

BLOOD PROFILE OF BROILER STARTER CHICKENS FED DIETS WITH FENUGREEK (*Trigonella foenum graecum*) OIL AND BLACK SEED (*Nigella sativa* L.) OIL

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ABSTRACT

A study was conducted to evaluate the blood profile of broiler chickens fed diet with fenugreek oil and black seed oil. Two hundred unsexed day-old broiler chicks were sourced from a reputable hatchery and randomly allocated to five dietary treatments of 40 birds per treatment in a completely randomized design experiment and the birds were sub-divided into four replicate each. Five experimental diets were formulated using commercial feed (Adva starter) such that diet 3, 4 and 5 were supplemented with fenugreek oil and black seed oil at ratio of 10:10, 10:20 and 20:10ml/kg diet respectively while diet 1 and 2 served as positive and negative control with no addition of test ingredients. At the end of four weeks, two birds were randomly selected from each replicate and blood samples were collected for hematology and serum indices through their jugular vein. Results of haematological parameters showed that Packed cell volume, Haemoglobin, Red blood cell, Lymphocyte, Heterocytes and Eosinophil were significantly ($P<0.05$) affected while the serum biochemistry results showed significant ($P<0.05$) differences on Albumin, Globulin, Aspartate transaminoferase, Alanine transaminase, Alkaline Phosphatase, High density Lipoprotein, Glucose, Creatinine and Urea, respectively. It can be concluded that dietary supplementation of fenugreek oil and black seed oil at moderate inclusion level (i.e 10:10ml/kg) enhances Packed cell volume, Haemoglobin and Red blood cell, supporting better oxygen transport and overall health while serum profile at 10:20ml/kg could be assumed as optimum level to maintain good health status of broiler chicken.

Keywords: Blood profile, Chicken, Fenugreekoil, Black seed (*Nigella sativa* L.) oil.

INTRODUCTION

Phytogenic feed additives such as local plant materials are often aimed at improving animal performance by increasing their growth rate, improving feed efficiency and reducing the incidence of diseases (Zomrawi *et al.*, 2013). They also serve as alternative for growth promoting antibiotics which has been banned by European union due to their resistance against bacteria which are pathogenic to humans (Majeed *et al.*, 2010). Removal of antibiotics from the poultry diets may negatively affect profitability of the animals. Alternatives used as feed additives are Fenugreek oil and Black seed oil. Fenugreek (*Trigonella foenum-graecum* L.) is an annual plant from the family *Fabaceae* (*Leguminosae*), originated in India and is cultivated in South Europe, Northern Africa, India and Egypt. Fenugreek seeds are rich in protein, fat, total carbohydrates and other minerals (Gupta *et al.*, 1996), fatty acids predominantly linoleic, linolenic, oleic and palmitic (Schryver, 2002). Nazar and El-Tinay (2007) reported that fenugreek seeds contained 28.4% crude protein and other phytochemicals. The endosperm of the seed has high content of saponin (4.63%) and protein (43.8%) (Naidu *et al.*, 2010). Black seed (*Nigella sativa* L.) is also known as Black cumin and grows in Asian and Mediterranean countries. The seed has been experimented with laboratory rodents and reported to have many biological properties including antibacterial activity (El-Kamali *et al.*, 1998), antiviral activity (Salem and Hossain, 2010), antiparasitic (Mahmud *et al.*, 2002). A few studies with broiler chickens showed the combined effect of Fenugreek (*Trigonella foenum graecum*) oil and Black seed (*Nigella sativa* L.) oil on blood profile of the broiler chickens.

MATERIALS AND METHODS

Experimental Site

The experiment was carried out at the Poultry Unit of the Teaching and Research Farm of Ladoko Akintola University of Technology, Ogbomosho, Oyo State in the derived savanna zone of Nigeria.

