EFFECTS OF FEEDING *Cassia obtusifolia* LEAF MEAL ON GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER CHICKEN

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ABSTRACT

An experiment was conducted to evaluate the effects of feeding *Cassia obtusifolia* leaf meal on growth performance and carcass characteristics of broiler Chicken. Two hundred (200) unsexed day old *Marshall* broiler chicks were used for the study. Five diets were formulated such that *Cassia obtusifolia* leaf meal were used at 0%, 3%, 6%, 9% and 12% designated as T1, T2, T3, T4 and T5 respectively. The chicks were weighed and randomly allocated to five dietary treatments replicated four times with ten birds per replicate in a Completely Randomized Design. The proximate composition of *Cassia obtusifolia* showed it contains 93.51% dry matter, 25.44% crude protein, 19.14%, crude fibre, 12.17% Ash, 4.06%, ether extract and 38.19% nitrogen free extract. The leaf meal also contains saponin (6.26%), phytate (2.97%), tannins (4.52%) and oxalates (2.37%). The result of growth parameter measured were significant different ($P<0.01$) except, total feed intake and average daily feed intake. Similarly, live weight, plucked weight, eviscerated weight, carcass weight and dressing percentages did not show any significant difference among treatment groups. However, the result of the internal organs evaluated showed variation in the weights of pancreas, large and small intestinal. It was concluded from the results obtained that COLM can be included up to 9% in broiler chickens' diet without adverse effect on the growth performance, carcass and internal organs characteristics.

Keywords: Growth Performance, broiler, carcass characteristics.

INTRODUCTION

High cost of conventional feedstuffs most especially protein and energy sources has been one of the major challenges of intensive poultry production in developing countries (Ani, 2008). A possible solution to the escalating cost of these ingredients is to explore the potentials of alternative feedstuffs as part of replacement for the expensive conventional feed ingredients. One of such alternative feedstuff considered is *Cassia obtusifolia. Cassia obtusifolia* is a leguminous plant that mostly grows in the wild commonly called sickle pod, *Sicklesenna, Senna obtusifolia,* coffee weed and arsenic weed. It is mostly found in the Northern part of Nigeria in areas that have not been cultivated during the rainy season. The seeds have been used in different forms and at times used as coffee (Ousman *et al.*, 2005; Damron and Jacob, 2009). Study conducted by Ayssiwede *et al.* (2010) reported that Cassia leaves on dry matter basis contain 27.4% crude protein,16.8% crude fibre, 15.2% ash, 3.8% ether extract, 36.8% nitrogen-free extract and 2050.47kcal/kg of Metabolizable energy. The leaves also contain some appreciable amount of calcium 3.1% and potassium 1.3%. Nuhu *et al.* (2010) also observed that *Cassia obtusifolia* leaf meal contain negligible amount of tannin 4.53%, polyphenols 14.02% and phytate 31.00%.This study therefore was carried out to investigate the effect of dietary inclusion of *Cassia obtusifolia* leaf meal in broiler production.

MATERIALS AND METHODS

Experimental site

The study was conducted at the Poultry Unit Teaching and Research Farm of the Department of Animal Science and Range Management, Modibbo Adama University of Technology Yola. Yola lies between latitude 7° and 11°N and longitude 11° and 14°E.Maximum temperature in the state can reach up to 40°C particularly in April, while minimum temperature can be as low as 18°C between December and January (Adebayo, 1999).

Processing of *Cassia obtusifolia*

Cassia obtusifolia leaves were collected around the study area. The leaves were left to sun dry on a concrete floor for 3-4 days until they are crispy to touch while still retaining the greenish coloration. The leaves were milled into fine powder using milling machine.

Experimental Diets, experimental design and management

Five diets were formulated such that *Cassia obtusifolia* leaves were used at 0%, 3%, 6%, 9% and 12% to represent T_1, T_2, T_3, T_4 and T_5 respectively as shown in Tables1. Two hundred (200) unsexed day old *Marshall* broiler chicks procured from Otta Farms Ltd Ibadan Oyo State Nigeria and were brooded for one week on commercial starter diet. The chicks were randomly allotted to the five dietary treatments of four replicates with ten birds per replicate in a completely randomised designed. The birds were managed on a deep litter system throughout the experimental period. Routine management practices were observed as recommended by (Oluyemi and Robert, 2000)

Data Collection

Feed intake was determined as the differences between feed offered and feed left over. Birds were weighed weekly to determine weekly weight gain. Feed intake and weight recorded were used to calculate feed conversion ratio (FCR).

Carcass and Organs Weight determination

At the end of the study, two birds per replicate were selected randomly and starved for about 12h to empty the crops. They were then slaughtered, scalded, plucked and eviscerated. The carcass and internal organs were removed, weighed and expressed as a percentage of live weight.

Chemical analysis

Proximate composition of experimental diets, *Cassia obtusifolia* leaf meal and anti- nutritive factors were analyzed using the methods described by AOAC (2000).

