that determine growth performance of animal. This could also

Table 2: chemical composition of experimental dietss

Composition	A (0%) (Control)	B (5%)	C (10%)	D (15%)
Moisture	8.95	8.2	8.43	8.67
Crude protein	17.18	17.98	18.24	18.06
Either extract	3.25	3.34	3.01	2.60
Crude fibre	3.43	3.88	4.29	6.36
Ash	3.25	3.52	3.24	3.68
NFE	63.84	63.08	61.68	60.63

Table 3: chemical composition of test ingredient

Composition	GLM (%)
Moisture	7.42
Crude protein	24.38
Ether extract	1.75
Crude fibre	12.45
Ash	8.64
NFE	43.36

Table 4: Performance characteristics and cost analysis of layer fed on experimental diets

Parameter	A (0%) (Control)	B (5%)	C (10%)	D (15%)	SEM
Henday production	86.85[a]	85.30[a]	75.98[b]	65.83[c]	±0.74
Daily feed intake	123.98[a]	120.73[b]	117.88[c]	111.63[d]	±0.09
Average egg weight	58.75	57.75	59.6	57.05	±0.49
Feed Efficiency kgfeed/kgegg	2.45	2.46	2.61	3.15	±0.047
Feed Egg mass/feed intake	0.413[a]	0.41[a]	0.39[a]	0.32	±0.000625
Kg feed/ Dozen egg	1.73[b]	1.70[b]	0.39[a]	0.32	±0.348
Feed cost (N 1kg)	132.15[a]	122.05[b]	112.7[a]	103.15[d]	±0.11

* Means with different superscript on horizontal row are significantly different ($p<0.05$)

Table 5: Nutrient digestibility of layer fed on experimental diet

Parameter	A (0%) (Control)	B (5%)	C (10%)	D (15%)
Crude protein (%)	57.6	51.57	51	44.65
Dry matter (%)	74	68.15	69	66.2
Ether Extract (%)	96.29	96	95	93.85

NS- No significant difference ($p>0.05$)

explain reduction in henday production in this study. Egg weight did not follow any definite pattern ($p>0.05$), however lower weight was recorded for birds on diet D. Significant difference ($p<0.05$) was recorded for efficiency of feed utilization interms of egg mass/feed intake and kg feed/dozen egg. Nutrient utilization studies (Table 5) showed that the dietary treatment had no significant difference on dry matter crude protein and ether extract ($p>0.05$), however, DM is higher in control diet and crude protein utilization followed the same pattern. Poor nutrient utilization observed is due to the fibre content of the diets which increased with GLM inclusion and chickens being monogastric lack necessary digestive microorganism for efficient utilization of fibrous feeds, thus constitute major bottle neck in the use of leaf meals for poultry birds this is in support of various reports[18,19,28,29]. Cost analysis revealed lower feed cost (N/kg) for diet D. onclusively Gliricidia leaf meal is a promising feed ingredient in layers' diet and future study should based or addition of sweeting ingredient, to increase feed intake and addition of exogenous enzyme to increase nutrient utilization, Economically GLM proved favoured, since it is considered to be non-competitive feed stuff, the only item of cost will include collection, drying and milling.

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