STUDY OF HEMATOLOGICAL PARAMETERS OF YOUNG GROWING CHICKS SUPPLEMENTED WITH MOLLUSCAN DIET

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Abstract

The grains used in the poultry feed can be minimized to certain extent by using other nonconventional additives which can be economical and useful in providing required diet contents. Considering the addition of nonconventional feedstuffs in the poultry feed, dried flesh of whole body mass and the grinded shell crush of bivalve mollusc, Lamellidens marginallis, was blended with regularly used poultry feed grains such as Bajara, Jowar, Wheat, Rice bran, Maize etc. The experiment was performed by feeding the chicks for 30 days in two separate groups with 10% and 20% addition of molluscan dried flesh and shell crush mixed in these grains. In addition, another three groups of chicks fed with only grains, commercial food recommended for poultry and fish meal added in grains were also maintained for 30 days. After experimental period blood-serum was analyzed for some hematological parameters (Triglyceride, Cholesterol, Protein, Calcium, Phosphorus and Amylase of blood serum). The analytical results observed were as follows. Serum triglyceride and Cholesterol was lower is chicks fed with commercial food and fish meal fed chicks than that of chicks fed with only grains and molluscan fed chicks. The protein content was higher is fish meal fed chicks and lower in other groups than that of grains fed chicks. Calcium was higher in molluscan fed chicks than all other groups. Serum phosphorus was higher is commercial food fed chicks than all other groups. Amylase was very higher in fish moral fed chicks than all the groups but it was lower in commercial and molluscan fed chicks.

Keywords

hematological parameters, grains, molluscan diet, chicks

Introduction

The nutritive requirements of poultry bird by permitting the maximum development of the physiological function and its growth is general concept for their efficiency of feed utilization, and egg production with hatchability. Fundamentally, in poultry, the main purpose of raising feed quality is to transform chicks into meat and eggs and the major objective of poultry feeding

is the conversion of these chicks into human food. Authentic compositions of poultry feed are available as reported by National Research Council, (1984) or such other organizations. Some experimental outlines shows formulation of feed for poultry birds is important through practical point of view in order to provide a substitute as proteins of animal origin as a new resource of high quality proteins for animal nutrition, particularly for poultry birds (Ocio et al., 1979). The present study is undertaken to test addition of molluscan dried flesh and shell crush mixed with different components of grains containing Bajara, wheat, rice bran, maize, pea beans, sorghum, etc. This study focuses on any change in biochemical contents in respect to blood of chicks during early developmental period.

Material and Method

The bivalve mollusc, Lamellidens marginalis, were collected from local lakes and maintained in aquarium containing fresh water for one day and then kept in deep freeze to sacrifice without any loss of nutrient contents of it. Then the whole body was separated out from shell, superficially blotted with filter paper, dried at moderate temperature in oven completely. The animal shell crush and dried flesh was blended in grinder along with grains. The pellets of this grinded mixture (used as mollusc-supplemented feed) after slight soaking in water were prepared for feeding young chicks. The one day old poultry birds were collected from poultry farm, acclimatized for rearing in the laboratory conditions for 3 days and then divided into 5 different groups. These chicks were fed for one month as Control group I- fed with only grain, Group II fed with only poultry farm recognized food, Group III fed with 10 % molluscan feed (grinded mixture of dried flesh and shell crush) added to 90% grains by weight, similarly Group IV was fed with 20 % molluscan feed added to 80% grains by weight, Group V fed with - 10 % fish meal added to 90% grains by weight. The diet was provided ad libitum with water. After the period of 30 days feeding all chicks were sacrificed and blood from the individual groups was introduced to

computerized auto-analyzer for the study of hematological parameters. The estimations of Serum Triglyceride, Cholesterol, Protein, Calcium, Phosphorus, and Amylase from blood-serum samples of poultry birds were performed by using Clinical Analyzer (Systronic 635). The blood of each chick was collected in fresh sterilized vials. The supernatant serum sample from the blood after keeping it aside for 30 min. was transferred into other separate sterilized vials for further analysis. The analysis of blood for hematological parameters was carried out by using the different chemical kits provided by Accurex Biomedical Pvt. Ltd., Mumbai. The analysis of various components on Clinical Analyzer requires reading of absorbance at different wavelengths as mentioned in standard operating procedure available with chemical kit for respective hematological parameters.

