



The Effect of aqueous extract of *Lagenaria breviflora* (Robert) whole fruit on Egg Lipoprotein profile of Laying Birds

D. A. Ekunseitan, M.A. Adeyemi, T.L. Akiode, L.T., Egbeyale, O.Y. Ayo-Ajasa and Adewole, F.A.

Department of Animal Production and Health,
Federal University of Agriculture, PMB. 2240, Abeokuta, Ogun State.

***Corresponding Author:** E-mail: ekunseitanda@funaab.edu.ng

Abstract

The continuous demand of the ever-growing Nigerian populace to meet their daily protein requirement resulted in the positive shift in the consumption of table eggs but with many opting for alternatives because of the perceived cholesterol content. The study was therefore carried out to investigate the effect of *Lagenaria breviflora* R. (LB) whole fruit on egg lipoproteins of laying birds on two management systems. A total of 126 Yaffa brown layers aged 36 weeks were administered aqueous extract of *L. breviflora* R. at three levels (0, 50, and 75 g fresh weight per L of water). Data obtained on egg lipid profiles were arranged in one way analysis of variance. The percentage change (reduction) in total cholesterol, LDL and VLDL were higher in 50 g-dosed birds likewise with a higher HDL-cholesterol. Therefore, commercial layers administered LB at 50 g/L as an alternative medication in cholesterol reduction in table egg production.

Keywords: Phytobiotics, *Lagenaria breviflora*, lipoproteins, egg-type chickens, cardiovascular.

Introduction

Poultry products are considered a good and low-priced source of animal protein because of its good and high biological value. There has been a growing interest in recent years over the concentration of cholesterol in human diet since eggs are concentrated source of cholesterol in the diet and limited egg consumption has often been recommended to reduce total serum cholesterol concentrations (Ekunseitan, 2016). Chicken eggs have been recognized as an excellent source of all essential nutrition and complete food for people of all ages (Salma *et al.*, 2007). Many reviews have postulated a relationship between yolk cholesterol and cardiovascular diseases in humans but with no clear association between egg consumption and cardiovascular diseases, egg can be part of an overall heart- healthy diet (Eckel, 2008; Wang *et al.*, 2009). The culprit responsible for this oxidized form that narrows or “hardens” the arteries is the LDL cholesterol and low level of the HDL fraction (Kasprzak and Hetmański, 2004). Therefore, it is imperative to counteract this process by eating foods rich in natural antioxidants (Ponte *et al.*, 2004).

Researches have focused on the beneficial effects of phytochemical substances in poultry production. These phytochemical substances contains Phenolic compounds that have been documented to have hypo-cholesterolemic effects: cholesterol and lipoprotein decreasing effects of alfalfa (Ponte *et al.*, 2004), thyme (Bolukbasi *et al.*, 2006), garlic (Habibian Dehkordi *et al.*, 2010) and lately *Lagenaria breviflora* R. (Ekunseitan *et al.*, 2016). There is an urgent need to increase organic livestock production to meet the animal protein needs of the world’s increasing population with attentive interest in reducing its cholesterol component. This study can be considered as a pilot study showing the influence of oral administration of *L. breviflora* whole fruit on the egg cholesterol in the laying hens.

Materials and Methods

The experiment was carried out at the poultry unit of the Directorate of University Farms (DUFARMS), Federal University of Agriculture, Abeokuta, Ogun State, Nigeria located 7° 15' N, 3° 26' E and 76 m above sea level.

A total of 126 Yaffa brown layers aged 36 weeks were used for the study. *Lagenaria breviflora* whole fruit



was administered : 0(Control), 50, and 75 g fresh weight per Litre of water): control (where *L. breviflora* was not given to the birds, but other conventional vaccinations and medication given).The birds were randomly allotted to the treatment groups, each treatment was assigned 42 birds and further divided into three replicates of 14 birds each. The experiment was carried out for a period of 10 wks. Birds were fed ME layers mash (17.10% CP and 2708.80 Kcal/Kg) while housing unit was provided with nest boxes.

Egg samples were collected from the birds randomly from each replicate and taken to the laboratory to determine total cholesterol, High-Density Lipoprotein (HDL), Low-Density Lipoprotein (LDL) and very low-density lipoprotein VLDL. The egg samples were collected very early in the morning three periods over the duration of the experiment. The collection period: start (beginning of the study), mid (5weeks) and Final (10 weeks) of the experiment. The yolk was analysed for Cholesterol and lipoprotein content.

Data obtained were arranged in a One-way analysis of variance. Significant differences among treatment means were separated using Turkeys test at 5% level of significance.

