Growth and carcass yield of finishing broiler chickens fed lablab leaf meal

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Abstract

The inclusion of lablab (Lablab purpureus) leaf meal (LLM) at 0, 50 and 100g/kg in finisher diet on broiler performance and carcass yields were evaluated in a 28-day feeding trial. Results showed that LLM in broiler finisher diets resulted in a significant ($p<0.05$) increase in feed intake relative to the control diet. The control diet and 50gLLM/kg diet supported similar ($p>0.05$) final body weight and weight gain, but these parameters were significantly ($p<0.05$) depressed in broilers fed 100gLLM/kg diet. Feed conversion ratio became poorer with increase in level of LLM. Carcass yield was not significantly influenced ($p>0.05$) by dietary treatments. Cut-up parts as a percentage of dressed weight showed that thigh and drumstick had a non-significant decrease in weight while back and wing had a non-significant increase with level of dietary LLM. Breast, neck and abdominal fat pad were significantly ($p<0.05$) decreased with increased LLM. Broilers fed 100gLLM/ kg diet exhibited a significantly lower weight for liver, spleen, lung and heart in comparison with the control diet. Only the gizzard is significantly higher ($p<0.05$) in broilers fed LLM compared to the control diet (without LLM). It can be concluded that LLM inclusion at 100g/kg diet had a negative effect on performance but not on carcass parameters whereas LLM at 50g/kg diet gave comparable response with the control diet in all parameters measured.

Keywords: Lablab leaf meal, carcass yield, broiler chickens

Introduction

The importance of the leaf component of legume herbage and effect of leaf yield on animal production was demonstrated by Hendrickson et al (1981). More recently, various authors (Ash et al., 1992., Odunsi, *et al* 1999; Odunsi *et al* 2002., Esonu *et al*, 2003) have followed the tradition of using forage meals to offset or supplement deficiencies of conventional livestock production. *Lablab purpureus* is a minor grain legume used as green manure crop or for forage and have potential as grain crop in the sub humid tropical areas. Hendrickson and Minson (1985) further reiterated the potentialities of the lablab grain and forage content in farming systems. Odunsi (2003) evaluated the chemical composition of lablab leaf meal and further reported on the productive response of laying birds to its dietary inclusion.

The present study was thus aimed at evaluating the inclusion levels of lablab leaf meal in diets for finishing broilers. Performance and carcass evaluation were used as measures of response.

Materials and Methods

The leaves of *Lablab purpureus* were harvested from plants on the University Teaching and Research Farm Plots. They were thinly spread on concrete slabs and sun-dried for about 72hours. The dried leaves were ground into meal (lablab leaf meal) using a 2 mm mesh screen, mixed thoroughly and included in three maize-soybean meal based broiler finisher diets at 0, 50 and 100g/kg diet (Table 1). Each diet was given to a group of thirty, 28-day old White Ross broiler chickens. Each group was further divided into three replicates of ten birds each. The birds were raised on concrete-floored pens with wood shavings as litter and were previously fed on a proprietary commercial broiler starter diet. Three of such replicate groups were fed *ad libitum* on one of the three experimental diets for 28 days. Treatments were arranged as a completely randomized design. The birds had free access to water under identical environmental and management conditions. Routine vaccination for broilers and medication were administered appropriately during the feeding trial.

The birds were weighed at the commencement of the feeding trial and subsequently at weekly intervals. Records of weekly feed consumption were kept while feed conversion ratio was determined by dividing the average daily feed intake by the average daily gain. On the 29th day, six birds per dietary group of average weight and mixed sexes were selected for carcass evaluation. The birds were fasted overnight but had access to water. They were weighed the following morning before slaughtering by cutting the jugular vein, followed by thorough bleeding. After scalding in boiling water for about a minute and manually plucking the feathers, the carcasses were eviscerated and cleaned. The dressing percentage was obtained by expressing carcass weight as a percentage of live weight. The organs were carefully excised and each carcass was cut up into parts for carcass evaluation. The relative weight was calculated by expressing the weights of the cut-up parts, organs and abdominal fat as a percentage of dressed weight.

All data collected were subjected to a one-way analysis of variance and significance of the difference of means was determined as outlined by Steel and Torrie (1980).

