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Effect of Maxigrain®supplemented G*liricidiasepium*(Jacq)Leaf Meal on Performance Characteristics and Nutrients Utilization in Laying hens(*Gallus domesticus*)

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Abstract: *Sixty(60) laying hens (Rhode Island Red strains)were usedto study the nutritive value of Gliricidia leaf meal (GLM) supplemented with Maxigrain® enzyme The birds were randomly allotted to five dietary treatments of 12 birds per treatment; each treatment was replicated into 4 groups with 3 birds per replicate. Five experimental diets were formulated; the test ingredient being Gliricidiasepium. Four of the diets were formulated with enzyme supplementation i.e. diets B, C, D, E while diet A was without enzyme supplementation. Gliricidiasepium leaf meal was included at 5%, 7.5% and 10% replacement of dietary soyabean meal in diets C, D and E respectively. The feeding trial lasted for twelve weeks during which data performance characteristics in terms of Henday production, feed intake, weight gain, and body weight changes were monitored. Digestibility trial was carried out in the last four days of the experiment. All data collected wereanalysed using One-way ANOVA,Diet C was comparable(P>0.0 5) to control in virtually allperformance characteristics variables and almost even higher(P<0.05)in nutrients utilization at a cheaper rate .Maxigrain® supplemented GLM will serve as a cheap abundant non-conventional feedand pigmenting stuff with high nutrients utilization efficiency.*
Key words:*,Gliricidia, Laying-hen, ,Maxigrain®,Nutrients-utilization,Performance-characteristics,*

I. Introduction

The limitation of poultry production in Nigeria has hinged particularly on the cost of feed production. Feed cost accounted for about 70-80% of the total cost of production due to the competitiveness of the conventional protein feed sources between humans and poultry. In fact, this singular problem is conspicuously responsible for the widening animal protein intake shortage because animal products are produced at costs out of reach of the populace. There is the need to produce at an affordable price to the consumers and also the farmers through the search and use of cheaper feed ingredients that are always available and have no competition with man's dietary demands i.e. non-conventional sources of feeds like *Gliricidiasepium*so as to meet 0.83g/kg per day protein requirement for man. . Leaf meals are gaining acceptance as feed stuffs in poultry diet as due to its availability and its similar nutrient content and are considered to be un-conventional feeds. Satisfactory performances have been reported of various leaf meals tested in the diet of some classes of poultry birds[1].Exogenous enzyme supplements are used widely in poultry diets in an attempt to improve nutrient utilization, health and welfare of birds, product quality and to reduce pollution as well as to increase the choice and content of ingredients which are acceptable for inclusion in diets [2]. The role of enzymes as feed additive in poultry diets is well established. The advent and use of commercial feed enzymes in livestock feeding has opened new horizon for the use of hitherto waste feedstuff without detrimental effect on poultry performance.The objective of the study was to evaluate the effect of Maxigrain® supplementation on performance characteristics and nutrient utilization in layers fed *Gliricidiasepium* leaf meal. It is thus expected that this study would provide a basis for recommendation of the supplementation of *Gliricidiasepium* leaf meal in layers diet.

II. Materials And Method

2.1 The Site of the study

This experiment was carried out at the poultry unit of the Teaching and Research Farm of the College of Agricultural sciences, OlabisiOnabanjo University, Yewa Campus, Ayetoro, Ogun State. Ayetoro is 35km North West of Abeokuta, located on latitude $70^0$12' N Longitude $30^0$3'E; a deciduous derived savannah zone in Ogun State. Climate sub-humid tropics with a gravelling ultisol soil and an annual rainfall of 963.3mm in 74 days with maximum of 29^0c during the peak of wet season and 34^0c during the dry season; mean annual relative humidity is 81%. Ayetoro lies between 90 and 120m above the sea level. The entire area is made up of undulating surface, which is drained majorly by River Rori and River Ayinbo.

2.2 Processing of test ingredient

Fresh, young *Gliricidiasepium* leaves were harvested from pasture and range unit of the College. The long stalks were then removed to reduce fibrousness before air drying. Air drying in shade was done to reduce the moisture content of fresh leaves, to prevent fungal growth and for easy milling. Drying was completed within few days of good sunshine. The dried Gliricidia leaves was then milled to obtain Gliricidia Leaf Meal (GLM) and incorporated into five layers' diet in which soyabean was replaced with Gliricidia Leaf Meal.

2.3 Management of experimental birds

A total of 60 point of lay (16 weeks) laying birds was purchased from a reputable farm at 16 weeks of age. The birds were allotted randomly into five treatments at 12 birds per treatment. Each treatment was replicated three times at 4 birds per replicate. The experiment lasted for 12 weeks. Feed and water were given *ad-libitum.* The birds were dewormed and vaccinated appropriately. Body weight of each bird was taken at the beginning of the experiment and at 2 weeks intermittently. The parameters monitored were feed intake, Hen day production, egg weight, and body weight changes.

