# Clinicopathological Studies On Chickens Fed On Some Animal And Non Animal Protein

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## ABSTRACT

The present study was performed to investigate the clinicopathological changes associated with different protein sources. One hundred and forty, one day old Cub-500 chicks were used for this investigation. They were divided into three groups according to the ratio of protein supplemented from different sources, the first group (A) fed on corn-soybean meal and was kept as control, the second one contained 40 birds and subdivided into 2 equal subgroups (B1 and B2) each of 20 chicks fed on diet contains corn gluten meal (CGM) at levels 5% and 10%. The third group fed on animal protein diet, contained 80 birds and subdivided into 4 equal subgroups C1 and C2 fed on diet contains fish meal (FM) at levels 5% and 10% and C3 and C4 fed on diet contains meat & bone meal (MBM) at levels 5% and 10%. Blood samples were collected from wing vein under aseptic precautions at the 21 and 46 day old from 5 birds in each group for biochemical and immunological studies.

Lipid profile showed significant increase in the serum triglycerides, total cholesterol, HDL cholesterol, LDL cholesterol and VLDL cholesterol in groups which C1, C2, C3 and C4 fed on animal protein source supplemented rations, at all experimental periods. While groups B1 and B2 showed non significant changes when compared with control group.

Regarding the immune response (humoral and cellular), there was a significant increase in the HI titer in groups B1, B2, C1 and C3 at the end of starter period (21 days), and in groups B2, C1 and C3 at the end of grower period (46 days). The serum IgG and IgM showed a significant increase in groups B1, B2, C1 and C3, allover the experimental periods. Also, there was a significant increase in most parameters of the cellular immune response (the lymphocytic transformation rate, phagocytic percentage and killing percentage) in groups B1, B2, C1 and C3 at the end of starter period and also lymphocytic transformation rate showed significant increase in groups B1, B2, C1 and C3 at the end of grower period, while phagocytic percentage and killing percentage showed significant increase in groups B2 and C1 at the end of grower period.

## INTRODUCTION

Chickens are important source of animal protein for human beings. Protein is a major nutrient in poultry rations, so protein source is considered mainly the most importance to give protein quality led to meet the higher relative growth rate of broiler chicks *(1)*.The conventional compound feeds are, soybean, corn gluten, fish and meat & bone meal which are the major sources of protein in poultry diets. Plant proteins are generally nutritionally imbalanced, unless supplemented with animal proteins or synthetic compounds *(2)*. Fish meal was to be the highest quality animal protein followed by meat meal when used in broiler rations. The superior quality of fish meal is attributed to its methionine and lysine content *(3)*. Numerous investigators *(4-6)*, have reported that dietary plant proteins compared to proteins of animal origin lowered serum cholesterol level. Moderate levels of dietary fish meal had the potential to improve the immune response of laying hens *(7)*. Also, it was reported that chicks received diet containing 3 g/kg methionine show improved cellular immune response, also HI test and ELISA indicated enhanced Ab titers than chicks received 6.5 g/kg methionine *(8)*. Corn

gluten meal is high in xanthophylls (carotenoid pigments), linoleic acid, methionine, lysine and selenium ***(9)***.

This work was performed to investigate the clinicopathological changes (lipid profile, humoral and cellular immune responses) associated with different protein sources and levels in chickens rations.

## MATERIALS AND METHODs

### I-Materials

### A-Chickens

One hundered and forty, one day old Cub 500 chicks were used for this experiment. Chicks were kept under standard environmental and hygienic conditions. Chicks were maintained on the experimental diets from the first day of age and were allowed free access to food and water. All chickens were vaccinated against ND by Hitchner strain intraocular at 8 days of age, Lasota strain intraocular at 21 days of age and against Gumboro disease by D78 strain intraocular at 12 and 22 days of age ***(10)***.