Result and Discussion

Hematological Parameters of Chicks, (Mean and SD). Haematological Parameters S-1 (Control) S-2 (Poultry Farm recognized food) S-3 (Exp- I- 10 %) S-4 (Exp-II-20 %) S-5 (Fish Meal) Serum Triglyceride (mg/dl) 85 ± 1.58 41* ± 1.58 72* ± 1.58 104 * ± 1.58 43*± 2.23 Serum Cholesterol (mg/dl) 201 ± 1.58 172* ± 1.58 182* ± 2.54 207* ± 1.58 164* ± 1.58 Serum Protein(mg/dl) 2.8 ± 0.16 2.6 NS ± 0.52 2.3*** ± 0.25 2.7* ± 0.16 3.1* ± 0.1 Serum Calcium(mg/dl) 4.8 ± 0.35 4.8 NS ± 0.52 9.5* ± 0.16 7.4* ± 0.16 5.2** ± 0.16 Serum Phosphorus (mg/dl) 6 ± 0.16 7.3* ± 0.16 4.8* ± 0.35 5.1* ± 0.16 6.2 NS ± 0.22 Serum Amylase(U/L) 586 ± 2.54 366* ± 1.58 249* ± 3.53 325* ± 1.58 823* ± 1.58 Above values are mean ± SD; n=5, Degrees of freedom=4, * P<0.01 (Highly Significant), ** P<0.05 (Significant), *** p<0.001 (Most Significant), and NS- Not Significant. Statistical analysis by - t-test Software- MATLAB 7.6.0 R2008a, Little and Moler, (1984). Blood parameters have been shown to be major indices of physiological, pathological and nutritional status of an organism and changes in the constituent compounds of blood when compared to normal values and could be used to interpret the metabolic stage of an animal as well

as quality of feed Babatunde et al., (1992). Analysis of serum triglycerides in experimental chicks fed with different diets showed that mean values of it were 85 ± 1.58 (mg/dl) in group-1 (control group), 41± 1.58 mg/dl (P<0.01) in group-2 (fed with poultry farm recognized food), 72 ± 1.58 mg/dl (P<0.01) in group-3 (fed with 10 % bivalve molluscan whole body with shell crush), 104 ± 1.58 mg/dl (P<0.01) in group-4 (fed with 20 % of molluscans whole body and shell crush), and group-5 (fish meal) 43 ± 2.23 mg/dl (P<0.01). From these observations, group-2, group-3 and group-5 were having less significant serum triglycerides as compared to control, but in group-4 serum triglycerides were significantly increased than that of group-1. The serum cholesterol of experimental chicks were noted as 201 ± 1.58 (mg/dl) in group-1, 172 ± 1.58 mg/dl (P<0.01) in group-2, 182 ± 2.54 mg/dl (P<0.01) in group-3, 207 ± 1.58 mg/dl (P<0.01) in group-4 and 164 ± 1.58 mg/dl (P<0.01) in group-5. It was observed that the cholesterol in group-2, group-3 and group-5 was significantly decreased as compared to group-1, but in group-4 it was significantly higher than that of group-1. Various researches are presently going on to lower cholesterol content of chicken egg and meat either through the use of additives, dietary fiber, polyunsaturated fatty acid supplementation, etc. Most dietary cholesterol is associated with saturated fats. Dietary cholesterol (1%) and lard (10%) supplementation in Japanese quail was found to be more harmful with increased total serum cholesterol levels and also associated with increased LDL + VLDL cholesterol fractions. Serum cholesterol levels increased with increasing tallow (2-6%) incorporation is reported by Guclu, et al., (2008). In our study cholesterol was lower in 10% molluscan fed chicks in favor of low risk cholesterol content. The serum protein concentration in influenced by dietary protein level in growing chicks. It was noted that serum protein and cholesterol can be altered by protein levels above that required for maximum growth. The increase in total serum protein is an indication of protein reserves in an animal. The increase in serum protein found when the dietary protein levels was increased beyond the requirement of growth, reflects the ability of

the chicks to store "reserve" protein even after the animal has reached its "labile" protein. These reserve are helpful to resist the stress of caloric supply, infection, etc. (Leveille And Sauberlich, 1961). Analysis of serum protein from the experimental chicks reveled the values as, 2.8 ± 0.16 (mg/dl) in group-1, 2.6 ± 0.52 mg/dl (NS) in group-2, 2.3 ± 0.25 mg/dl ($P<0.001$) in group-3, 2.7 ± 0.16 mg/dl ($P<0.01$) in group-4 and it was 3.1 ± 0.1 mg/dl ($P<0.01$) in group-5. So in these experimental groups of chicks it was observed that serum protein was slightly decreased in group-2, group-4 and group-3 respectively but in group-5 slight increase in serum protein was noted. Though the serum protein was less than whole grain fed chicks the growth and weight gain was higher in molluscan diet supplemented chicks indicating the proper utilization of the diet in experimental chicks of group-3 and 4. Mineral substances play a significant role in a development of immunity, health status and laying rate, influence eggs quality, mainly eggshell strength reported by Tronina et al., (2008). Thus, the concentration of main chemical elements in blood serum is a good index of mineral supplementation in poultry feeding. Analysis of serum calcium values of experimental chicks on 30th days of feeding experimentation revealed that it was 4.8 ± 0.35 (mg/dl) in group-1, 4.8 ± 0.52 mg/dl (NS) in group-2, 9.5 ± 0.16 mg/dl ($P<0.01$) in group-3, 7.4 ± 0.16 mg/dl ($P<0.01$) in group-4, and 5.2 ± 0.16 mg/dl ($P<0.05$) in group-5. So it was observed that the serum calcium content was highest in group-3 and slightly lower than that of group-4. It was comparatively higher than group-1, group-2, and group-5. This reflects in the presences of calcium in shell crush which might have absorbed more from molluscan food content by chicks of group-3, but surprisingly the content of serum calcium was less in group-4 which was provided with 20 % bivalve mollusc food content which could be because of the absorption limitation of these chicks. Thus the serum Ca concentration reflected the Ca content of the respective diet, without any adverse effects on digestion and food intake. It was analyzed that the contents of serum phosphorus of experimental chicks in blood serum, on 30th day of feeding experimentation were 6 ± 0.16 (mg/dl) in

