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Performance, Carcass Characteristics and Economics of Production of Broiler Fed Diets Containing Gliricidia Leaf Meal as Replacement for Soybean Meal

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Abstract
This study was conducted to assess the growth performance, carcass traits and economics of production of broiler fed soya bean replaced with *Gliricidia* leaf meal (GLM) diet. One hundred, 4 weeks old broiler chickens were randomly distributed to five treatments of 2 replicates with ten birds per replicate. These were fed trial diets containing 0, 10, 20, 30 and 40% levels of soya bean replaced with GLM for 5 weeks. Results showed that weight gain were not significantly influenced ($p>0.05$) by the dietary treatments. Feeding trial exerted effects on feed intake however, feed gain ratio and feed efficiency were not significantly different ($p>0.05$).No significant difference ($p>0.05$)was observed in thigh, wing and breast muscle weights of the birds fed *Gliricidia* substituted diet however, liver weight was significantly affected by the diet. Price/kg of feed reduced with increased. *Gliricidia* in the diets but the cost per/kg animal produced was not significantly affected ($p>0.05$).It could therefore be suggested that soya bean meal could be replaced with GLM up to 40% level without adverse effect on performance and weights of major primal parts of the bird. This will also reduce the cost of feed and competition for soya beans between man and livestock industry.

Keywords: Gliricidia leaf, growth performance, broiler, carcass traits and soya beans

Introduction

The major problem faced by developing countries especially Nigeria is the ever increasing population without a corresponding increase in animal protein (Friday *et al*., 2015). Bonsul *et al*. (2012) reported that the importance of poultry to the socio economic development of a country cannot be overemphasized because birds have faster gestation period than other farm animals to produce meats and eggs for human consumption at a reasonable cost. The economic efficiency of poultry production is not only dependent on productivity but also on the relationship between inputs and outputs. The growth and expansion of the industry is confronted by high cost of feed. The conventional protein feed stuffs for poultry such as soya bean, groundnut cake and fish meal are becoming increasingly more scarce and expensive because they are competed for by human beings as food and other industrial uses. The rising cost of finished feed, which is 70 – 80% of the cost of production among others, is a major setback the prices of such conventional protein feed ingredient such as groundnut cake, soyabean meal and fish meal have soared so high in recent times that it is becoming uneconomical to use them in poultry feed (Esonu *et al*., 2003). The poultry feed is also expensive as a result of relatively high cost of imported feed because most of these developing countries rely on imported feed and the foreign exchange rate has continue to widen.

Therefore, an alternative source which will be cheaper must be looked into, particularly those that do not attract competition in consumption between humans and livestock such as leaf meal for the formulation of balanced and cheaper ration. Leaf meals do not only serve as protein source but also provide some necessary vitamins, minerals and also some yellow colour of broiler skin and shank (Esonu *et al*., 2003). Fasuyi and Kehinde (2009) investigated effects of cellulase-glycanase-xylanase combination on the nutritive value of *Telfairia* occidentalis leaf meal in broiler diet. Mmereole (2009) evaluated dietary inclusion of sweet potato leaf meal with or without enzyme treatment in broilers diet. Hence leaf meals are gaining acceptance as feedstuff in animal diet which are locally available and considered cheaper.

Giliricidia sepium is a multipurpose tree-legume that has the ability to provide large quantities of high quality forage materials all-year-round as well as the ability to maintain a sustainable environment through nitrogen fixation thus replenishing the soil (Simons and Stewart, 1994).In many tropical countries, it is used as browse plant for ruminant, live fencing, shade for planation crops, green manure, support for yam vines and demarcating boundaries *Gliricidia sepium* has a crude protein content of 24.38% (Ogungbesan *et al*., 2013).Despite the availability and abundance of *Gliricidia*, there is little information on the use of the plant as feed resources in broiler diet.

This research work therefore aimed at determining the effect of replacing soybean meal with *Gliricidia* leaf meal diet on growth performance, carcass characteristics and economics of production of broiler chicken.

