EFFECT OF *MORINGA OLEIFERA* LEAF MEAL ON GROWTH PERFORMANCE AND SERUM BIOCHEMICAL INDICES OF BROILER CHICKENS

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ABSTRACT
This study was conducted to evaluate the effect of Moringa oleifera leaf meal on growth performance and serum biochemical indices of broiler chickens. A total number of seventy-two 1-day-old chicks were allotted to four experimental groups in a completely randomized design and fed graded levels (0, 5.0, 7.5, and 10%) of Moringa oleifera leaf meal (MOLM) for eight weeks (56 days). The experimental groups which were designed as treatment T1, T2, T3 and T4 respectively were further replicated three times with six birds per replicate so that each group has a total of 18 birds per replicate. Diet 1 which contained 0% MOLM served as the control, Diets 2, 3 and 4 contained 5.0, 7.5 and 10% MOLM respectively. Parameters determined were final live weight, average daily weight gain, feed intake and feed conversion ratio. At the end of the feeding trail, blood samples were collected from the birds of each replicate to evaluate the serum biochemical indices. The data collected were subjected to analysis of variance (ANOVA) and Duncan new multiple Range Test. The results showed there was a significant (P< 0.05) in final weight, average weight gain, feed intake, and feed conversion ratio. The serum total protein indicated higher values in birds fed diet 10% MOLM than others. The results of the serum biochemical indices shows that Moringa oleifera replace protein source (soybean) up to 7.5% in broiler diets without any adverse effects on growth performance.
Keywords: Feed, *Moringa oleifera*, Leaf Meal, Broiler, ingredients

INTRODUCTION

Livestock feeding has been a continuous challenge. The high and increasing prices for animal feeds have compelled researchers to direct their attention to non-conventional feed sources, with particular emphasis on protein substitutes. The use of leguminous multipurpose trees and shrubs has been suggested to be a viable alternative source of proteins, vitamins and minerals for poultry feeding. Plant leaves are commonly processed into leaf meals for use as poultry feed. Due to the increase in costs of conventional feed ingredients, which has had a significant negative impact on the net return from poultry industry, 80% of the overall cost of running a chicken operation is spent on feed. This development has compelled animal nutritionists to explore the incorporation of non-conventional feedstuffs in poultry diets. Their inclusion in the diets could help reduce feed cost and competition between man and livestock industry for the available conventional feedstuffs. Incorporation of local novel feed resources in livestock feed for sustainable feed security and circular economy in Africa (Prince, *et al*., 2023). Scientists has been forced to focus on alternative feeds with emphasis on protein substitutes due to the limited conventional feed materials and the high cost of livestock feed. *Moringa oleifera* is among plants that can be used as a cheap protein supplement to improve digestibility of broiler diets. It belongs to the family *Moringacae*, which is known to have high content of protein (Olugbemi, *et al.* 2010a). *Moringa oleifera* tree is said to contain high crude protein (CP) in the leaves (125 kg DM) and negligible content of tannins and other anti- nutritive compounds. It can be an alternative source of protein to ruminants and monogastric animals. *Moringa Oleifera* is said to be a good source of essential amino acids that boost immunity (Olugbemi, *et al.* 2010a) therefore, *Moringa oleifera* can be used). *Moringa oleifera* tree is a good nutritional plant that is rich in protein, minerals, vitamins and enhance growth performance of animals especially broiler chickens. Broiler plays major role in human economy by providing fast food, and as well as creating employment for unemployed Nigerians. Broiler provides job opportunities, fast income and food for the large economy worldwide. Broiler chicken are capable utilizing these by-products as sources of protein, energy, vitamins and minerals. The inclusion of these plant materials in broiler diets can improve growth rate, reduce feed costs and total cost of production. A positive result of this research will help

farmers and animal nutritionist to know how to reduce high cost of protein feedstuff, poultry production making poultry products affordable to consumers.

MATERIALS AND METHODS

Experimental site

The research was conducted at the Teaching and Research farm, Department of Animal Science, Faculty of agriculture, Alex Ekwueme Federal University Ndufu-Alike, Ebonyi state.

Sources of experimental material

Moringa oleifera plants was sourced from a local farm, and the leaves was removed from the stems, sorted, cleaned with water, sprayed under room temperature for 1-2 days. The dried Moringa leaf was grounded using grounding machine. It was dried up to 12-13% moisture content. It was stored for mixing with other ingredients.

Experimental diet

Four diets (T_1, T_2, T_3, and T_4) was formulated for both the starter Diet T_1 the basal diet served as control (without moringa leaf inclusion). The other three experimental Diets T_2, T_3 and T_4 contained 5g, 7.5g and 10g *Moringa oleifera* leaf meal inclusions per 1kg diet, respectively.

Table 1: Composition of Experimental diet

Ingredients (%)	T_1 0%	T_2 5%	T_3 7.5%	T_4 10%
Maize	50.00	50.00	50.00	50.00
Soyabean meal	24.00	19.00	16.50	14.00
Moringa oleifera leaf meal	0.00	5.00	7.50	10.00
Palm kernel cake	9.00	9.00	9.00	9.00
Wheat Offal	10.00	10.00	10.00	10.00
Fish Meal	3.00	3.00	3.00	3.00
Bone Meal	3.00	3.00	3.00	3.00
Premix	0.25	0.25	0.25	0.25
Common salt	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**
Cal. Chemical Composition (%)				
Crude protein	20.60	21.29	21.16	21.14
Crude fibre	4.28	6.28	6.43	6.48

Experimental animals and management of the broiler chickens.