### B-Diets

The feed stuff used in formulation of the experimental diets was being analyzed for crude protein, ether extract and crude fiber ***(11)***. Chicks were fed on 22% CP (crude protein) and 3010 ME (metabolic energy) in starter phase (0-3 weeks of age)as shown in Table 1, but 20% CP and 3100 ME in grower phase (4-7 weeks of age) as shown in Table 1. Diets provided to each feeding phase were formulated to be isoenergetic, isonitrogenous and nearly equivalent with respect to other nutrients. Diets were supplement with DL-methionine, calcium carbonate and sodium chloride to be balance for these nutrients as recommended by ***NRC (12)***. Two types of diets were being used plant protein diets and animal protein diets.

**Table 1.Composition of the experimental diets.**

| Period | Ingredient | Control | Corn gluten meal | | Fish meal | | Meat and bone meal | |
|---|---|---|---|---|---|---|---|---|
| | | | 5% | 10% | 5% | 10% | 5% | 10% |
| starter period (0 - 21 day) | -Yellow corn | 58 | 61.8 | 64.8 | 60.9 | 64.4 | 59.4 | 62.5 |
| | -Soybean meal | 38 | 30 | 23 | 31 | 23.5 | 32.5 | 26 |
| | (44%) | - | 5 | 10 | - | - | - | - |
| | -CGM (60%) | - | - | - | 5 | 10 | - | - |
| | -Fish meal (60%) | - | - | - | - | - | 5 | 10 |
| | -MBM (55%) | 2.5 | 2 | 1 | 2 | 1 | 2 | 1 |
| | -Oil | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | - |
| | -Ca carbonate | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | - |
| | -Ca dibasic ph | 0.3 | 0.3 | 0.3 | 0.25 | 0.25 | 0.25 | 0.25 |
| | -Na cl | 0.3 | 0.3 | 0.3 | 0.25 | 0.25 | 0.25 | 0.25 |
| | -Premix | 0.3 | - | - | - | - | - | - |
| | -DL-methionine | | | | | | | |
| grower period (22 -46 day) | Yellow corn | 61.5 | 64.8 | 68.3 | 63.5 | 67.5 | 64.5 | 66.5 |
| | -Soybean meal | 34 | 26.5 | 19 | 27.5 | 19 | 27 | 21.5 |
| | (44%) | - | 5 | 10 | - | - | - | - |
| | -CGM (60%) | - | - | - | 5 | 10 | - | - |
| | -Fish meal (60%) | - | - | - | - | - | 5 | 10 |
| | -MBM (55%) | 2.5 | 2 | 1 | 2.5 | 2 | 2 | 1.5 |
| | -Oil | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | - |
| | -Ca carbonate | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | - |
| | -Ca dibasic ph | 0.35 | 0.35 | 0.35 | 0.25 | 0.25 | 0.25 | 0.25 |
| | -Na cl | 0.35 | 0.35 | 0.35 | 0.25 | 0.25 | 0.25 | 0.25 |
| | -Premix | 0.3 | - | - | - | - | - | - |
| | -DL-methionine | | | | | | | |

## II. Methods

### A-Experimental design

140 chickens were divided into three groups, first one (A) contained 20 chicks fed on corn and soybean meal diet as a control; second one contained 40 birds and subdivided into 2 equal subgroups (B1 and B2) each of 20 chicks fed on plant protein diet composed of corn, soybean meal and 5% & 10% CGM, respectively to previous studies ***(13,14)***. Third group fed on animal protein diet, contained 80 birds and subdivided into 4 equal subgroups: (C1 and C2) fed on diet composed of corn, soybean meal and 5% & 10% FM, respectively and C3 and C4 fed on diet composed of corn, soybean meal and 5% and 10% MBM, respectively ***(15)***.

### B-Blood sampling

Blood samples were collected from wing vein under aseptic precautions at 21 and 46 day old from 5 chickens in each group. Two blood samples were collected from each chicken. The first blood sample was 2 ml of blood collected in sterile plastic centrifuge tube containing heparin (50 IU/ml) to be used for separation of mononuclear leukocytes. The second blood sample was 3 ml of blood taken without anticoagulant in clean dry centrifuge tubes, left to clot at room temperature and then centrifuged at 3000 rpm for 5 minutes. The separated sera were subjected to both

biochemical and humoral immunological studies.

