EGG QUALITY RESPONSE OF GUINEA HEN TO DIETARY INCLUSION OF SUNFLOWER LEAF MEAL AND GLIRICIDIA LEAF MEAL

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Abstract
Forty (40) matured guinea hen were used for the experiment to evaluate the effects of sunflower leaf Meal (SLM) and Gliricidia leaf meal (GLM) on the performance characteristics and egg quality parameter of guinea fowl under intensive system. They were randomly and equally distributed to 5 treatment of two (2) replicates each, in a completely randomized design. The experimental diets were formulated such that Diet i and ii contained 20g/kg and 30g/kg of GLM respectively, Diet iii and iv contained 20g/kg and 30g/kg of SLM respectively while Diet v contained none of the two leaf meals. The birds were fed the diets for ten weeks. Highest feed cost per birds per week was recorded from 20g/kg GLM (78.26), followed by 30g/kg SLM (75.94), but statistically similar to control while 20g/kg SLM had least value (58.92) and significantly (P<0.05) lower than 30g/kg GLM (64.44). Birds fed 30g/kg SLM had the highest hen-day production value (52.38) which was statistically (P<0.05) different from others. Egg quality parameters showed significant (P< 0.05) differences among the treatments with egg weight, shell thickness, shell surface area (SSA) and Egg Shape Index (ESI) being enhanced by the test ingredients. Haugh unit showed no significant (P> 0.05) difference. Egg weight, shell thickness, SSA and yolk percentage were positively influence by increasing inclusion levels of both gliricidia and sunflower. Yolk colour was improved as the inclusion levels increases with sunflower leaf meal, having better value than gliricidia. The use of sunflower leaf meal at 30g/kg could therefore be recommended.

Introduction

Guniea fowl (*Numida meleagris*) products is a delicacy with demand being higher than supply and can be a tool for poverty reduction (Koney, 2004 and Avornyo *et al*., 2007). Being native to Africa, guinea fowl possess valuable adapter genetic potentials and yield valuable products under low input of rural Nigeria with its larger population found mostly in the northern region of Nigeria. This calls for systematic effort to conserve, sustain and improve the birds in other regions, like the rainforest zone, derived savannah zone etc owing to their economics importance. Such effort would be assumed timely since there seems to be upsurge of interest in the production of guinea fowl in the zones. In this regards, meat quality and carcass yield will not only be used as selection criterion but will also enhance economic decisions for intending backyard and/ or commercial guinea fowl produces in these regions.

Egg, another valuable product of the animal also need critical consideration in terms of it productivity and quality. These quality criteria include such diverse and important aspects as safety, nutritional and organoleptic properties or technological properties for cooking, all of which must be controlled from farm. The external and internal quality of eggs are influenced by a broad range of factors among which nutrition is, and the main priorities of the poultry breeder, farmers, food, egg sorting and marketing companies are to deliver a safe product which is accepted by the consumers (Fanimo *et al.*, 1999: Rafiu *et al.*, 2008). The main goal of breeders is therefore to manipulate the hens to deliver a consistent product with well-established characteristics concerning the appearance of the product, the integrity of the shell to avoid contamination of the egg, a particular weight of the egg and specific colour of the eggshell and yolk as well as good processing properties reflecting the "freshness of the egg". Along the whole chain, the objective is to avoid any defect in external or internal appearance of the product or any deviation from the expected taste of the product which may be as a result of domestication process of the animal. The nutritional value of the egg will be important when extra value is added because of the enrichment of egg in specific nutrients such as fatty acid, vitamins or trace elements. Since the physical structure of the product is less affected by the domestication process, the research therefore focus on the internal quality manipulation.

Materials and Method

Experimental Site

This experimental was carried out at the Poultry Unit, Teaching and Research Farm Ladoke Akintola University of Technology, Ogbomoso, Oyo State.

Test Ingredient and Experimental diets

i Sunflower Leaf Meal: Young matured sunflower leaf was plucked, air dried for 48hours before it was sundry for 4hours to have a dried sunflower leaf after which it was milled to have sunflower leaf meal.

ii Gliricidia Leaf meal: young gliricidia leaf was also plucked, air dried, later sun dry as done to sunflower leaves. It was later ground to have gliricidia leaf meal then stored till the time of use. Five experimental diets I to V (Table 1), containing varying levels of gliricidia and sunflower, 11.25MJ/kg, Crude protein of 22%, Calcium of 3.26%, Phosphorus of 0.85% as required by laying guinea fowl were prepared.