2.4 Metabolic studies

The metabolic studies were carried out in the last four days of the feeding trial. The birds were placed in individual metabolism cage made of welded wire mesh fitted with removal feeders and arranged for quantitative collection of faeces inmorning before feeding and watering. The feeds andfaeces were weighed fresh and 10% aliquot each day collection for each animal were taken, dried at 60^0c for 48 hours in a forced draught air over and bulked. A sub sample was done, thoroughly mixed and milled to pass through a 0.60mm sieve and stored in sealed hermetically in label container until analysis.

2.5 Chemical analysis

Samples of the test ingredients, diets and excreta were analysed for proximate component using the analytical methods described by [3].

2.6 Statistical Analysis

Data obtained from these samples chemo-metric were used to calculate the metabolites digestibility. They were further subjected to analyses using one way ANOVA / completely randomized design using the general linear models (GLM) procedures as package due to[4] and significantly different means were separated using least significance difference at 0.5 level of probability in the same package; The general linear model is us defined thus

$Xy= \mu+\alpha i+ eij$

Xy= individual data generated from the fixed treatment (Diets A-E) effects

μ= Grand population mean

αi = the fixed treatments effects

eij= the error (replicate) term within each treatment.

Table 1: Percentage Composition of Experimental layers Diets

	Diet A	Diet B	Diet C	Diet D	Diet E
Ingredients (%)	0%(Control)	0% with M	5%with M	7.5% with M	10% with M
Maize	40.00	40.00	40.00	40.00	40.00
Soybean meal	20.00	20.00	15.00	12.50	10.00
Gliricidia leaf meal	-	-	5.00	7.50	10.00
Palm kernel cake	10.00	10.00	10.00	10.00	10.00
Wheat offal	14.25	14.25	14.25	14.25	14.25
Fish meal	3.00	3.00	3.00	3.00	3.00
Oyster shell	8.00	8.00	8.00	8.00	8.00
Bone meal	4.00	4.00	4.00	4.00	4.00
Vit-premix*	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
TOTAL	100.00	100.00	100.00	100.00	100.00
Calculated Chemical Composition					
Crude protein	18.94	18.94	17.96	17.47	16.98
Ether extract	7.06	7.06	7.36	7.50	7.66
Crude fibre	7.06	7.06	7.36	7.50	7.66
Ash	2.87	2.87	3.00	3.07	3.13
Energy[KCAL/KG]	2655.3	2655.3	2534.2	2473.7	2413.2

M= Maxigrain®

III. Results And Discussion

The proximate analysis of the experimental diet and test ingredient is presented in Tables 2 and 3 respectively. The value for crude protein ranged from 18.33 (diet D) to 21.57 (diet B). The crude protein of the test ingredient (GLM) was 24.38% which is very close to that reported by [5] which is 26%. It is however higher than the value gotten by [6]. The variation observed could be by factors such as cutting frequencies,leaves nature(phyllodinous or bipinnate) plants age[7] while others could be from plant parts assayed, session of harvests, soil fertility, specific and varietal variations, cultivar differences, post harvest treatments, and growing conditions (water, and drought stress, photo periodicityas well as laboratory analytical dissimilarities[8]Table 4 shows the performance characteristics of the birds in the experimental diets. There was a consistent increase in ($p<0.05$) in feed consumption with increase in Gliricidia content of the diets. Birds fed 5% GLM with Maxigrain® enzyme show the highest feed intake per day. At 10% GLM, feed intake was significantly depressed in GLM treatments. The reduction in feed intake can be attributed to various phytoalexin,deleteriousprinciples,antiquality factorsor secondary plant metabolites (anti-nutritional factor) content of Gliricidia[8]. Basically, diets containing 5, 7.5 and 15%GLM should be consumed more because of claim can only come true if the inherent palatability problems in Gliricidia(9)andtheir higher fibre content so that birds could meet their energy requirements [10] are considered and averted. [11]claimed that drying reduced the tannin content of Gliricidia, thus making it more palatable. Observations on feeding pattern indicated that though the birds eventually got used to GLM even at 10%, the intake remained lower implying the utilization problems associated with Gliricidia. The advantages of released encapsulated nutrients and degradation/attenuation of cell wall content and deleterious principle was exhibited in diet C[12]. While the evident in body weight losses recorded by birds fed 7.5 and 10% GLM, a situation similar to reports of toxicity and growth inhibition in poultry [13]. Also, Hen day production decreases significantly ($p<0.05$) as the level of GLM increases in the diet which is due to the lower feed intake with increase in GLM.especially beyond 5% that had all the performance indices almost equal todiet A and also interms of nutrients digestibility which implied that the maxigrain®functions at best synergistically at respective rate of enzyme and GLM inclusion [14][15] and at least-cost(Table 6) beyond which therewas poor performance by the birds in those diets that could in part be due to anti quality factors in the GLM (cell wall fractions and deleterious principles of various sorts)[8] and also according to [2]who observed thatreasons for apparent lack of response to enzyme supplementation could include the following;

i)The likelihood/possibilty of the diet being fed be of extremely good quality and allow the animals to performclose to their genetic potential.