**C-Clinico-biochemical studies**

Test kits were used for colorimetric estimation of the following parameters using spectrophotometer. Serum triglycerides (TG) *(16),* Serum "total cholesterol *(17)*, and HDL-cholesterol *(18)* were estimated, LDL-cholesterol and VLDL were calculated by the following formulae. The VLDL-cholesterol= TG/5 and the LDL-cholesterol=TC-(HDL+TG/5) *(19)*.

**D-Humoral immune response**

The serum hemagglutination inhibition antibody titer *(20)* and immunoglobulins (IgM and IgG) titer were estimated *(21,22).*

**E-Cellular immune response**

Lymphocyte transformation test *(23),* Phagocytosis and killing assay were estimated *(24,25).*

**F-Statistical analysis**

The data obtained from this investigation was statistically analyzed by students; T-test *(26).*

## RESULTS AND DISCUSSION

A fundamental assumption in poultry feed formulation is that the nutrient supply of individual feed stuffs can be added together to meet the nutrient specifications of the diet and extensive genetic selection towards a fast-growing chicken which led not only to a dramatic shortening of the growing period, but also to excessive carcass fatness. Due to increasing public demand for low fat and cholesterol products, interest in manipulating the lipid composition of poultry meat via dietary means has become important *(27)*.

Therefore, in recent years there is some tendency among nutritionists to formulate animal protein free diets for poultry; the sole source of protein in these diets is of plant origin. Vegetarian broilers now is common practice in many countries, meat of these chicken is more tender, juicy and preferable to the consumer *(6).*

Concerning the effect of plant and animal protein diets on lipid profile, our results revealed that serum triglycerides, total cholesterol, HDL-cholesterol, LDL-cholesterol and VLDL-cholesterol showed significant increase with the increasing of animal protein (fish meal and meat & bone meal), while there was non significant change between control group and groups that fed on corn gluten meal (plant protein) at two concentration 5% and 10% at the end of starter and growing periods. Our results are consistent with several previous studies *(28-30).* They found that serum total cholesterol was significantly decreased when animal proteins were replaced with soybean. Also, our result are coincides with reported investigation *(31)* which showed that plasma cholesterol level was significantly increased when animal fats were used, while it was decreased when plant oil was used in the diets. Also, it was found that gradual replacement of soybean meal by fish meal or broiler concentrate produce a significant increase in serum total lipid and cholesterol in chicken *(32)*. By the same way, it was concluded that gradual replacement of soybean meal by fish meal or meat & bone meal produce a significant increase in serum triglyceride, total cholesterol, HDL, LDL and VLDL in broiler; On contrary, it was found that gradual replacement of soybean meal by corn gluten meal showed non significant change in serum lipid profile *(6)*.

Feeding soybean meal is associated with a decrease in serum triacylglycerol and cholesterol concentrations *(33)*. It was found that corn gluten meal resulted in significant reduction in serum concentrations of triglycerides and cholesterol in chicken in comparison with animal protein *(5, 34,35)*. Also, when 50% of soybean was replaced by equal amounts of cotton seed meal and corn gluten meal, gave the same effect of soybean as lowering total lipid and cholesterol *(36)*.

The hypocholesterolemic effect of soybean may be due to several possible mechanisms

A. Enhancement of bile acid excretion

Studies on rabbits and rats have evidence that soybean protein increases fecal excretion of bile acids. In this respect hepatic cholesterol metabolism is shifts to provide cholesterol for enhanced bile acid synthesis. Cholesterol biosynthesis increases as does low-density lipoprotein (LDL) receptor activity. The net result is increased removal of cholesterol from the blood via the LDL receptor ***(37, 38).***

B. Hepatic metabolism of cholesterol

Feeding soybean protein increased β-hydroxyl β- methyl glutaryl coenzyme A (HMG – CoA) reductase activity, increased bile acid synthesis and its fecal excretion, decreased hepatic apolipoprotein β – 100 synthesis and increased hepatic clearance of LDL and VLDL ***(39,40).***