Statistical analysis

All data obtained during the experiment were subjected to Analysis of Variance (ANOVA) described by Steel and Torrie (1980). Means were separated using Duncan Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Proximate Composition of *Cassia obtusifolia* Leaf Meal (COLM)

The result of the proximate composition of *Cassia obtusifolia* leaf meal is presented in Table 2. The result shows that it contains 93.51% dry matter, 25.44% crude protein, 19.14%, crude fibre and 38.19% nitrogen free extract. The leaf meal also contains saponin (6.26%) phytate (2.97%), tannins (4.52%) and oxalates (2.37%).The crude protein value was similar to 25.37% reported by Abu *et al.* (2015) but higher than 21.10% reported by Adjoudji *et al.* (2005). The CP value was however lower than 27.40% reported by Ayssiwede *et al.* (2010). Crude fibre value was similar to the 19.25% reported by Odura *et al.* (2008).The metabolizable energy was higher than 2050 Kcal/kg reported by Ayssiwede *et al.* (2010). Tannin content recorded was similar to 4.06% reported Nuhu *et al.* (2010). However, the phytate value obtained was lower than 13.52% reported by Nuhu *et al.* (2010). Studies have attributed variations in nutrient composition and anti-nutritive factors of leaf meals to the age of harvesting, climatic conditions, edaphic factors as well as methods of processing and laboratory analysis (Ojewole *et al.*, 2005; Taiwo *et al.*, 2005).

Performance of broiler chickens fed *Cassia obtusifolia* Leaf Meal

The growth performance of broiler chickens fed graded levels of *Cassia obtusifolia* leaf meal is presented in Table 3. The result showed significant differences (P<0.01) in all the parameters measured for growth performance except total feed intake and average daily feed intake. Final weight decreased (P<0.01) progressively with increasing levels of COLM in the diets. This trend could be attributed to imbalance in nutrient composition and improper metabolism associated with the leaf meal when fed beyond 9% inclusion as reported by (Esonu et al., 2005 and Abu et al., 2015).Total feed intake was not significantly (P<0.05) influenced by inclusion levels of COLM although it progressively increased as the levels of inclusion of COLM increases. This result agreed with the report of Ossebi *et al.* (2010) who observed no significant (P>0.05) effect on feed intake when broiler chickens were fed with COLM. Feed conversion ratio differ significantly (P>0.01) among the treatment groups. FRC was superior in birds on T1 (2.26) and T2 (2.3) while treatments 3, 4 and 5 are similar. The relatively higher feed conversion ratio of birds in treatments 3, 4 and 5 suggests poor utilization of the diets at an incremental level of COLM. The result is in conformity with the findings of Onu, (2012) who observed significant (p<0.05) differences in FCR when broiler chicken were fed pumpkin leaf meal.

Effects of feeding *Cassia obtusifolia* leaf meal on Carcass Yield and Internal Organs Weight of Broiler chicken

The values of live weight, plucked weight, eviscerated weight, carcass weight and dressing percentage were not significant (p>0.05) different across the treatment groups. The result agreed with the finding of Ayssiwede *et al.* (2012) who observed no variation in carcass characteristics when they fed *Cassia obtusifolia* leaf to broiler chicken. The dressing percentage reported in this study (68.20 - 70.60%) is within the range of (67.32-71.59%) reported by Onunkwo and George (2015).

The result of the internal organs evaluation showed that only pancreas, large and small intestinal weight showed variation across the treatments. All other parameters are similar. The result is contrary to reports of Ayssiwede *et al.* (2012) and that of Zanu *et al.*(2012) who in their separate studies showed no significant(p>0.05) difference on internal organs of birds fed diets containing different levels of *Cassia obtusifolia* leaf and moringa leaf meals to broiler finisher respectively. The values for heart and lungs y were similar to (0.41-0.57) and (0.58- 0.61) reported by Onunkwo and George, (2015) respectively. It is evident therefore that inclusion of COLM in the diet of broiler chicken did not illicit any toxic response by the bird as the liver and kidney which are the major organs of detoxification did not undergo any hypertrophy (Carew et al., 2003).

CONCLUSION

It could be concluded from the results that COLM can be included up to 9% in broiler chickens' diet without adverse effect on the growth performance, carcass and internal organs characteristics.