Materials and Methods

The experiment was carried out at the Poultry unit of the Teaching and Research Farm, Department of Agricultural Science, Adeyemi College of Education, Ondo, Ondo State. Fresh *Gliricidia sepium* leaves were harvested within the College environment, dried under shade for several days, milled to obtain GLM and incorporated into five broiler diets in which soybean was replaced withGLM at 10, 20, 30 and 40% levels.One hundred, four weeks old broiler birds were used for the experiment.

The birds were randomly allotted to five treatments of 2 replicate with 10 birds per replicate. Birds which were tagged for easy identification were housed in ten deep litter pen. These were offered experimental diets and water *ad-libitum* for a period of five weeks. Records of daily feed intake and weekly weight gain were taken.At the end of five weeks feeding trial, four birds were selected per treatment (making a total of twenty (20) birds). The birds were slaughtered by cutting the jugular vein and bled. Birds were later de-feathered, eviscerated and cut into primal parts. Internal and external organs were weighted using electric weight balance.

Data collected were analyzed using analysis of variance.The significant differences between treatment means were calculated using Duncan Multiple Range Test with the aid of Statistical Package for Social Sciences (SPSS) Version 13.

Results and Discussion

The result in table 1 shows that there is no significant difference ($p>0.05$) in the total, weekly and daily weight gain of birds fed control diet and those fed varying levels of *Gliricidia* inclusion. This result is contrary to the report made by Amata and Bratte (2008) that there is decrease in weight gain of rabbits fed GLM in place of soya bean meal. Similarly, Odunsi *et al*. (2002) reported that GLM inclusion significantly reduced the weight gain when fed to layers.Feed intake significantly decreased with the inclusion of GLM in the diet. However there is no difference in the total feed intake of birds fed the control diet and those fed 40% replacement level of SBM with GLM. This finding is in conformity with report made by Bonsu *et al*. (2007) when broilers were fed with GLM. Amata and Bratte (2008) also made a similar report when GLM were fed to rabbit in place of Soya bean meal.GLM inclusion in broiler diet influenced feed intake significantly ($p<0.05$). However, this did not affect the weight gained of birds fed the experimental diets. The feed efficiency and the feed gain ratio were not significantly influenced ($p>0.05$) by the diets. This finding is in contrast with the report of Odunsi *et al.* (2002) who observed that the feed gain ratio decreases as the proportion of GLM in feed increases. Price of feed/kg decreased ($p<0.05$) with the increased level of GLM in the diet however, there was no significant difference in the cost per kg of animal produced. This suggests that GLM inclusion did not influence the cost of production of the animal.

Table 1:Effect of GLM on the growth performance and economics of production of broiler chicken

Parameters	Levels of GLM (%)					SEM
	0	10	20	30	40	
Initial weight (g)	446.50	436.50	416.00	439.50	436.50	7.57
Final weight (g)	1420.00	1307.50	1380.00	1880.00	1325.00	108.17
Total weight gain (g)	973.50	870.50	964.50	940.50	888.50	33.01
Daily weight gain (g)	27.81	24.87	26.87	26.87	25.38	0.91
Total Feed intake (g)	3467.40^{d}	3315.00^{c}	3230.00^{b}	3150.95^{a}	3400.00^{d}	14.45
Feed intake (kg)	3470.00^{e}	3315.00^{c}	3230.00^{b}	315.00^{a}	3400.00^{d}	13.49
Daily feed intake (g)	99.07^{d}	94.71^{c}	92.29^{b}	90.03^{a}	97.14^{d}	0.39
Feed gain Ratio	4.28	4.77	3.68	3.89	4.24	0.19
Feed Efficiency	1.91	0.26	0.30	0.30	0.26	0.33
Price kg feed	112.27^{e}	10.47^{d}	108.67^{c}	106.87^{b}	105.07^{a}	0.26
Price/Broiler (kg)	480.52	527.11	399.84	415.62	440.72	20.75

^{a,b,c,d,e}: means within the row carrying different superscripts differs significantly ($P<0.05$)**;** SEM: Standard error of mean