C. Endocrine effect

Feeding of soybean protein may alter hormone concentration has been reported and showed that soybean protein increased thyroxin, free thyroxin index and in some cases, thyroid stimulating hormone ***(41)***. Also it was found that insulin was decreased and glucagons were increased with consequent increase in insulin: glucagons ratio as response to soya protein feed ***(42)***. Because all these hormones are known to be involved in cholesterol metabolism, it has been proposed that variation in hormone secretion is responsible for the hypocholesterolemic effect of soybean protein, especially thyroid hormone as metabolic effect of hyperthyroidism are very similar to those observed with soy protein feeding (LDL receptor activity increase, HMG – CoA reductase activity increase, bile acid secretion increase and total cholesterol and LDL-cholesterol decrease). The component of soya responsible for modulation of these hormones is not known, it has been hypothesized that lower lysine:arginine ratio of soya decrease secretion of insulin and increase secretion of glucagons ***(43).***

Animal protein (fish meal and meat &bone meal) are rich in methionine and lysine ***(44)***, these amino acids are considered the most hypercholesterolemic ***(45).*** Also, it has been found that laying hens fed fish meal protein had significantly lower plasma $T_4$ concentration after 7 days of feeding than did hen fed corn- soya protein ***(46)***.

Corn gluten meal is frequently used in broiler diets due to its unique nutritional qualities as it is an excellent source of A.A. for poultry due to the desirable balance of essential A.A. and also it contains 2.5% fiber and it is good source of carotenoids, which have vitamin A activity ***(9).*** Vitamin A markedly depressed both serum total cholesterol and LDL- cholesterol levels due to mutual interference between vitamin A and cholesterol during the course of absorption across the intestinal wall ***(47)***. In addition, fibrous content in the diet might block intestinal cholesterol absorption ***(48)***.

**Table 2. Lipid profile (mean values ± SE) in chickens fed on different protein diets for starter and grower periods.**

| Period | Group | Types of diet Protein | Triglycerides (mg/dl) | Total cholesterol (mg/dl) | HDL-cholesterol (mg/dl) | LDL-Cholesterol (mg/dl) | VLDL-Cholesterol (mg/dl) |
|---|---|---|---|---|---|---|---|
| Starter (0-21) days | A | Control | 91.8 ± 3.78 | 107.2 ± 6.65 | 38.8 ± 2.87 | 50.04 ± 3.8 | 18.36 ± 0.76 |
| | B1 | CGM 5% | 95.6± 3.89 | 111± 4.79 | 39.4± 2.68 | 52.48± 2.38 | 19.12± 0.78 |
| | B2 | CGM 10% | 93.4± 4.34 | 108.6± 4.38 | 39.2 ± 1.66 | 50.72± 3.96 | 18.68± 0.87 |
| | C1 | FM 5% | 108.2*± 4.22 | 127.6*± 2.32 | 46.2*± 1.36 | 59.76*± 1.64 | 21.64*± 0.85 |
| | C2 | FM 10% | 110.6*± 5.1 | 132.6*± 4.13 | 46.6*± 1.54 | 63.88*± 3.93 | 22.12*± 1.01 |
| | C3 | MBM 5% | 114.0*± 6.98 | 130.0*± 2.43 | 47.6*± 1.63 | 59.60*± 1.44 | 22.80*± 1.40 |
| | C4 | MBM 10% | 119.0**± 6.76 | 138.4**± 4.30 | 48.4*± 1.97 | 66.20**± 2.82 | 23.70**± 1.35 |
| Grower (22-46) days | A | Control | 116.0±5.81 | 121.4±3.44 | 42.6 ± 2.06 | 55.6 ± 2.23 | 23.20 ± 1.16 |
| | B1 | CGM 5% | 117.2± 5.54 | 123.4± 4.18 | 44.2± 2.22 | 55.76± 2.21 | 23.44± 1.11 |
| | B2 | CGM 10% | 118.4±4.80 | 124.8±4.44 | 44.4±2.87 | 56.72±4.25 | 23.68±0.96 |
| | C1 | FM 5% | 154.8**±7.30 | 151.5**±4.54 | 55.4**±2.68 | 64.84*±3.32 | 30.69**±1.46 |
| | C2 | FM 10% | 158.2**±8.37 | 155.0**±5.95 | 56.6-**±3.07 | 66.72*±3.83 | 31.64**±1.71 |
| | C3 | MBM 5% | 156.8**±6.77 | 154.2***±5.11 | 57.2**±4.32 | 65.64**±1.94 | 31.36**±1.35 |
| | C4 | MBM 10% | 163.8***±7.17 | 156.4***±5.28 | 61.4**±3.43 | 71.24**±3.86 | 32.76***±1.43 |