Procurement of Test Ingredient and Preparation of Experimental Diets

Fenugreek oil (FGO) and Black seed oil (BSO) was purchased from a local market in Ogbomosho, Oyo State and supplemented in the diets directly without any further processing. Five experimental diets were formulated from commercial feed (Adva starter). The diets were supplemented with Fenugreek oil (FGO) and Black seed oil (BSO), such that diets 3, 4 and 5 were supplemented at ratio of 10:10, 10:20 and 20:10ml/kg FGO and BSO respectively. Diet 1 and 2 rendered as the positive and negative control with no FGO and BSO supplementation.

Experimental animal, Design and management

Two hundred (200) unsexed day-old broiler chicks were purchased from reputable hatchery in Oyo State for the experiment. The chicks were weighed individually on arrival and randomly allocated to five dietary treatments in

a Completely Randomized Design Experiment (CRD). Each treatment was replicated four times with ten birds per replicate. Feed and water were given *ad libitum*. Other management practices and vaccination programs were strictly adhered to.

Table 1: Gross composition of experimental diets for broiler starter chickens

Treatment	T1	T2	T3	T4	T5
Level of supplementation of fenugreek oil and black seed oil (ml/kg diet)	0:0	0:0	10:10	10:20	20:10
Calculated nutrient composition					
Protein		22%			
Fat		5%			
Crude fibre		5%			
Calcium		0.85%			
Available phosphorus		0.4%			
Metabolizable energy		3000kcal/Kg			
Lysine		1.1%			
Methionine		0.5%			

Data collection

Blood sample collection

At the end of week four, two birds were randomly chosen from each replicate. Blood samples were collected from their jugular vein. The blood samples meant for haematology were collected into the Ethelene Diamine Tetra Acetic Acid (EDTA) bottles while those meant for the serum indices were collected into EDTA-free bottles. Blood samples were analyzed according to Dacie and Lewis (1991). The Haematology parameters analysed included, Red blood cell (RBC), White blood cell (WBC), Packed cell volume (PCV), Platelets, Hemoglobin and Lymphocytes while serum indices parameters were, Albumin, Globulin, Total protein, Cholesterol, Urea, Creatinine, Alkaline Phosphatase (ALP), Alanine transaminoferase (ALT) and Aspartate transaminoferase (AST).

Data Analysis

Data generated from the experiment were subjected to one way analysis of variance (ANOVA) using the general linear model of SAS 2007) while the significant means among the treatments were separated using Duncan's Multiple Range Test of the same statistical package at 5% significant level.

RESULTS AND DISCUSSION

The results of haematological parameters of broiler starter chickens fed diets supplemented with fenugreek oil and black seed oil is shown in Table 2. Results obtained showed that all parameters measured were significant ($P < 0.05$) different except white blood cell, platelet and monocytes. Packed cell volume (PCV), Red blood cell (RBC) and haemoglobin (Hb) were higher in birds fed diet containing fenugreek and black seed oil at ratio of 10:10 than their control counterparts, lower ($P > 0.05$) value was recorded in those birds placed on 20:10 of fenugreek and black seed oil. Contradictory results was reported by Sohail *et al.*, (2012), who observed significant differences in Packed cell volume (PCV), Red blood cell (RBC) and haemoglobin (Hb) concentration respectively. Lymphocyte decreased in birds treated with black seed and fenugreek oil, higher ($P < 0.05$) value was recorded in both control groups and vice versa for the heterocytes. Treatment which received 20:10 fenugreek and black seed oil had highest significant ($P < 0.05$) value for eosinophil.