The result in table 2 shows that there is no significant differences ($p>0.05$) in thigh, wing, feather and breast muscle percentage of birds fed control diet (0%) and the experimental diets. This shows that the experimental diets did not exert any significant influence on thigh, wing and breast muscle. This result is similar to that of Essiet and Solomon (2013) who reported that there is no change in the primal part of broilers fed diet containing *Ocimum gratissimum* and *Gongronema latifolium* in place of soybean meal. However, the live shrunk and dressed carcass weight were higher in birds fed 10% level of replacement compare with those fed 20 and 30% levels of replacement. This is in conformity with the report made by Bonsu *et al.* (2007) that there is significant difference ($p>0.05$) in the live weight and dressed carcass weight of broiler chickens fed GLM. Drumstick percentage is higher in birds fed control diet (0%) compared with 10% and 40% level of inclusion while the back percentage is higher in birds fed 20% replacement compare with 10% and level of inclusion. This result is inconsistence with report of Essiet and Solomon (2013) that no significant effect of was observed in back and drumstick percentage of broiler fed *Ocimum gratissimum* and *Gongroenema latifolium.*

Differences in heart, lung, lizard and kidney were not significant ($p>0.05$) whereas, the liver weights tend to increase as the proportion of GLM in the diet increases. This in conformity with report made by Amata and Bratte (2008) that there is no changes in the weight of heart, lung and gizzard but significant difference was observe in the liver of weaned rabbits fed GLM. Also, Bonsu, *et al.* (2007) reported that there is significant difference ($p<0.05$) in liver weight of birds fed GLM. The increase in the weight of the liver is probably in response to the effect of the toxic/anti-nutritional factors in the diets incorporating GLM.

Table 2:Effect of soybean meal replaced with GLM on carcass characteristics of broiler

Parameters	Levels of GLM (%)					SEM
	0	10	20	30	40	
Dressed Carcass (g)	1787.50^{bc}	1887.50^{c}	1575.00^{ab}	1462.50^{a}	1637.50^{abc}	48.59
Drumstick (%)	10.47^{b}	9.02^{a}	6.66^{ab}	9.62^{ab}	9.13^{a}	0.19
Thigh (%)	12.39	11.68	12.16	12.26	12.88	0.20
Wing (%)	9.44	8.68	9.08	8.99	8.84	0.13
Breastmuscle (%)	17.99	19.25	19.41	17.03	17.72	0.46
Feather (%)	9.39	8.52	9.53	10.64	9.16	0.61
Shank (%)	4.22^{ab}	3.52^{a}	3.67^{a}	4.82^{b}	3.63^{a}	0.15
Neck (%)	5.10^{b}	4.39^{a}	5.20^{b}	437^{a}	5.12^{b}	0.12
Head (%)	2.85^{a}	2.78^{a}	2.86^{a}	3.34^{b}	2.96^{b}	0.07
Back (%)	13.23^{ab}	11.67^{a}	14.03^{b}	11.98^{a}	12.45^{ab}	0.29
Kidney (%)	0.18	0.15	0.16	0.18	0.16	0.01
Gizzard (%)	1.89	1.78	2.14	2.19	2.10	0.07
Intestine (full Content) (%)	7.77	10.52	9.39	9.93	9.49	0.48
Heart (%)	0.51	0.51	0.39	0.45	0.39	0.02
Liver (%)	2.69^{a}	3.49^{b}	3.05^{ab}	2.64^{a}	2.70^{a}	012
Lung (%)	0.49	0.52	0.54	0.58	0.76	0.04

^{a,b,c,d,e}: means within the row carrying different superscripts differs significantly ($p<0.05$)

Conclusion

It could be concluded that soya bean meal replaced with GLM in broiler diet did not exert significant effect on the growth performance of broilers; however significant differences were observed in feed intake of the experimental birds. There were significance differences in the weight of primal parts of birds fed GLM based diet, only liver exhibited significant weight difference among the internal organs of the birds. Feed price/kg reduced with increased GLM in the broiler finisher diet and price per kg bird produced was least at 30% level of soya bean meal replacement. GLM when properly dried could therefore be included in the broiler finisher diet with no deleterious effect on birds' growth. This will not only reduce the cost of production but also the competition between man and livestock industry.

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