Results and Discussion

The gross and chemical composition of experimental diets and lablab leaf meal (LLM) is presented in Table 1. The chemical contents of LLM is similar to major leaf meals previously employed in poultry feeding trials (Odunsi et al 2002). Inclusion of LLM in the diets resulted in a progressive decrease in metabolizable energy and the ether extract. The dietary protein content was maintained while there is a concomitant increase in the crude fibre and ash contents of such diets.

Data on the performance of broilers fed LLM based diets were presented in Table 2. Feeding LLM to broilers increased ($p<0.05$) feed intake at 50 and 100 g/kg diet relative to the control diet. Weight gain was similar ($p>0.05$) between broilers on 0 and 50gLLM/kg diet but these parameter was depressed ($p<0.05$) in broilers fed 100gLLM/kg diet. Efficiency of feed conversion became poorer with increasing level of LLM. The higher feed intake was a result of the increase in dietary fibre and the decrease in the metabolisable energy of LLM based diets. The increase in feed consumption was contrary to what was observed in the layer study (Odunsi, 2003). The results of this trial agrees with previous observations on most leaf meals (Dada et al 2002, Esonu et al, 2003., Fasina et al 2004). Teguia *et al* (1997) reported that the replacement of maize with sweet potato and 30% peanut leaves significantly ($p<0.05$) depressed body weight gain while 20% peanut leaf meal supported similar weight gain as the control diet. The workers further observed that feed conversion ratio was significantly poorer when 30% maize was replaced by either sweet potato or peanut leaves.

Table 1: *Composition of diets*

Ingredients	Levels (g/kg) of lablab in diets		
	0	50	100
Maize	582.5	552.5	522.5
Soybean meal	265.0	245.0	225.0
Lablab[1]	0	50.0	100.0
Fixed[2]	152.5	152.5	152.5
Total	1000	1000	1000
Determined analysis			
Dry matter	914.2	915.0	919.0
Crude protein	211.0	211.0	209.0
Ether extract	28.4	27.4	26.5
Crude fibre	38.1	39.5	41.9
Ash	32.6	35.1	40.1
Nitrogen free extracts	603.9	592.1	591.0

[1]Composition of lablab (g/kg): 91.6 dry matter, 234.3 crude protein, 19.0 ether extract, 83.4 crude fibre, 116.0 ash and 466.9 nitrogen free extracts.
[2]Fixed ingredients contained (g/kg): Wheat offal, 75; Fish meal, 25; Bone meal, 30; Oyster shell, 15; Methionine, 2.5; Salt, 2.5 and Premix, 2.5[3]
[3]Odunsi et al (1999)

Table 2: *Effect of dietary inclusion of lablab leaf meal on the performance of finishing broiler chickens (28-56 days of age)*

Parameter	Levels (g/kg) of lablab in diets			
	0	50	100	SEM
Initial weight (g/bird)	553	585	597	20
Final body weight (g/bird)	1960^a	1975^a	1765^b	44.5
Weight gain (g/bird/d)	50.3^a	49.6^a	41.7^b	3.45
Feed intake (g/bird/d)	137.8^b	162.3^a	166.8^a	5.72
Feed/gain ratio	2.75^c	3.2^b	4.01^a	0.23

^{a,b,c} :Within-row means with different superscripts are significantly different at $p<0.05$

The negative effect of leaf meal diets on feed utilization was confirmed by a significant dependency of feed efficiency on the substitution level. The poor feed utilization in LLM fed birds could be attributed to the high fibre content of the leaf meal diet as evident in diet 3 having 42g/kg crude fibre compared to the control diet with 38g/kg. The fibrous nature of leaf meals is the common factor limiting the utilization of green forage as a feed for monogastric animals.

The impact of dietary treatments on carcass yield and organ weights of broilers is presented in Table 3. Broilers fed 100gLLM/kg diet had the least live and eviscerated weights, which was partly due to reduced body weight gain resulting from poor utilization at that level of inclusion. The dressing percentage was not significantly influenced by dietary treatments and values fell generally within 63-71% range reported previously by Odunsi *et al* (1999) as optimum for meat chickens. In contrast, Awosanya and Akinyode (2000) reported a decrease in dressing percentage of rabbits fed Leucaena leaf meal and associated it to low carcass fat and high gut contents. Cut-up parts expressed as a percentage of dressed weight indicated that thigh and drumstick exhibited a declining ($p>0.05$) trend while the back part and the wing numerically ($p>0.05$) increased with increased dietary lablab. Breast, neck and abdominal fat values significantly ($p<0.05$) decreased with increase levels of lablab in the diets (Table 3).