group-1, 7.3 ± 0.16 mg/dl (P<0.01) in group-2, 4.8 ± 0.35 mg/dl (P<0.01) in group-3, 5.1 ± 0.16 mg/dl (P<0.01) in group-4, and 6.2 ± 0.22 mg/dl (NS) in group-5. This indicated that the phosphorus content in blood serum was highest in group-2, compared to all and it was nearly equal in group-1 and group-5; whereas in group-3 and group-4 it was lower than group-1. Boyd et al., (1981; 1983) showed that inorganic phosphorus content of the serum and alkaline phosphatase activity was highly correlated with bone breaking strength. From the observations of phosphorus content in serum phosphorus range appears that it was utilized as bioavailable phosphorus by groups 3 and 4 and no deformities in bones of all experimental chicks was observed. The serum amylase contents in blood serum of chicks on 31st day of feeding experimentation were 586 ± 2.54 (U/L) in group-1, 366 ± 1.58 U/L (P<0.01) in group-2, 249 ± 3.53 U/L (P<0.01) in group-3, 325 ± 1.58 U/L (P<0.01) in group-4, and 823 ± 1.58 U/L (P<0.01) in group-5. It is observed that the serum amylase was highest in group-5 and lowest in group-3. Khalid et al., (2011) observed in two breeds of chickens which differ in growth rate over the period of 1-day to 120-day of age, and the synthesis of enzymes Amylase, Trypsin and Chymotrypsin within pancreas and the small intestine was affected according to the body requirements, age and biological function and this may affect the digestion and finally the growth rate. Rodeheaver and Wyatt, (1984) suggested increase in serum amylase is caused by reduction of food intake for short period but long term restriction of food caused elevation of serum amylase. In our experimental chicks fed with molluscan diet revealed low level of serum amylase indicating no reduction in utilization of food and also carbohydrate metabolism. In our experimental observation it seems that, it was significantly more in group fed with fish meal than fed with conventional food grains, but significant lowering of amylase was observed in chicks fed with commercial poultry feed and chicks fed with additional food content of mollusc and its shell crush compared to chicks fed with only grains. It reflects in food dependent amylase secretion as its digestive role.

Conclusion

The addition of molluscan flesh and shell crush to chick diets at a level of 10% or 20% in grains did not negatively affect in chick performance or serum chemistry. The results indicate that molluscan diet did not negatively affect dietary nutrients at this dietary inclusion level.

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Hematological Parameters of Chicks.

Haematological Parameters	S-1 (Control)	S-2 (Poultry Farm recognized food)	S-3 (Exp- I- 10 %)	S-4 (Exp-II- 20 %)	S-5 (Fish Meal)
Serum Triglyceride *(mg/dl)*	85 ± 1.58	41* ± 1.58	72* ± 1.58	104 * ± 1.58	43*± 2.23
Serum Cholesterol *(mg/dl)*	201 ± 1.58	172* ± 1.58	182* ± 2.54	207* ± 1.58	164* ± 1.58
Serum Protein*(mg/dl)*	2.8 ± 0.16	2.6 NS ± 0.52	2.3*** ± 0.25	2.7* ± 0.16	3.1* ± 0.1
Serum Calcium*(mg/dl)*	4.8 ± 0.35	4.8 NS ± 0.52	9.5* ± 0.16	7.4* ± 0.16	5.2** ± 0.16
Serum Phosphorus *(mg/dl)*	6 ± 0.16	7.3* ± 0.16	4.8* ± 0.35	5.1* ± 0.16	6.2 NS ± 0.22
Serum Amylase*(U/L)*	586 ± 2.54	366* ± 1.58	249* ± 3.53	325* ± 1.58	823* ± 1.58

Above values are mean **±** SD; n=5, Degrees of freedom=4, *** P<0.01** (Highly Significant),

** **P<0.05** (Significant), *** **p<0.001** (Most Significant), and **NS**- Not

Significant. Statistical analysis by - *t*-test Software- MATLAB 7.6.0 R2008a, Little and Moler, (1984).