Experimental Birds and Managements

Forty (40) birds of laying guinea hen were used. They were randomly and equally distributed to 5 treatments of two (2) replicates per treatments. Each replicate contained four birds in a completely randomized design. They are housed on deep litter system. The respective feed was supplied and water was given *ad libitum*. The birds are provided with laying nest, egg laid were collected twice a day to prevent them from been soiled.

Data Collection

Performance parameters such as feed intake, number of egg lay, Hen-day production (HDP), feed intake/ 30eggs, cost of feed/ 30eggs, were measured and determined as the case may be. Egg quality parameter such as; Egg weight, Egg Shape Index, Albumen percentage, Haugh unit, Yolk proportion, were measured and determined as the case may be. Yolk colour was measured with the aid of yolk colour fan.

Statistical Analysis

Data obtained was subjected to analysis of variance (ANOVA) using one way ANOVA of SPSS version 21 package, and mean were separated using Duncan multiple range test of the same package,

Result and Discussion

The performance characteristics of guinea hen fed varying levels of Giliricidia leaf meal and sunflower leaf meal showed a significant different ($P<0.05$) in feed intake, cost of feed/bird, average egg produced per bird and hen day production. Feed intake per birds per week were statistically ($P<0.05$) different in all diets, Highest feed cost per birds per week was recorded from 20g/kg GLM (78.26), followed by 30g/kg SLM (75.94), but statistically similar to the control diet (70.61) while 20g/kg SLM had least value (58.92) and significantly ($P<0.05$) lower than 30g/kg GLM (64.44). **Variation in hen day production was observed** with birds fed 30g/kg SLM had the highest mean hen-day production value (52.38) which was statistically ($P<0.05$) different from others including the control. This better performance of diet 4 than the control could be traced to the enhancement of the nutritional status of the diet through the dietary inclusion of the supplements (GLM and SLM) especially the sunflower since there is no source of variation (Brown *et al.*, 2000; Rafiu *et al.*, 2008). However, Wang *et al.*, (2007) who reported that xanthophylls containing diet does not provide higher nutrition levels, enhancements are observed in pigmentation of egg yolk. While Cho *et al.*, (2013) established that 6-8 mg of xanthophylls/kg of feed is required to produce an egg color that is acceptable to consumers, indication that presence of yolk colourant supplement has impact on the egg quality. The feed cost per dozen eggs produced by guinea hen fed the 20g/kg GLM gave highest means value, followed by the control (204.28). The least feed cost per dozen egg was recorded from 20g/kg SLM and lower than others though statistically ($P>0/05$) similar. This indicated that inclusion of highly negligible quantity of the naturally occurring supplements facilitate belter production most especially sunflower which was found to be more potent.

The results of egg quality parameters obtained from the varying dietary inclusion levels of Gliricidia leaf meal (GLM) and Sunflower leaf meal (SLM) versus control diet (Table 3) showed significant ($P< 0.05$) differences among the treatments such that egg weight, shell thickness, shell surface area (SSA) and Egg Shape Index (ESI) were enhanced by the test ingredients. There were also significant ($P< 0.05$) differences in the Albumen percentage, yolk percentage, Yolk Index and yolk colour. Haugh unit showed no significant ($P> 0.05$) difference among treatment means. The egg weight, shell thickness, SSA, yolk percentage and yolk colour were positively influence by increasing inclusion levels of both gliricidia and sunflower while the differences ($P<0.05$) recorded from ESI, albumen percentage and yolk index had no definite trend. Slight changes in nutritional quality of the poultry diets (especially the micro nutrients) influence their productivity and products quality (Kirubakaran *et al.*, 2011), as it could be observed, guinea fowl on pasture vested on varieties of materials ranging from different species of plants to different insects which they were deprived when in captivity. This reflected in their products among which is egg yolk colour where treatment 5 (control diet) had relatively low value compared to those fed leave meal based

diets.