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Table 1. Ingredient composition of experimental diets

Ingredients	Dietary treatments				
	T1	T2	T3	T4	T5
Maize	50.00	50.00	50.00	50.00	50.00
Soybeans	32.70	30.70	29.70	27.70	25.70
COLM	0.00	3.00	6.00	9.00	12.00
Wheat offal	12.00	11.00	9.00	8.00	7.00
Fish meal	2.00	2.00	2.00	2.00	2.00
Bone meal	2.50	2.50	2.50	2.50	2.50
Premix*	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.10	0.10	0.10	0.10	0.10
Calculated analysis					
Crude protein	20.01	20.01	20.01	20.01	20.01
Crude fibre	4.00	4.30	4.70	5.00	5.30
Calcium	1.00	1.10	1.20	1.30	1.40
Phosphorus	0.50	0.50	0.60	0.60	0.70
Methionine	0.50	0.50	0.50	0.40	0.40
Lysine	1.10	1.00	1.00	1.00	1.00
ME(Kcal/kg)	3072.70	3049.50	3040.60	3017.40	2994.00

*Vitamin- Mineral premix (Bio-mix) provided per kg include the following: Vitamin A 500 IU; Vitamin D_3, 888,000 iu; Vitamin E, 12,200mg; Vitamin K_3 15,000mg; Vitamin B_1, 100mg; B_2, 200mg; B_6, 1500mg; Niacin, 1200mg; Pathothenic acid, 2000mg; Biotic, 100mg; Vitamin B_{12}, 3000mg; Folic acid, 1500mg; Chlorine chloride, 60,000mg; Manganese, 10,000mg; Iron, 1500mg; Zinc, 800mg; Copper, 400mg; Iodine, 80mg; Cobalt, 40mg; Selenium, 8000mg.

Table 2 Proximate Composition/Antinutritional Factors of *Cassia obtusifolia* Leaf Meal

Nutrients	Percentage Composition
Dry mater	93.51
Crude Protein	25.44
Crude fibre	19.14
Total ash	12.17
Ether Extract	4.06
Nitrogen free extract	38.19
Metabolizable Energy	2629.14
Anti-nutritional factors	
Tannin	4.52

Saponin	6.26
Oxalate	2.37
Phytate	2.97

Table3. Effects of *Cassia obtusifolia* Meals on the Growth Performance of Broiler

Parameter	Dietary Treatment(s)					
	T1	T2	T3	T4	T5	SEM
Initial weight (g)	156.60	144.50	153.30	151.47	149.85	4.47^{ns}
Final weight (g)	2136.00^{a}	2100.41^{ab}	2015.44^{ab}	1955.30^{b}	1719.62^{c}	50.12^{**}
Total Weight Gain (g)	1979.40^{a}	1955.84^{ab}	1892.14^{ab}	1803.83^{b}	1650.77^{c}	49.03^{**}
Average daily weight gain (g)	40.39^{a}	39.91^{ab}	38.00^{ab}	36.81^{b}	31.99^{c}	1.00^{**}
Total feed intake (g)	4470.55	4496.87	4491.85	4492.66	4609.87	10.22^{ns}
Average feed intake (g)	91.23	91.77	91.67	91.68	94.07	2.00^{ns}
Feed conversion ratio	2.26^{a}	2.30^{a}	2.41^{bc}	2.50^{c}	3.13^{c}	0.18^{**}

Means on the same row with different subscripts are significantly different (P>0.01) **

Table 4 Carcass Analysis and Internal Organ Weight

Parameters	**Dietary Treatments**					
	T_1	T_2	T_3	T_4	T_5	**SEM**
Live weight	2220.00	2195.00	1985.00	2155.00	2280.00	74.10^{ns}
Plucked weight	2027.50	2027.50	2062.50	1957.50	1817.50	65.90^{ns}
Eviscerated weight	1707.50	1647.50	1685.00	1640.00	1487.50	53.71^{ns}
Carcass weight	1565.00	1540.00	1555.00	1472.50	1362.50	53.28^{ns}
Dressing percentage	70.60	70.17	68.47	68.35	68.21	0.90^{ns}
Internal Organs (% live weight)						
Head	3.02	3.07	2.74	2.90	3.03	0.12^{ns}
Leg	4.27	4.68	4.28	4.19	4.54	0.28^{ns}
Liver	2.37	2.27	2.29	2.32	2.40	0.12^{ns}
Lungs	0.78	0.56	0.65	0.58	0.75	0.18^{ns}
Kidney	0.25	0.27	0.23	0.23	0.25	0.02^{ns}
Gizzard	3.70	3.76	2.85	3.82	3.29	0.29^{ns}
Heart	0.55	0.45	0.44	0.46	0.65	0.06^{ns}
Pancreas	0.22^{c}	0.45^{ab}	0.44^{ab}	0.35^{b}	0.50^{a}	0.03^{**}
Ceacal weight	0.67	0.68	0.59	0.46	0.50	0.09^{ns}
Small intestine weight	4.40^{c}	4.43^{c}	4.74^{bc}	5.61^{ab}	5.99^{a}	0.36^{*}
Large intestine weight	0.45^{a}	0.34^{ab}	0.22^{b}	0.46^{a}	0.38^{a}	0.04^{**}
Abdominal Fat	1.25	1.36	1.09	0.84	0.69	0.24^{ns}

Means on the same row with different subscripts are significantly different (P<0.05)*, (P>0.01) **