International Journal of Pharma Medicine and Biological Sciences

ISSN 2278 – 5221 www.ijpmbs.com
Vol. 1, No. 2, October 2012


Research Paper

# PRELIMINARY INVESTIGATION ON THE RELATIONSHIP BETWEEN BLOOD LIPID PROFILE AND EGG LIPID PROFILE IN DIFFERENT BREEDS OF LAYERS

**Imasuen J A[1*] and C S O Otoikhian[1]**

*Corresponding Author: ***Imasuen J A,*** ✉ *Basicimage4u@yahoo.com*

Twenty strains of local laying birds of the Dominant Black (DBK), Frizzle Birds (FB), Naked-Neck (NK) and Normal feathers Birds (NB) each were used to access the relationship between plasma lipid and egg lipid profile in our local breeds of layers. The experiment was laid out in a simple randomized design and result shows that significant differences exist in plasma and egg lipid profile as a result of breed's variation in laying birds. Total cholesterol (TC) in yolk range from 602.0± 30.0 to 618.0± 30.0mg/dl and that of plasma TC range from 220.0± 25.0 to 360.0±30.0 mg/dl, while the value of Albumen TC were in traces and ranges from6.0±2.0 to12.0±1.5mmg/dl. While other parameters examined such as triglycerdes, high density lipoprotein and low density lipoprotein

***Keywords:*** Dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), Yamuna River, Heavy Metals

## INTRODUCTION

The Nigerian local chicken constitutes between 80 and 90% of the local population of chickens in Nigeria. Over 98% of these birds are managed extensively under the traditional system. They are highly variable in plumage coloration and shank with some of them having feathered shanks (Adebambo, *et. al.* 1999*)*

Under the modern commercial poultry production, the Nigerian local chicken does not possess valuable economical traits (Obioha, 1992), however, their numbers in terms of population and genetic makeup could be exploited in the development of locally based meat type or egg type chickens suitable for use in the tropics. Among these genes are the Naked-Neck, Fizzles and Dominant Black genes which according to Ibe (1993) confer some tolerance to heat stress and increase productive capacity of the breeds.

In spite of the disadvantages enumerated above associated with the local breed of chicken in Nigeria there uses as source of meats and egg

[1] Department of Animal Science, Faculty of Agriculture, Ambrose Alli University, P.M.B. 14, Ekpoma, Edo State. E-mail: Basicimage4u@yahoo.com

cannot be wish away because of the fact that avian egg is an excellent source of nutrients which is widely accepted for human consumption. According to Olomu (1995), the eggs most frequents consumed are those of chickens and guinea fowls.

In Nigeria egg has both domestic and industrial uses and the only known limitation to eggs consumption is the high cholesterol level in the yolk (Campbell *et al.*, 2003). Consumers limit their intake of eggs because of adverse publicity about saturated fats and cholesterol. Health professional suggest that decreasing saturated fat intake is important as consumption of polyunsaturated fatty acids has been reported to reduce the risk of atherosclerosis and stroke as well as promote infant growth, unlike saturated fat which promote atherosclerosis and stroke (Lada and Rudel, 2003).

Although most dietary cholesterol comes from eggs yolk, yet eating eggs does not increases serum cholesterol as much as eating saturated fat, and eating eggs may not increase serum cholesterol at all if the overall diet is low in fat. (Jackson, 2008). Eggs when are not innocent after all because when cholesterol from eggs is cooked or exposed to air, it oxidized and eating oxidized cholesterol may increase heart disease. Eating eggs also makes serum cholesterol susceptible to damages, which is linked to disease. Egg eaters are more likely to die from heart disease even when serum cholesterol levels are not elevated (Jackson, 2008).

From the foregoing therefore this research work is aimed at investigating the relationship between the blood lipid profile and the egg lipid profile of different breeds of local laying birds with view to ascertain if breeds influences egg lipid quality.

## MATERIALS AND METHOD

The experiment was carried out at the teaching and research unit of the Ambrose Alli University, Ekpoma in Edo state. Eighty layers of four strains of laying chickens were used for this study. The chicken comprises of; Dominant Black (DBK), Frizzle Birds (FB), Naked-Neck (NK) and Normal feathers Birds (NB). Twenty birds were assigned to each treatment. The birds were subjected to standard layers management procedure by providing water and feed.