* Significant at 0.05 probability ** Highly significant at 0.01 probability *** Very highly significant at 0.001 probability

**Table 3. Humoral and cellular immune response (mean values ± SE) in chickens fed on different protein diets for starter and grower periods**

| Period | Group | Types of diet Protein | HI Antibody titer | IgG (mg/dl) | IgM (mg/dl) | LTR | Phagocytic % | Killing % |
|---|---|---|---|---|---|---|---|---|
| Starter (0-21) days | A | Control | 4±0.15 | 987.6±13.0 | 236.5±7.9 | 1.17±0.04 | 74.2±1.4 | 70.2±1.0 |
| | B1 | CGM 5% | 4.6*±0.12 | 1099*±43.4 | 312.1**±18.8 | 1.48*±0.09 | 84.8***±1.5 | 80**±1.9 |
| | B2 | CGM 10% | 5.24***±0.15 | 1159***±28.6 | 346***±16.9 | 1.52**±0.07 | 86***±1.6 | 82.2***±1.93 |
| | C1 | FM 5% | 5.4***±0.19 | 1218***±42.4 | 355.6***±13.8 | 1.59***±0.02 | 81.6*±1.9 | 77.6**±1.6 |
| | C2 | FM 10% | 4.3±0.16 | 1066±32.1 | 271.2±19.9 | 1.37±0.08 | 77.4±2.9 | 73±0.9 |
| | C3 | MBM 5% | 4.5*±0.13 | 1126**±25.6 | 304.9**±11.7 | 1.53**±0.06 | 80.6*±1.5 | 78.2**±1.8 |
| | C4 | MBM 10% | 4.2±0.12 | 1060±31.5 | 280.4±19.1 | 1.31±0.05 | 74.6±1.9 | 74±1.4 |
| Grower (22-46) days | A | Control | 4.3±0.25 | 991.9±14. | 242.8±9.8 | 1.22±0.0 | 76.4±1.3 | 71.6±1.2 |
| | B1 | CGM 5% | 4.7±0.24 | 1131*±40.3 | 262.9*±11 | 1.41**±0. | 81.6±1.9 | 76.2±1.7 |
| | B2 | CGM 10% | 5.2**±0.22 | 1139**±28.9 | 267.7**±8.9 | 1.48***±0.04 | 83.6*±2.8 | 78.6**±1.6 |
| | C1 | FM 5% | 5.5**±0.18 | 1149**±35.7 | 269**±9.5 | 1.46***±0.04 | 82.6*±2.1 | 78.4**±1.2 |
| | C2 | FM 10% | 4.6±0.21 | 1018±44.6 | 249.2±4.2 | 1.29±0.04 | 76.4±1.4 | 72±1.4 |
| | C3 | MBM 5% | 5*±0.19 | 1118*±41.4 | 262.2*±8.97 | 1.38**±0.03 | 78±2.45 | 73.4±1.2 |
| | C4 | MBM 10% | 4.5±0.23 | 1040±17.8 | 250.4±3.7 | 1.23±0.04 | 77.2±0.9 | 72.8±1.2 |

* Significant at 0.05 probability ** Highly significant at 0.01 probability *** Very highly significant at 0.001 probability

On contrary, our results disagree with the results which detected no significant differences between diets of animal or plant origin proteins in blood lipid composition, of laying hens for a long duration *(49,50)*.

Diet has been shown to play an important role in modulating the resistance to infection and the immune system *(51)*.