ii)That enzymehas the incorrect mains pecificity (amylases,pectinases,β-glucanases,arabinoxylases,cellulases,hemicellulases,,acidproteases,alkalineproteases,phytases,esterases,lipases)and s attendant supplementary activity for the substrate.

iii)Denaturation of the enzyme before the dietis consumed,or supplementation of the diet with wrong enzyme.

iv)Variation within an ingredientsin the concentration or activity of proteinaceous antinutrients to the enzyme.

v)Variation in the quality of feed ingredients

vi)Animal stage of growth /maturity.

Furthermore,It must be emphasized ,however according to [16] that for commercial use exogenous.enzymes must be able to survive the rigours of feed processing (Temperature,Pressure,and Moisture)and the in-hospitable.Not only do these enzymes have to survive the fluctuations of pH and proreolytic attack by enzymes,but they also have to operate in these conditions at a meaningful rate in order to accomplish the neccesary degrees of digestionof the intended substrate

IV. Conclusion

From the above glricidia could be incorporated into the diet of the ration of layers apart from the fact that it is cheap ,perennial, easily esatablished,widely adapted to various soils,Chemically,it inherent abundant and cheap vitamin Athat is needed for maintainance of the eyes while more research is needed in the area of the optimum rate of Maxigrain® with corresponding inclusion of GLM(being aforage leaf and not cereals)

Table 2;Chemical composition of experimental diets

Composition	Diet A 0%(Control)	Diet B 0% with M	Diet C 5%with M	Diet D 7.5% with M	Diet E 10% with M
Crude protein	**18.93^{c}**	**21.57^{a}**	**19.53^{b}**	**18.33^{c}**	**19.23^{b}**
Ether extract	**15.83^{b}**	**16.83^{a}**	**15.13^{b}**	**16.23^{a}**	**15.67^{b}**
Crude fibre	**14.13^{a}**	**13.87^{ab}**	**14.57^{a}**	**12.53^{c}**	**13.53^{b}**
Ash	**9.63^{a}**	**9.07^{ab}**	**9.43^{a}**	**8.67^{b}**	**9.57^{a}**
NFE	**41.50^{c}**	**38.70^{d}**	**41.34^{c}**	**44.30^{a}**	**42.00^{b}**

^{abcd}means within the same row bearing different superscripts are significantly different ($p<0.05$)

Table 3;Chemical composition of test ingredient (GLM)

Composition (%)	GLM
Crude protein	24.38
Ether extract	1.75
Crude fibre	18.93
Ash	11.58
NFE	43.36

Table 4; Effect of Gliricidia leaf meal supplemented with Maxigrain® on performance characteristics of layers

	Diet A	Diet B	Diet C	Diet D	Diet E	SEM	LOS
Parameters	0%(Control)	0% with M	5%with M	7.5 % with M	10% with M		
Feed intake, g/d	90.00^{c}	103.00^{b}	117.00^{a}	116.00^{ab}	114.00^{ab}	0.09	*
Initial body weight, kg	1.42^{d}	1.65^{a}	1.52^{c}	1.50^{c}	1.57^{b}	1.13	*
Final body weight, kg	1.55^{b}	1.52^{c}	1.63^{a}	1.54^{b}	1.52^{c}	5.72	*
Body weight changes, g	0.13^{a}	-0.13^{d}	0.11^{ab}	0.04^{b}	-0.05^{c}	4.52	*
Henday production, %	87.60^{a}	86.90^{a}	85.30^{b}	80.80^{c}	76.00^{d}	0.74	*
Egg weight, g	54.33^{a}	52.33^{b}	54.33^{a}	53.67^{ab}	54.00^{ab}	0.49	*
Feed/kg egg (kg)	1.67^{d}	1.98^{c}	2.17^{a}	2.19^{a}	2.11^{b}	1.05	*

^{abcd}means within the same row bearing different superscripts are significantly different (p<0.05)
SEM= Standard Error of Mean, LOS= Level of Significance, NS= Not Significant

Table 5; Effect of Gliricidia leaf meal supplemented with Maxigrain® on Nutrient digestibility of layers(%)

~~DietADietBDietCDietDDietE~~

Composition	0%(Control)	0% with M	5%with M	7.5 % with M	10% with M
Dry matter	78^{b}	78^{b}	80^{a}	79^{ab}	79^{ab}
Crude protein	**59^{b}**	**58^{c}**	**56^{d}**	**56^{d}**	**63^{a}**
Ether extract	**67^{c}**	**69^{a}**	**68^{b}**	**68^{b}**	**68^{b}**
Crude fibre	**58^{d}**	**62^{b}**	**64^{a}**	**62^{b}**	**60^{c}**
Ash	**21^{d}**	**31^{b}**	**32^{a}**	**28^{c}**	**31^{b}**

~~abcd~~**means within the same row bearing different superscripts are significantly different (p<0.05)**

Table 6; Economic analysis of feeding layers on experimental diet supplemented with *Gliricidiasepium* leaf meal and Maxigrain® enzyme.