Two months into the laying cycle of the experimental birds, 10% (i.e., 2 birds) of each treatment groups were sacrificed for blood sample collections from the heart. Prior to sacrificing of the birds for the blood sample collection five eggs were collect from each birds to be sacrificed over a period of one week.

The blood samples were collected into a heparin bottle and taken to the pathology laboratory in the Otibhor Teaching Hospital, Irrua, for blood lipid analysis. The eggs collected from these birds were also taken to the Biochemistry laboratory in Ambrose Alli University for separation of the yolk from the egg white, thereafter the separated egg yolk and egg white were taken to the pathology laboratory in Otibhor Hospital for the analysis of egg lipids profile.

The lipid profile analyzed in these samples were; Total cholesterol (TC) Triglycerides (TG) High-Density lipoproteins(HDL) , Low-Density lipoproteins(LDL).

The methods used for total cholesterol determination was the enzymatic endpoint method (Roschlan *et al.,* 1974), while the method used for Triglycerides was the calometric method (Tietz,1990) and finally, the method used for both

high density lypoproteins and low density lypoproteins was the precipitation methods (NCEP, 2001).

Data generated was subjected to analysis of variance (Steel and Toriel, 1980) and differences were separated by Duncan Multiple Range Test (DMRT).

## RESULTS AND DISCUSSION

From Table 1, it was observed that the level of Total Cholesterol (TC) value (360.0+30.0) in the plasma of Normal bird (NB) was highest and was significantly different (P<0.05) from the other breeds, but significantly lower (p<0.05) in Dominant Black (DBK) (218.0+20.0) compared to the others. In the albumen, TC was highest in Frizzles breed (FB) with a value (12.0+1.5) but low in the Naked – Neck (NK) with a value (6.0+2.0) compared to others , making it also significantly different (P<0.05).Whereas in the yolk of Dominant Black (DBK) , it was also observed that TC was highest with a value (618.5+30.0) while it was lowest in the yolk of Normal Bird (NB) with this value (593.6+26.5).

Thus revealing that blood plasma TC may be inversely proportional to TC in egg. This finding may require further investigation because it is believed that blood plasma is directly related to egg yolk TC (Campbell *et al.*, 2003), but according

**Table 1: Lipid Profile of Blood Plasma and Eggs in Different Breeds of Local Layers**

| Parameters | NK | FB | NB | DBK |
|---|---|---|---|---|
| **Total Cholesterol (TC)** | | | | |
| Plasma | $220.0\pm25.0^{C}$ | $268.0\pm15.0^{b}$ | $360.0\pm30.0^{a}$ | $218.0\pm20.0^{C}$ |
| Albumen | $6.0\pm2.0^{b}$ | $12.0\pm1.5^{a}$ | $6.5\pm2.5^{b}$ | $7.0\pm2.5^{b}$ |
| Yolk | $602.0\pm30.0^{b}$ | $610.5\pm28.0^{a}$ | $593.6\pm26.5^{b}$ | $618.0\pm30.0^{a}$ |
| **Triglycerides(TG)** | | | | |
| Plasma | $920.0\pm25.2^{b}$ | $938.0\pm30.0^{b}$ | $958.0\pm35.0^{a}$ | $928.0\pm25.5^{b}$ |
| Albumen | $19.0\pm0.5^{b}$ | $40.0\pm3.5^{a}$ | $19.5\pm2.0^{b}$ | $21.0\pm25.5^{b}$ |
| Yolk | $810.0\pm50.0^{a}$ | $811.0\pm43.5^{a}$ | $801.5\pm45.0^{a}$ | $819.0\pm30.5^{a}$ |
| **High density Lipoprotein** | | | | |
| Plasma | $27.0\pm10.0^{a}$ | $24.0\pm12.0^{b}$ | $25.0\pm13.0^{b}$ | $20.0\pm10.0^{c}$ |
| Albumen | $1.5\pm0.2^{a}$ | $2.0\pm0.1^{a}$ | $2.0\pm0.3^{a}$ | $1.0\pm0.0^{a}$ |
| Yolk | $344.0\pm20.5^{a}$ | $361.0\pm33.5^{a}$ | $375.5\pm30.0^{a}$ | $352.0\pm30.5^{a}$ |
| **Low- density Lipoprotein** | | | | |
| Plasma | $19.0\pm1.5^{b}$ | $50.5\pm15.0^{a}$ | $14.8\pm5.4^{c}$ | $12.0\pm2.0^{c}$ |
| Albumen | $1.0\pm0.0^{a}$ | $2.0\pm0.5^{a}$ | $1.5\pm0.2^{a}$ | $1.0\pm0.1^{a}$ |
| Yolk | $96.5\pm5.4^{a}$ | $93.0\pm10.0^{a}$ | $94.0\pm4.5^{b}$ | $96.0\pm5.8^{a}$ |