Corn gluten meal supplementation to compensated corn- soya meal diet for broiler enhanced the humoral immune response (HI antibody titer and serum IgG and IgM values) allover the experimental periods in our investigations. Similar findings were cited *(52,53)*. Chicks received diet containing 6.5 g/kg methionine show improved cellular immune response, also HI test and ELISA indicated enhanced Ab titers *(8)*. Chicks received 3 g/kg methionine showing significantly better immune response. As corn gluten feed has moderate protein content and contains considerable levels of sulfur containing A.A. (methionine, cystine) SAA, threonine and leucine *(54)*. A low level of SAA lowered antibody production to SRBC in broiler chickens *(55)*. Increasing methionine levels from 0.35 to 1.2% in the diet for chickens infected with Newcastle disease virus markedly enhanced leucocyte migration and antibody titre *(8)*. For all that before corn gluten meal enhanced the humoral immune response of broiler chicks in comparison to those fed on corn-soybean meal (control group). In addition it was found that gamma globulin fraction showed an increase after vaccination with inactived ND vaccine in serum of birds fed on plant protein *(53)*.

In our result corn gluten meal in groups B1 and B2 showed significant increase in cellular immune response (lymphocyte transformation rate, phagocytic % and killing %) allover the experimental periods.

Carotenoids in corn and green beans have antioxidant and immunomodulating properties, as carotenoids have been shown to affect immune response by protecting against oxidative stress and lipid peroxidation, improving humoral and cellular immune response indicated by increase in B and T cell proliferation *(54)*. Also, it was stated that low immune response of diet based on corn-soybean meal is possibly due to reduced protein availability for liver protein synthesis associated with immune response or antibody production *(55)*.

Our results revealed that fish meal 5% significantly enhanced the humoral immune response and cellular immune response all over the experimental periods as shown in Table 3. That is in accordance with previous studies *(7,56)* which found that increased proliferation of splenic lymphocyte, in addition, it has been also observed a significant increase in the percentage of splenic $CD_4$ cells from hens that were fed 3% fish meal for 9 weeks. Enhanced splenic lymphocyte proliferation to phytohemagglutinine (PHA) in 3% fish meal hens could be partially attributed to the increase in $CD_4$ cells *(57)*, which are known to support lymphocyte activation, possibly by increased interleukine2 (IL2) production *(58)*. Processed fish meal are excellent protein supplements, usually supplying high amounts of amino acids especially lysine and methionine*(59)*. The immunogen- injected chicks had significantly higher serum Interleukin-1 (IL-1) activity by 53% when fed methionine sufficient diet, but they did not have significantly greater IL-1 levels when fed methionine, deficient diet. IL-1 stimulates the T-helper lymphocyte to secrete IL-2 and $\gamma$ interferone, which activates B-lymphocyte (to become antibody producing plasma cell). Also the IL-2 stimulates other T-cell subtypes to initiate a cell mediated immune response (enhances lymphocytes blastogenesis and lymphokine-production), the release of certain lymphokines (MAF macrophage activating factor) activates the macrophages *(60)*.

On contrary broiler fed on diet contains 10% fish meal showed non significant changes in the humoral immune response (HI antibody titer and serum IgG and IgM values) and cellular immune response (lymphocyte transformation rate, phagocytic % and killing %) all over the experimental periods. Our

results are in agreement with previous several studies *(7, 61, 62)*. Fish oil has been shown to be immunosuppressive at high concentrations and immunostimulatory at lower concentration in chickens *(63)*. Dietary fish oil was shown to decrease kupffer cell phagocytosis and oxidative burst during the early part of *Salmonella typhimurium* infection as well as increase mortality rates of infected mice *(64 and 65)*.

Our investigation revealed that meat & bone meal inclusion with 5% in broiler diet significantly increased the humoral immune response (HI antibody titer and serum IgG and IgM values) allover the experimental periods and increased lymphocyte transformation rate in the two experimental periods (starter and grower periods) while increased phagocytic % and killing % during starter period only. On the other hand, meat & bone meal by level of 10% did not affect either humoral or cellular immune response. Our results are in agreement that which reported that poultry offal meal and whole poultry carcass meal fed at 10 % had no effect on the cellular and humoral immune response; however, the feeding of these supplements proteins at 20% of the diet depressed the blastogenic response to PHA *(56)*. And which showed that broiler fed a diet contained low energy and protein had higher IgM response to SRBC than those fed a diet contained higher energy and protein *(61)*.

