Preliminary Investigation On The Relationship Between Blood Lipid Profile And Egg Lipid Profile In Different Breeds Of Layers (Gallus gallus domesticus).

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Twenty strains of local layer 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 profiles 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 ranged from 602.0± 30.0 to 618.0± 30.0 mg/dl and that of plasma TC ranged from 220.0± 25.0 to 360.0± 30.0 mg/dl, while the value of Albumen TC were in traces and ranges(d) from 6.0±2.0 to12.0±1.5mg/dl. While other parameters examined such as triglycerides, high density lipoprotein and low density lipoprotein did not follow any logical pattern for scientific inference to be deduced.

Keywords: Relationship, Blood Lipid Profile, Egg Lipid Profiles, In Layers.

Introduction

The Nigerian local chicken (Gallus gallus domesticus) constitutes between 80 and 90 percent of the local population of chickens in Nigeria. Over 98 percent 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, Frizzles 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 chickens in Nigeria their uses as source of meats and egg cannot be wish away, for 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 frequently 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). Cholesterol in eggs is still bad for health because when cholesterol is cooked or exposed to air, it oxidized and eating oxidized cholesterol may increase heart disease. Eating eggs also makes serum cholesterol susceptible to cause damages, which is linked to heart disease. Egg eaters are more likely to die from heart disease even when serum cholesterol levels are not elevated (Jackson, 2008).

Meanwhile, the argument for egg consumption is very controversial, but the fact remains that the major source of cholesterol in egg is the egg yolk and the level of total cholesterol in egg yolk in laying hens can be influenced by the breeds, plane of nutrition and

The blood serum proteins, calcium, phosphorus and lipids in the laying hen are about two-, two-, three- and fourfold, respectively, higher than in non laying hen. The increased in this blood constituent is explained by the need for great quantities of protein for yolk and albumen formation, for an abundance of calcium and phosphorus in shell formation and for lipids in the formation of egg yolk, (Campbell, et al., 2003). 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 hens with view to ascertain if breeds influences egg lipid quality.

Materials and Methods:

The experiment was carried out at the teaching and research unit of the Ambrose Ali University, Ekpoma in Edo state. Eighty layers of four strains of laying chickens (Gallus gallus domesticus) 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 hens were subjected to standard layers management procedure by providing water and feed. They were fed on standard-feed mixture for laying hens throughout the experimental period. (NRC, 1988)

Two months into the laying cycle of the experimental birds, 10 percent (i.e 2 birds) of each treatment groups were sacrificed for blood sample collections from the heart, after fasting the birds overnight. Prior to sacrificing of the birds for blood sampling five eggs were collected from each birds over a period of one week.

The blood samples were collected into heparinized bottles and taken to the pathology laboratory in the Otibhor Teaching Hospital, Irrua, for blood lipid analysis. 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.

Lipid profiles analyzed in these samples were Total cholesterol (TC) Triglycerides (TG) High-Density lipoproteins(HDL), Low-Density lipoproteins(LDL).

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), the method used for both high density lipoproteins and low density lipoproteins 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).

Result and Discussion

From Table 1, it was observed that the level of Total Cholesterol (TC) was highest (360.0±30.0) in the plasma of Normal feather bird (NB) and was significantly different (P<0.05) from the other breeds. TC significantly lower (p<0.05) in Dominant Black (DBK) (218.0±20.0) compared to the other. TC in the albumen was highest in Frizzles breed (FB) (12.0±1.5) and lowest in the Naked – Neck (NK) (6.0±2.0). Egg yolk of Dominant Black (DBK) contain highest concentration of TC (618.5±30.0) and egg yolk of normal bird had lowest concentration of TC (593.6±26.5). These results shown above suggest that concentration of TC in blood plasma 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). However, Jackson, (2008) reported that 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.

This finding partially agrees with other research work reported by Isidahomen, et al, (2009) in which they examined the effect of genes on proximate composition and lipid profile of chicken eggs and reported that the highest value of total cholesterol and triglyceride was observed among the frizzle breeds of local hen. Paucity of information in the area of relationship between blood lipid profile and egg lipid profile did not allow for better comparism.

Furthermore, this study shows that high density lipoprotein and the low density lipoprotein did not reveal any significant differences (P>0.005) in the egg albumen and yolk. Where differences were observed in the blood plasma, value did not follow any logical pattern for scientific inference to be deduced, because significant differences was only observed in the blood plasma value 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.

Table 1: Lipid Profile of Blood Plasma And Eggs In Different Breeds of Local Layers.

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>NK</th>
<th>FB</th>
<th>NB</th>
<th>DBK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol(TC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(mg/dl)</td>
<td>Plasma</td>
<td>220.0±25.0iameter</td>
<td>268.0±15.0iameter</td>
<td>360.0±30.0a</td>
</tr>
<tr>
<td></td>
<td>Albumen</td>
<td>6.0±2.0iameter</td>
<td>12.0±1.5b</td>
<td>6.5±2.5b</td>
</tr>
<tr>
<td></td>
<td>Yolk</td>
<td>602.0±30.0o</td>
<td>610.5±28.0o</td>
<td>593.6±26.5o</td>
</tr>
<tr>
<td>Triglycerides(TG)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(mg/dl)</td>
<td>Plasma</td>
<td>920.0±25.0b</td>
<td>938.0±30.0b</td>
<td>958.0±35.0a</td>
</tr>
<tr>
<td></td>
<td>Albumen</td>
<td>19.0±0.5b</td>
<td>40.0±3.5b</td>
<td>19.5±2.0b</td>
</tr>
<tr>
<td></td>
<td>Yolk</td>
<td>810.0±50.0a</td>
<td>811.0±43.5a</td>
<td>801.5±45.0a</td>
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<td>High density lipoproteins(HDL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(mg/dl)</td>
<td>Plasma</td>
<td>27.0±10.0b</td>
<td>24.0±12.0b</td>
<td>25.0±13.0b</td>
</tr>
<tr>
<td></td>
<td>Albumen</td>
<td>1.5±0.2b</td>
<td>2.0±0.1b</td>
<td>2.0±0.3b</td>
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<tr>
<td></td>
<td>Yolk</td>
<td>344.0±20.5a</td>
<td>361.0±33.5a</td>
<td>375.5±30.0a</td>
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<td>Low-density lipoproteins(LDG)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(mg/dl)</td>
<td>Plasma</td>
<td>19.0±1.5b</td>
<td>50.5±15.0b</td>
<td>14.8±5.4c</td>
</tr>
<tr>
<td></td>
<td>Albumen</td>
<td>1.0±0.0b</td>
<td>2.0±0.5b</td>
<td>1.5±0.2b</td>
</tr>
<tr>
<td></td>
<td>Yolk</td>
<td>96.5±5.4a</td>
<td>93.0±10.0a</td>
<td>94.0±4.5a</td>
</tr>
</tbody>
</table>

**KEY:** a, b, c: means along the same row with different superscript are significantly different. (P<0.05)

NK: Naked–neck bird, FB: Frizzles bird, NB: Normal bird, DBK: Dominant black bird

**Conclusion**

Results from this preliminary investigation into the relationship between blood plasma and egg lipid profile show that the Total Cholesterol in blood plasma and egg yolk are inversely related 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**