Conclusion and Recommendation

Utilization of leaf meal as feed supplement had positive significant ($P<0.05$) influence on performance characteristics and egg quality parameters especially the targeted yolk colour. It improves as the inclusion levels increase while sunflower leaf meal was better than gliricidia. Therefore, the use of sunflower leaf meal at 30g/kg is recommended.

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Table 1: Composition of Experiment Diet with varying inclusion level and yolk colourant supplement

Feed Ingredient	Diet I	Diet II	Diet III	Diet IV	Control
Maize	41	41	41	41	41
Soybeans	19	19	19	191	19
Groundnut Cake	15	15	15	15	15
Wheat Offal	14.2	14.2	14.2	142	14.2
Fish Meal	3	3	3	3	3
Bone Meal	3	3	3	3	3
Oyster Shell	4	4	4	4	4
Methionine	0.2	0.2	0.2	0.2	0.2
Lysine	0.1	0.1	0.1	0.1	0.1
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Supplement	*	**	+	++	-
TOTAL	**100**	**100**	**100**	**100**	**100**

* = 20g/kg of gliricidia ** = 30g/kg of gliricidia + = 20g/kg of sunflower ++ = 30g/kg of sunflower

and sunflower

Table 2: Performance characteristic of guinea hen fed on Difference levels of Giliricidia leaf meal and sunflower leaf mal

PARAMETERS	20g/kg GLM	30g/kg GLM	20g/kg SLM	30g/kg SLM	Control	Sem	sig
Feed Intake/bird/week	0.88^{a}	0.73^{b}	0.66^{b}	0.77^{ab}	0.79^{ab}	0.211	*
Feed Cost/bird/week	78.26^{a}	64.44^{ab}	58.92^{b}	75.94^{a}	70.61^{ab}	2.112	*
Average Egg/Bird/week	4.63^{ab}	4.25^{b}	4.11^{b}	5.13^{a}	4.17^{b}	0.101	*
Hen Day production	42.86^{b}	41.67^{b}	42.69^{b}	52.38^{a}	42.46^{b}	2.258	*
Feed Cost/egg	17.24	15.32	14.46	14.56	17.02	0.414	NS
Feed cost/Dozen egg	206.84	183.87	173.5	174.68	204.28	4.971	NS
Feed cost/30eggs	517.1	459.68	433.75	436.7	510.69	12.429	NS

^{abc}mean within the same row with different superscripts differ significantly (P<0.05)
* : means significant different (P<0.05) NS: means nonsign.02ificant difference (P>0.05).

Table3: Eggqualityparameterlayingguineahensfeddifferentlevelsof Giliricidia leaf meal (GLM) and Sunflower Leaf Meal.

PARAMETERS	20g/kg GLM	30g/kg GLM	20g/kg SLM	30g/kg SLM	Control	sem	sig
Egg weight	39.30^{b}	41.30^{a}	36.45^{c}	41.05^{ab}	39.50^{ab}	0.496	*
Shell thickness	49.00^{c}	57.50^{a}	49.50^{c}	59.50^{a}	52.50^{b}	0.563	*
shell suface area	56.04^{b}	57.98^{a}	53.26^{c}	57.73^{ab}	56.31^{ab}	0.286	*
Egg Shape Index	7.94^{ab}	8.36^{a}	8.05^{ab}	8.04^{ab}	7.82^{b}	0.063	*
Haugh unit	62.81	62.76	62.81	62.8	62.72	1.219	NS
Albumen percent	52.62^{a}	40.17^{c}	55.84^{a}	51.12^{ab}	46.54^{b}	0.907	*
Yolk percent	29.84^{c}	42.65^{a}	33.63^{ab}	32.49^{ab}	36.07^{a}	0.897	*
Yolk Index	0.45^{a}	0.36^{b}	0.36^{b}	0.43^{a}	0.40^{ab}	0.008	*
yolk color	5.00^{c}	6.00^{b}	5.50^{bc}	8.00^{a}	1.00^{d}	0.201	*

^{abc}mean within the same row with different superscripts differ significantly (P<0.05)
* : means significant differe(P<0.05), NS: means nonsignificant difference (P>0.05).