Table 3 *Effect of dietary inclusion of lablab on the carcass and organ characteristics of finishing broiler chickens*

Parameter	Levels (g/kg) of lablab in diets			
	0	50	100	SEM
Live weight (g)	1960^{a}	1975^{a}	1765^{b}	44.5
Eviscerated weight (PLW)	77.4	75.8	74.6	1.23
Dressed weight (PLW)	70.4	69.5	68.7	1.14
Cut –up parts (PDW)				
Breast	26.5^{a}	24.1^{a}	23.1^{b}	0.66
Neck	13.2	12.6	12.5	0.38
Drumstick	13.2	12.6	12.5	0.38
Thigh	15.9	14.4	13.5	0.56
Wing	10.2	10.2	12.1	0.40
Back	17.5	19.5	20.2	0.69
Organ (PDW)				
Liver	3.24^{a}	3.22^{a}	2.61^{b}	0.18
Spleen	0.18^{a}	0.14^{b}	0.14^{b}	0.01
Lung	1.09^{a}	1.03^{a}	0.68^{b}	0.09
Heart	0.74^{a}	0.73^{a}	0.64^{b}	0.02
Gizzard	3.08^{b}	3.64^{a}	3.77^{a}	0.19
Abdominal fat	1.29^{a}	1.53^{a}	0.77^{b}	0.18

^{a,b}Within-row means with different superscripts are significantly different at $p<0.05$
PLW = Percent live weight; PDW= Percent dressed weight

Organ weights were significantly influenced by dietary treatments as shown in Table 3. Broiler chickens fed 100gLLM/kg diet exhibited a significantly lower liver, spleen, lung and heart while the gizzard weight increased ($p<0.05$) across the treatment. The gizzard hypertrophy has been associated with fibrous diets and this is well documented by Fasina et al (2004). This could possibly account for the enlarged gizzard noticed in broilers fed 50 and 100gLLM/kg diet. This may not be unconnected with the abrasive nature of the diet and the higher volume of the digesta in the gastro-intestinal tract that could have induced increase in size and thickness of the gizzard muscles. Despite the decrease in weights of the liver, spleen, lung and heart in broilers fed 100gLLM/kg diet, the values are still close to what Odunsi et al (1999) and Joseph et al (1992) reported for birds fed other types of leaf meals. This is an indication that feeding lablab may not pose serious danger to the functions and development of such organs. Furthermore, no mortality was recorded during the course of the trial indicating that the dietary levels of LLM used are tolerable. Visually, birds fed LLM showed a higher yellow body pigmentation compared to the control diet, and this is similar to the observations of Opara (1996) with Alchornia cordifolia.

Based on the results obtained and the regression analysis (Table 4), it was evident that inclusion of 100gLLM /kg diet in a maize/soybean meal diet had adverse effect on daily weight gain and feed conversion ratio of finishing broiler chickens. However, at the dietary inclusion level of 50g/kg, performance traits and carcass characteristics were comparable to that of the control group (0%LLM).

Table 4: *Regression equations relating levels of lablab leaf meal to growth and some carcass traits of broiler finisher chickens*

Parameter	Linear equation	r^2	Adjusted r square
Final body weight	y= 1999.2 – 1.97X	0.69	0.645*
Daily weight gain	y= 51.5 – 0.086X	0.80	0.773*
Dressed weight	y= 70.4 – 0.017X	0.36	0.267*
Breast	y= 26.3 – 0.034X	0.72	0.679*
Thigh	y= 15.8 – 0.24X	0.84	0.812*
Wing	y= 9.88 – 0.02X	0.65	0.599*
Back	y= 17.7+ 0.027X	0.86	0.843*
Drumstick	y= 13.1 – 0.007X	0.15	0.031*

* $p < 0.05$

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