Table 2: Haematological parameters of broiler starter chickens fed diet with fenugreek (*Trigonella foenum graecum*) oil and black seed (*Nigella sativa* L.) oil

Parameters	T1 (+ve)	T2 (-ve)	T3 (10:10)	T4 (10:20)	T5 (20:10)	SEM
Packed cell volume (%)	28.75 ^{ab}	29.50 ^a	29.50 ^a	28.50 ^{ab}	26.25 ^b	0.46
Red blood cell ($\times 10^3/\text{mm}^3$)	2.90 ^{ab}	3.16 ^{ab}	3.32 ^a	3.03 ^{ab}	2.70 ^b	0.17
White blood cell ($\times 10^3/\text{mm}^3$)	14837.50	151775.00	15400.00	15000.00	13987.50	204.50
Haemoglobin (g/dl)	9.35 ^{ab}	8.95 ^{ab}	9.70 ^a	8.68 ^{ab}	8.40 ^b	0.17
Platelets ($\times 10^6/\text{mm}^3$)	166250.00	180000.00	143375.00	162759.00	174500.00	7493.06
Lymphocyte (%)	71.75 ^a	67.00 ^{ab}	64.25 ^{abc}	60.00 ^{bc}	58.75 ^c	1.45
Heterocytes (%)	24.50 ^b	26.50 ^b	32.25 ^a	36.75 ^a	35.50 ^a	1.34
Monocytes (%)	3.00	3.00	2.50	2.50	2.78	0.22
Eosinophil (%)	1.25 ^b	2.25 ^{ab}	1.50 ^b	1.00 ^b	3.00 ^a	0.25

^{abc}- means in the same row bearing different superscripts differed significantly ($P < 0.05$). SEM – Standard error of mean.

Serum indices of broiler starter chickens fed diets with fenugeek oil and black seed oil is shown in Table 3. Non-significant ($P > 0.05$) differences were observed in total protein (TP) and cholesterol while other parameters were

significantly ($P<0.05$) different. This is in consistent with the result obtained by Olayeni *et al* (2024) who observed significant differences in broiler fed diets with varying inclusion levels of fenugreek powder. The observable differences in all parameters measured could be as a result of synergistic effect of the test materials, though both contained multiple constituents with antimicrobial activity including phenols, quinones, flavones, tannins, terpenoids, and alkaloids that helps to decrease the cholesterol content in the blood serum according to Azouze *et al.* (2001).

Table 3: Serum indices of broiler starter chickens fed diets with fenugreek (*Trigonella foenum graecum*) oil and black seed (*Nigella sativa* L.) oil

Parameters	T1 (+ve)	T2 (-ve)	T3 (10:10)	T4 (10:20)	T5 (20:10)	SEM
Albumin (g/dL)	1.21 ^a	1.15 ^{ab}	1.09 ^{ab}	1.05 ^b	1.11 ^{ab}	0.02
Globulin (g/dL)	1.31 ^b	1.45 ^{ab}	1.50 ^{ab}	1.72 ^a	1.39 ^{ab}	0.06
Total protein (g/dL)	2.52	2.60	2.58	2.77	2.50	0.04
Alkaline phosphatase (1u/L)	77.97 ^{ab}	73.66 ^{bc}	70.58 ^c	79.30 ^a	75.93 ^{ab}	0.90
Aspartatransaminase (1u/L)	28.75 ^a	21.74 ^b	20.89 ^b	31.46 ^a	16.58 ^b	1.48
Cholesterol (mg/dl)	125.49	115.84	115.35	110.28	160.99	507.14
Alanine transaminase (1u/L)	16.73 ^b	24.49 ^a	20.31 ^{ab}	20.73 ^{ab}	20.97 ^{ab}	0.87
Urea	3.04 ^b	3.14 ^b	3.13 ^b	5.17 ^a	4.47 ^a	0.24
Creatinine	1.05 ^b	1.01 ^b	0.95 ^b	1.56 ^a	1.04 ^b	0.06

^{abc}- means in the same row bearing different superscripts differed significantly ($P<0.05$). SEM – Standard error of mean.

CONCLUSION

It can be concluded that dietary supplementation of fenugreek oil and black seed oil at moderate inclusion level (i.e 10:10ml/kg) enhances Packed cell volume, Haemoglobin and Red blood cell, supporting better oxygen transport and overall health while serum profile at 10:20ml/kg could be assumed as optimum level to maintain good health status of broiler chicken.

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