Seventy-two day old chicks were used for this experiment. Each bird was weighed before the commencement of the experiment and weekly throughout the experiment period. The birds were randomly allotted to five dietary treatments in a completely randomized design (CRD). Other poultry management practices were maintained and the experiment lasted for five (Makinde, *et al*., 2017) weeks (56days). The birds were raised in deep litter and other management practices were adopted. Water and feed was provided *ad-libitum*. Diets were formulated to meet nutrient requirements for starter and grower broiler chickens.

Statistical analysis

All data obtained were statistically analyzed. The data collected were subjected to analysis of variance (ANOVA) as outlined by (Snedecor and Cochran, 2005). Duncan new multiple Range Test as outlined (Obi, 1990) was to separate the means.

Collection of blood samples and analysis

Blood (2mLs) was collected from three birds of each replicate via wing vein. Samples collected were put in a sterile bottle tube containing Ethylene Diaminetetra-acetic acid (EDTA) as anticoagulant to prevent blood clothing before the analysis. Packed cell volume (PCV) and haemoglobin count were determined as described by (Mitruka and Rawnsely 1977)). Analysis to be obtained serum albumin

and protein were analyzed using sigma kits according to (Banjo, 2012) total cholesterol was determined spectrophotometrically.

RESULTS AND DISCUSSION

The effect of feeding broiler chickens with different levels of inclusion of *Moringa oleifera* leaf is shown in Table 3. The inclusion of MOLM in diet of broiler significantly (P<0.05) enhanced the weight gain as compared to control group. The improved weight gain shoul be attributed to higher protein content of the diets which were efficiently metabolized for growth. This result was incline with the finding of (Banjo, 2012) who mentioned that the inclusion of *Moringa oleifera* leaf meal in the diet of broilers significantly (P<0.05) enhance their weight gain at 1% level. The birds fed on the diet that contained 5% MOLM obtained significantly (P<0.05) higher weight gain as compared to those fed on the diet that contained 10% MOLM. This result may be attributed to higher crude fibre

Table 2: Proximate analysis of the *Moringa oleifera* leaf meal

Parameters	**(%)**
Ash	13.34
Moisture	8.95
Crude protein	36.09
Crude fibre	12.00
Ether extract	5.41
Carbohydrate	24.20
Energy in Kcal/kg	2632.64

Source: new concept analytical laboratory and environmental service limited. 2023.

Table 3: Perforce of broiler chicken fed different levels of *Moringa oleifera* leaf meal.

Parameters (₦)	T_1 (0%)	T_2 (5%)	T_3 (7.5%)	T_4 (10%)	SEM
Initial body weight (g)	1.10	1.09	1.24	1.09	0.008
Final body weight gain (g)	3.26d	4.13a	4.00b	3.83c	0.045
Average body wt gain/bird (g)	0.05b	0..06a	0.06a	0.06a	0.004
Feed intake/bird (g)	8.56c	9.13b	9.43a	8.34d	0.082
Feed conversion ratio	3.76a	2.33d	2.43c	2.49a	0.259

abc Means of same row with different superscript are significant (P< 0.05) SEM= standard Error of means

content which may have the reduced nutrient digestion and absorption. It is also observed that birds in T_2 and T_3 had lower feed conversion ratio than those birds without *Moringa oleifera* leaf meal. This indicates that the lower values of feed conversion ratio. The higher weight gain of the birds as shown in the Table 3 above. This also implies that birds fed 5% and 10% *Moringa oliefera* leaf meal diets had better utilization potential of the nutrients probably because of the increased bulkiness as inclusion level increased.

Parameters on the serum indices are shown in Table 4. The serum total protein indicated higher values in birds fed diet 10% MOLM than others. Serum albumin is higher in birds fed control diet followed by birds fed 7.5% MOLM but lower values of serum globulin were obtained from birds fed diets 10% and 5% MOLM. Serum urea had close value in all the parameters. Serum cholesterol reduced as the inclusion of the MOLM in the diets of birds increased and glucose was very high in birds fed control diet 0%.

Table 4: Serum biochemical indices of broiler chicken in diet of Moringa leaf meal

Parameters (%)	T1 (0%)	T2 (5%)	T3 (7.5%)	T4 (10%)	SEM
Total Protein (g/LI)	51.70	52.70	52.00	58.13	2.24
Albumin (g/LI)	15.67	13.33	14.00	13.00	1.19
Globulin (g/LI)	36.00	39.30	38.00	45.70	2.34
Urea (mmol/LI)	2.30	2.06	2.20	2.30	0.15
Cholesterol (mmol/LI)	3.47	3.37	3.18	3.00	0.20
Glucose (mmol/LI)	12.60	11.30	9.60	6.00	2.60

Means in rows with no superscript are not significantly different (P> 0.05). SEM= standard error of the mean.

CONCLUSION

The results of this study indicates that the higher the inclusion level of MOLM in diets of broiler chicken the more the adverse effects on serum biochemical profile. The concentration of higher level of MOLM has a greater effect on the total protein level, with higher concentration leading to increase in total protein. Also, the inclusion of *Moringa oleifera* up to 7.5% broiler ration can improve performance without any adverse effect on performance.

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