**Note:** a, b, c = value along the same row with different super script are significantly different ($P < 0.05$); NK: Naked –neck bird, FB: Frizzles bird, NB : Normal bird, DBK: Dominant black bird.

to Jackson (2008) cholesterol in the body comes from two sources, which are the liver and the saturated fats consumed by the animal; thus suggesting that this observation may be a reflection of how the breeds of birds are able to handle the saturated fats in their diets.

In the plasma of Normal Bird (NB), the level of Triglycerides (TG) value (958.0+35.0) was highest while TG value of 920.0+25.2 was lowest in the Naked- Neck breed (NK) showing significant differences ($P<0.05$). In the albumen, TG value of (40.0+3.5) was highest in Frizzle breed (FB) which was significantly different ($P<0.05$) from the others, but with lowest value of 19.0+0.5 in the Naked-neck compared to the others. Triglycerides value in the yolk did not show any significant differences in their values.

In this study the high density lipoprotein and the low density lipoprotein did not reveal any significant differences too ($P > 0.005$), thus logical inferences cannot be deduces form these values since significant differences was only observed in the blood plasma values without any differences noticed in the values of egg yolk and albumen, thus suggesting that the variation noticed in blood plasma is probably a reflection of fats in the diets of the laying birds and how best the various breeds of birds are able to make use of available fats in their diets.

## CONCLUSION

Results from this preliminary investigation into the relationship between blood plasma and egg lipid profile shows that the total cholesterol in blood plasma and egg yolk are inversely related in this study and that other lipid profile such as triglyceride, high density lipoprotein and low density lipoprotein are more of blood plasma variation rather than in egg yolk and albumin.

## REFERENCES

1. Adebambo O A, Ikeobi C O N, Ebozoje M O, Adenowo J A and Osunowo O A (1999), "Colour Variation and Performance Characteristic of the Indigenous Chickens of Southern Nigerian", *Nig. Journal of Animal Production,* Vol. 26, pp. 15-22.
2. Campbell J R, Douglas K M, Campbell K L (2003), *Animal Science: The Biology, Care, and Production of Domestic Animals,* McGraw-Hill Companies Inc. Publication, p. 292.
3. Ibe S N (1993), "Growth performance of Normal, Frizzle and Naked Neck Chickens in Tropical Environment", *Nig. Journal Animal Prod.,* Vol. 20, pp. 28-31.
4. Jackson S (2008), *Low Cholesterol in Diets,* pp. 1-2, www.gicare.com
5. Lada A T and Rudel L L (2003), "Dietary Monounsaturated Versus Polyunsaturated Fatty Acids: Which is Really Better for Protection from Coronary Heart Disease?", *Curr. Opin. Lipidol.*, pp. 41-46.
6. National Cholesterol Education Programme (NCEP) (2001), *Third report of the NCEP on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults*, Jama Publication, Vol. 285, No. 19, pp. 2486-2497.
7. Obioha F C (1992), *A Guide to Poultry Production in the Tropics*, Arena Pub, Enugu, p. 18.

8. Olomu J M (1995), *Monogastric Animal Nutrition: Principles and Practice,* 1st Edition, Jachem Publication, Benin City, p. 320.

9. Roschlan P, Bernt E and Gruber in (1974), "Enzymatische Best Immung Des Gesatcholesterive in Serum", *J. Clin. Chem. Brochem*., Vol. 12, pp. 407-407.

10. Steel R G D and Torrie J A (1980), *Principles and Procedures of Statistic, A biological Approach,* 2nd Edition, Int. Student (Ed.), McGraw Hill Book Coy, Inc., p. 663, New York.

11. Tietz N W (1990), *Clinical Guidance to Laboratory Test*, 2nd Edition, Philadelphia Pub. W. B Saunders Co., pp. 444-446.