Results and Discussion

The effect of *Lagenaria breviflora* administration on yolk cholesterol is presented in Figure 1. There was an upward increase ($p < 0.05$) in Total cholesterol in 0 g and 75 g LB administered treatment group while a decreasing trend was observed in 50 g treatment group. This can be ascribed to its sulphur containing compounds which are capable of reacting with –SH group systems (Prasad *et al.*, 2009) since *L. breviflora* R. has been established to comprise compounds like higher hydrocarbons (higher alkanes, alkenes, benzenes) and sulphur-containing ones amongst them is 2-methyl-Benzothiazole (Ekunseitan, 2016). This may be possible by the mechanism of hypo-cholesterolaemic and hypolipidemic action of S-group which is known to be proficient in altering the hepatic activities of lipogenic and cholesterolgenic enzymes thereby significantly reducing cholesterol content in blood of birds and subsequently amount shed into egg laid. As consumption of egg yolk with higher Cholesterol content could be disastrous to the health of an individual with predisposition to cardiovascular diseases.

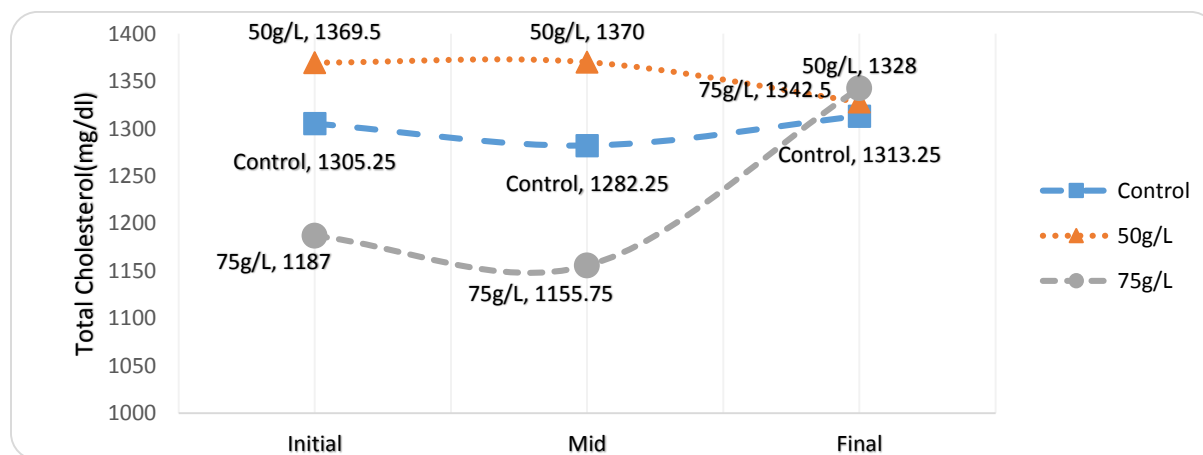


Figure 1: Effect of *Lagenaria breviflora* administration on Yolk Cholesterol

The effect of *Lagenaria breviflora* administration on yolk HDL is presented in Figure 2. There was an increase in HDL in all treatment groups with 95.25, 85.25 and 68 % increase observed in Control, 50 and 75 g groups respectively. *L. breviflora* R. (LB) has been affirmed to contain phytochemicals notably phenols, carotenoids, flavonoids which have been reported to have wide orbit of biological activities (Ekunseitan *et al.*, 2016). Since this study could be considered as a first pilot study showing the influence of different doses of oral administration of *L. breviflora* on the egg cholesterol in the laying hens.