Treatment	Cost of feeding (#)	Cost per kg feed (#/kg)
A	9364.32	92.90
B	9364.32	92.90
C	8532.72	84.65
D	8182.94	81.18
E	7827.12	77.65

#= Naira

Reference

[1] Ige, A.O., Odunsi, A.A., Akinlade, J.A., Ojedapo, L.O., Ameen, S.A., Aderinola, O.A. and Rafiu, T.A. Gliricidia Leaf meal in Layer's Diet: Effect on Performance, Nutrient Digestibility and Economy of Production. *Journal of Animal Veterinary Advances 5(6)*(2006): 483-486(1)

[2] Acamovic, T. Commercial application of enzyme technology for poultry production *In; World Poult. Sci. J., 57.*(2001) 226-242(2)

[3] A.O.A.C, (1995): Official method of Analysis (16th Ed.) Association of Official Analytical Chemists, Washington DC

[4] S.A.S, (2002): Statistical Analysis Software. SAS.Ints.Inccary N.Y.

[5] Chadokar, P.A. (1982): Gliricidia maculate: A Promising Legume Forage Plant. *World Animal Review,* 44: 36-45.

[6] Carew, B.A.R. (*Gliricidiasepium* as a sole feed for Ruminants. *Tropical Grassland, 17(4)*(1983)181-183.

[7] Ogungbesan,A,MProduction and utilization of Tephrosia bracteolate (Guill et Perr) as a forage for West Africa dwarf goats in South Western Nigeria. A Ph.D Thesis in Agricultural Biochemistry and Animal Nutrition submitted to the Department of Animal Science University of Ibadan,(2004) 239pg

[8] Ogungbesan,A,MSecondary plant metabolites utilizationin west African dwarf does fed combined levels of Andropogongayanus (kunzth)and Gliricidiasepium(Jacq)with Cassava offal based concentrate*Journal of Environmental Issues and Agriculture in Developing Countries,3,(2)*(2011) *1-9*

[9] Simons, A. J. and Stewart, J.L. *Gliricidiasepium* – a multipurpose tree legume. In: *Forage Tree Legumes in Tropical Agriculture* (R.C Gutteridge and H.M Shelton, eds) *CABI, Walling Ford, UK. pp*(1994)30-48

[10] Yu, B., Tsai C. C., Hsu J.C. and ChiouP.W. S Effect of different sources of dietary fibre on growth performance, intestinal morphology and caecalcarbohydrases of domestic geese. *Br. Poult. Sci*., *39*., (1998)560-567

[11] Ahn, J.N., Robertson, B.M. Elliot, R., Gutteridge, L.C. and Ford, C.M. Quality assessments of tropical browse legumes: Tannin content and protein degradation. *Anim. Feed Sci. Technol.,*(1998) 147-156.

[12] Ademola, S.G.,Egbewande,O.O.,Lawal,I.E.,Isah,A.T and Kuranga,S.MEffect of Roxazme G® and Maxigrain® on Performance ,Egg quality , Cost benefit and Haematological parameters of laying hens fed Wheat offal,Corn bran and Brewers Dry Grain diets .*International J. of Poultry Science 11(1)*(2012)33-38

[13] Raharjo, Y.C., Cheeke, P.R., Arscott, G.H., Burke, J.M. and Glover, N. Performance of broiler chicks fed Gliricidia leaf meal. *Nitrogen Fixing Tree Research Reports 5*(1987) 44-45

[14] Odunsi A.A., Ogunleke, M.O., Alagbe, O. S. and Ajani, T.O. Effect of Feeding *Gliricidiasepium* Leaf Meal on the Performance and Egg Quality of Layers. *International Journal of Poultry Science 1 (1)*(2002) 26-28

[15] A.M Ogungbesan, Awoola, O.J.,Adeleke, G.A.andAdenugba,A.The Effect of Enzymes on Blood Constituents and Minerals Utilization in Broilers Fed *Gliricidiasepium* (Jacq)*Epizootiologyand Animal Health in West African* 9(2013) (In press)

[15] Bedford, M,RExogenous enzyme in monogastric nutrition-their current value and future benefits,*Anim Feed Sci& Tech8*.(2000) 61-13