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Effects of *Moringa oleifera* Leaf Meal on Lipid Profile and Levels of Some Serum Enzymes in Nigerian Local Chickens

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Original Research Article

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Abstract: There is the need to move away from chemical growth promoters to natural products in the poultry industry, as these have negative effects especially with regard to fat accumulation. In this regard, Moringa oleifera is known to have a number of beneficial effects on hematology and serum chemistry of humans. This study was therefore conducted to investigate the effects of M. oleifera leaves on lipid profile and some serum enzymes in Nigerian local Chickens. Thirty adult Chickens were used for the study. The birds were randomly assigned to three groups(n=10).One group served as control while two treatments received a daily oral dose of 12.5mg and 25mg Moringa leaf solution respectively. The experiment lasted for 28 days. Data obtained were subjected to analysis of variance. Results indicate that the mean values of total cholesterol, high density lipoprotein cholesterol, low density lipoprotein cholesterol, Triglycerides were statistically similar for all groups. Furthermore, mean values for serum levels of aspertate aminotransferase, alanins aminotranferae and alkaline phosphatase were statistically similar for all treatment groups. It is concluded that the administration of M. oleifera leaves at the dose used in this study has no significant effects on lipid profile and the serum enzymes evaluated. It is recommended M. oleifera leaf meal can be used to supplement expensive protein sources in chicken diets.

Keywords: Cholesterol, Serum enzymes, Moringa, Triglycerides.

INTRODUCTION

Poultry meat and its products have a vast consumer market and are making a significant contribution to the supply of quality protein, vitamins and minerals [1]. Various plant extracts considered to be natural products that consumer would accept, have received increased attention as possible feed additives alternatives such as for antibiotic growth promoter replacements, following their ban by the European Union in 2006 [2]. Feed grade antibiotic growth promoters are banned due to, not only cross-resistance, but also to the risk of possible drugs multiple resistances in human pathogenic bacteria [3]. Consequently, the animal feed manufacturers are exposed to increasing consumer pressure to find alternatives to antibiotic growth promoters in poultry diets. Probiotics and prebiotics; acidifiers as well as extracts of plants; neutraceuticals viz., copper as well as zinc are the alternatives of antibiotics. At the same time the potential of antimicrobial peptides; clay minerals; antibodies from chicken egg yolk, essential oils, medium chain fatty acids (from eucalyptus oil), rare earth elements; as well as enzymes (recombinant) have been tested for their ability of replacing antibiotics as dietary feed additives [4]. Several alternatives to these growth promoters have been proposed. Organic acids obtained from medicinal plants as natural feed additives have recently being inroduced in poultry diet to enhance immune response of poultry birds. One such plant is *Moringa oleifera*, commonly known as the drumstick tree [5, 6]. The tree has gained popularity as a life-saving nutritional power plant that can feed the needy. It is commonly used to treat cardiac disorders, diabetes and infections as a means of natural therapy without the users fully comprehending the effects on their hematology and serum biochemistry. Moringa is not only concentrated in nutrients, the raw form seems to reduce activity of pathogenic bacteria and moulds and improve digestibility of other nutrients ,thus helping chickens to express their natural genetic potential [7]. Blood lipid profile has an important role in the performance and carcass quality of broilers. Due to the intense selection programs toward increasing body weight of broiler chickens, an excess of fatness in current modern stock is observed, this is becoming of substantial concern to poultry producers and consumers [8]. It has been reported that plasma very low density lipoprotein (VLDL) was a useful parameter to infer the

degree of fatness in chickens. Decreasing plasma (VLDL) level, by any means decrease abdominal fat in broiler chickens [9]. It has been reported that M. oleifera possesses hypocholesterolemic properties and that it can be included in layer diet facilitate reduction in egg cholesterol content [7]. This study intends to evaluate the effects of M. oleifera leaf meal on lipid profile and some serum enzymes of Nigerian local cocks.

MATERIALS AND METHODS

Location of the Study

The study was conducted at the teaching and Research farm of the Nasarawa State University, Faculty of Agriculture, Lafia. The area lies between Latitude 08°35N and Longitude 08° 33E

Experimental animals and design

Thirty (30) adults local cocks were used for the study. The birds were purchased from areas around Shabu-Lafia, Nasarawa State, Nigeria and were assigned into three treatment groups (n=10). For birds in group 1, 1ml distil water was administered daily (control). Birds in groups 2 and 3 received a daily oral dose of 12.5mg and 25mg of Moringa leaf suspension, respectively. The research pen was cleaned and disinfected prior to arrival of the experimental animals. Dried wood shavings were used as litter material. The animals were kept for an acclimatization period of two weeks before commencement of the experimental phase. Prophylactic antibiotics and anti-stress were provided to the birds on arrival. Commercial grower mash was used for feeding with clean drinking water provided *ad-libitum*. The experiment lasted for 28 days.

Preparation of moringa leaf solution

Moringa oleifera leaves were collected from gardens around Lafia, Nasarawa State. The leaves were air dried under shade. The dried leaves were milled to powder and sieved through mesh. The solution was prepared by dissolving 5g of powder in 200ml distilled water to obtain a solution of 25mg/ml (0.5ml contain 12.5mg).