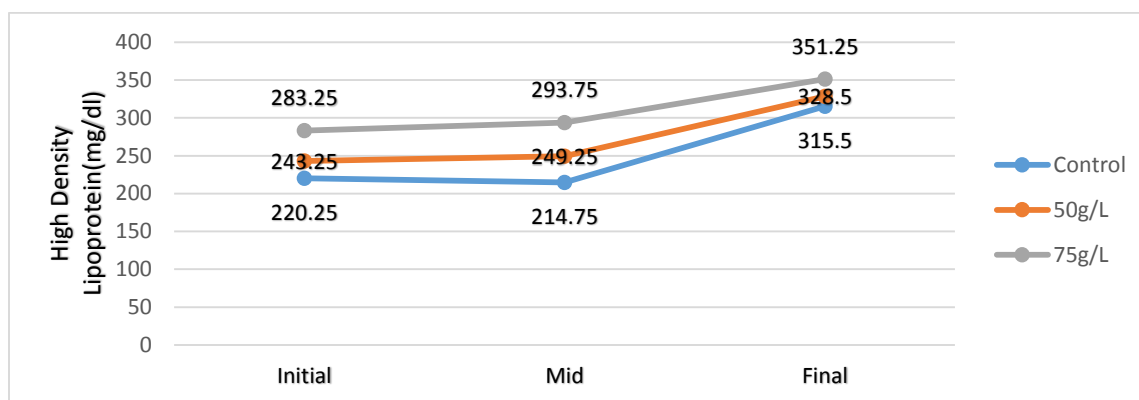


Figure 2: Effect of *Lagenaria breviflora* administration on Yolk HDL

A reduction in LDL-component of egg was observed as the level of administration of *L. breviflora* increased from 0 – 50 g while an increase noticed in 75 g-dosed treatment group (Figure 3). The percentage change in VLDL component of egg was negative in all treatment group indicating a decrease with the highest reduction observed in 50 g-dosed birds but a 15% increase in the 75 g group (Figure 4). The perceive ability of LB in influencing lipid profiles (VLDL) at 50 g maybe as an increase in esterified cholesterol leading to increase or reduction in excretion by bile and antioxidant action of LB (Onasanwo *et al.*, 2011), resulting in decrease in hepatic production of VLDL which serves as precursor of LDL-cholesterol in blood circulation (Prasad *et al.*, 2009). Since the bulk of cholesterol is majorly transported to yolk with very low density lipid via the intestine (Wang *et al.*, 2009), the reduction or positive activity of LB on VLDL can be used as a useful factor to regulate the degree of deposition.

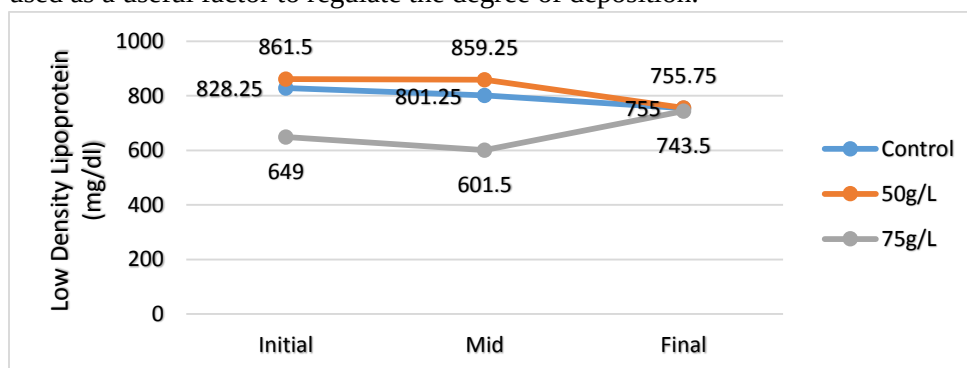


Figure 3: Effect of *Lagenaria breviflora* administration on Yolk LDL

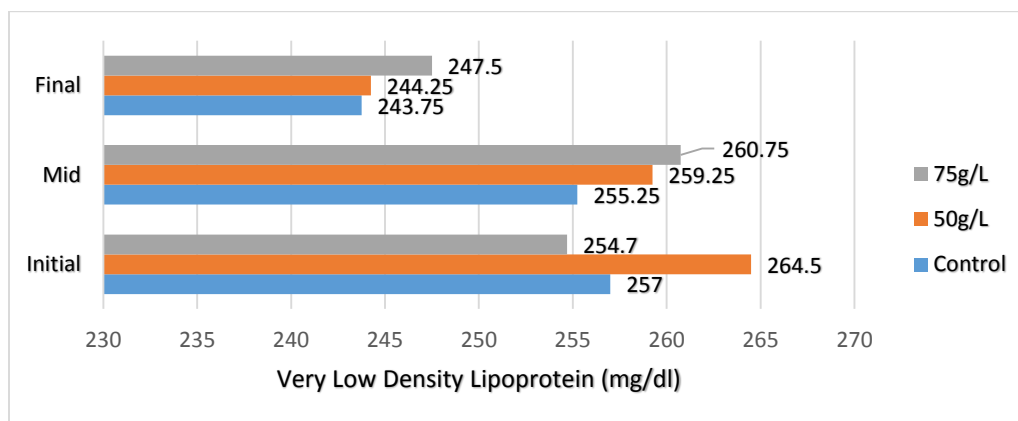




Figure 4: Effect of *Lagenaria breviflora* administration on Yolk VLDL

Conclusion and Recommendations

The yolk Total Cholesterol, LDL, and VLDL of eggs were lowered, but with a higher HDL deposition in the 50 g group compared to the control and 75 g. Therefore, commercial layers can be administered LB up to 50 g as a cholesterol-lowering agent in the egg.

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