Feeding chickens on diets containing 5% fish meal or 5% meat & bone meal had no superiority over diets composed of protein from vegetable sources such as corn gluten meal (5% or 10%) in term of immune response (humoral and cellular). Moreover, corn gluten meal (5% and 10%) decreased serum cholesterol level than animal protein (fish meal and meat & bone meal) and so plant protein given safe product for the consumer. Corn gluten meal (10%) was better than GM (5%) regarding to lipid profile and the immune response.

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## الملخص العربى

# دراسات باثولوجية اكلينيكية على الدجاج المتغذى علي عليقة من مصدر حيوانى ومصدر غير حيوانى

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قسم الباثولوجيا الاكلينيكية-كلية الطب البيطرى-جامعة الزقازيق و معهد بحوث صحة الحيوان-بالزقازيق

اجري هذا البحث علي ١٤٠ كتكوت تسمين ذكور عمر يوم لمعرفة التغيرات الكيميائية الحيوية والمناعية المتأثرة بنوع البروتين في العلائق و تم تقسيم الكتاكيت الي ثلاث مجاميع ،المجموعة(A) وهي المجموعة الضابطة,و تحتوى على ٢٠ طائر واعتمدت علي الذرة وفول الصويا في تغذيتها، المجموعة الثانيةبها ٤٠ طائر وتم تقسيمها الى مجموعتين فرعيتين كل منها ٢٠ طائر (B1 & B2) تم اضافة جليوتين الذرة لعليقتيهما بنسبة ٥% و١٠% ،المجموعة الثالثة وبها ٨٠ طائر وقسمت الى أربع مجاميع فرعية متساوية (C1 & C2) تم اضافة مسحوق السمك لعليقتيهما بنسبة ٥% و١٠%، (C3 & C4) تم اضافة مسحوق اللحم والعظم لعليقتيهما بنسبة ٥% و١٠% لمدة ٤٦ يوم. و تم ذبح خمس كتاكيت من كل مجموعة بعد اخذ عينات الدم منهم عند اعمار 21 و٤٦ يوما.

بتحليل مصل الدم لقياس تركيز الدهون في الدم وجد زيادة معنوية في الجليسيريدات الثلاثية، الكوليستيرول الكلى، البروتينات الدهنية عالية الكثافة ومنخفضة الكثافةو شديدة الانخفاض في المجاميع (C1, C2, C3 & C4) طوال فترات التجربة.

وبالنسبة للمناعة السائلة دلت نتائج الاختبارات المناعية على وجود زيادة معنوية فى مستوى الاجسام المناعية بالنسبة لاختبار التلازن في كل المجاميع عدا المجموعتين (C2 & C4)، وأظهرت نسبة الجلوبيولين المناعى (م) و الجلوبيولين المناعى (ج) زيادة معنوية في نفس المجاميع عند عمر ٢١ و ٤٦ يوم. بقياس المناعة الخلوية ظهرت زيادة معنوية في النشاط المناعى عند عمر ٢١ و ٤٦ يوما في كل المجاميع عدا المجموعتين (C2 & C4). وجدت زيادة معنوية في قدرة الخلايا الليمفاوية على التحول وأيضا نسبة التهام البكتريا والقدرة علي قتلها. كان تأثير المجموعتين ( B2 & C1) على مختلف قياسات المناعة السائلة والخلوية أكثر وضوحا من باقى المجاميع.

**ومن هذه الدراسة يمكن استنتاج الأتى:**

اضافة جليوتين الذرة بنسبة ٥% و ١٠% أو مسحوق السمك بنسبة ٥% أو مسحوق اللحم والعظم بنسبة ٥%، ينتج عنه زيادة فى المناعة السائلة والخلوية لدجاج التسمين. كمان المناعة تبدأ في النقصان عند اضافة مسحوق السمك ١٠% أو مسحوق اللحم والعظم بنسبة ١٠%. وأيضا فإن اضافة مسحوق السمك(٥% و ١٠%) و مسحوق اللحم والعظم (٥% و ١٠%) تزيد من تركيزنسبة الدهون في الدم عن استخدام جليوتين الذرة والذى يعطي اقل تركيز للدهون فى الدم وبالتالي يعطى أفضل منتج للمستهلك البشرى.