Sample collection and evaluation

At the end of the 28 days, blood samples were collected using sterile disposal syringe and needle through the wing vein. Serum enzymes parameters evaluated include; aspertate transaminase (AST), alanine transaminase (ALT) and alkaline phosphatase. Analysis of lipid profile was done by evaluating the following parameters; High density lipoprotein cholesterol (HDL-chol), Low density lipoprotein cholesterol (LDL-chol), Triglycerides and very low density lipoprotein cholesterol.

Determination of lipid profile and some serum enzymes parameters

Determination of high density lipoprotein cholesterol and low density lipoprotein cholesterol was done by Precipitation method using reagents manufactured by agappe diagnostics Switzerland GmbH.

Serum levels of aspertate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase was determined by Colorimetric method as described by [10] using reagents produced by Egyptian company for biotechnology. (S.A.E). Triglycerides evaluation was done by Enzymatic determination as described by Manafa *et al*., [11] using reagents produced by agappe diagnostics Switzerland GmbH. Total Cholesterol was determined using reagent produced by Eba diagnostics Mannhaim GmbH

Statistical analysis

The data obtained were subjected to analysis of variance (ANOVA) and the differences between means were determined by Duncan multiple range test using Statistical Package for Social Sciences (SPSS) version 20. The significant level was set as $P<0.05$.

RESULTS AND DISCUSSION

The mean values of the effect of *M. oleifera* on the lipid profile and some serum enzymes parameters of Nigerian local cocks are given in Table 1 and 2 respectively. The high density lipoprotein (HDL) cholesterol (1.300, 1.100, 1.075), low density lipoprotein cholesterol (0.850,0.925, 0.950), total cholesterol (3.125, 2.725, 2.825) and triglycerides (0.855,0.875,0.910) showed no significant difference ($P>0.05$) between the control group and the two treatment groups.

There were no significant differences ($P>0.05$) in the mean values of serum enzymes AST (30.75,30.00, 28.25), ALT (25.70,27.375,25.525) and ALP (151.00,155.00, 158.00) between the control and treatment groups.

Table 1: Effects of *Moringa olefeira* meal on lipid profile of Nigerian local cocks

Parameters	I(Control 1ml H_2O)	II(12.5mg)	III(25mg)		SEM
HDL Cholesterol	1.300	1.100	1.075		0.088^{NS}
LDL Cholesterol	0.850	0.925	0.950		0.417^{NS}
Total Cholesterol	3.125	2.725	2.825		0.083^{NS}
Triglycerides	0.855	0.875	0.910		0.416^{NS}

SEM= Standard error of mean, ($P > 0.05$), NS= Not significant

Table-2: Effects of *Moringa olefeira* meal on some serum enzymes of Nigerian local cocks

Parameters (µg/L)	**I(Control 1ml H_2O)**	**II(12.5mg)**	**III(25mg)**		**SEM**
AST	30.750	30.000	28.250		0.678^{NS}
ALT	25.700	27.375	25.525		0.873^{NS}
Alkaline Phosphatase	151.000	155.000	158.000		2.324^{NS}

STD= Standard deviation, SEM= Standard error of mean, (P > 0.05), NS= Not significant
AST: Aspartate aminotransferase; ALT: Alanine aminotransferase

Moringa oleifera has gained popularity as a life-saving nutritional power plant that can feed the needy. It is commonly used to treat cardiac disorders, diabetes and infections as a means of natural therapy without the users fully comprehending the effects on their hematology and serum biochemistry. The present study shows that *M. oleifera* leaf meal induces no significant changes in the AST, ALT, and ALP values of local cocks. Elevation of serum AST and ALT can occur with states of altered hepatocellular membrane permeability due to circulatory hypoxia, exposure to toxins and toxemia, inflammation, metabolic disorders or proliferation of hepatocytes). Hence, the absence of significant differences among treatment diets in serum AST in the present study may reflect normal liver function of the birds fed MOLM. The absence of significant changes on these parameters indices may therefore suggest that the meal has no effect on liver function at the dosage used in this study. This observation is in agreement with the report of Ologhobo *et al*., [12] who compared effect of *M. oleifera* leaf meal and oxytetracycline on hematology and serum biochemical profile of broiler finishers. However, Adedapo *et al.*, [13] reported that there were significant increases in the liver enzymes when high doses of *M. oleifera* seed extracts were used on male Wister rat. The present study also showed that *M. oleifera* leaf meal induces no significant changes in the total cholesterol, HDL LDL and triglycerides values of local cocks .It has earlier been reported that M. oleifera possesses hypocholesterolemic properties and that it can be included in layer diets to facilitate reduction in egg cholesterol content [7]. The non significant difference in lipid profile observed in this study may be attributed to dosage of M. oleifera and duration of the experiment. Findings of this study indicates that oral administration of *M. olefeira* leaf meal (12.5mg and 25mg) had no significant effects on serum levels of alkaline phosphatase, aspertate aminotransferase and alanine aminotransferase. Findings also showed that MOLM had no effects on serum lipid profile of Nigerian local cocks.

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