Research paper

Effect of flaxseed powder supplementation on haematological and serum biochemical profiles of Giriraja birds

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ABSTRACT

The experiment was conducted at Department of Animal Husbandry and Dairy Science, Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtrato determineflaxseed powder supplementation on the haemato-biochemical parameters of Giriraja birds. A total of 140 one-day-old Giriraja chicks were individually weighed and randomly assigned to five treatments, each with 4 replicate pens of 28 chicks. The dietary treatments included were T_0: Control (basal ration), T_1: basal ration + 2 per cent flaxseed powder, T_2: basal ration + 3 per cent flaxseed powder, T_3: basal ration + 4 per cent flaxseed powder and T_4: basal ration + 5 per cent flaxseed powder. The results of the experiment revealed that incorporation of 5 per cent flaxseed powder in Giriraja bird as feed additive significantly improved haemtological parameters *viz.* Hb (8.60 mg/dl), RBC (2.501 10^6/mm^3), WBC (22165.5cell/mm^3) and PCV (32.35 %)and biochemical traits *i.e.*Cholesterol (93.92 mg/dl),HDL (53.50 mg/dl), LDL (42.57 mg/dl), VLDL (19.11 mg/dl) and Triglycerides (95.50 mg/dl) as compared with control group. The study concluded that 5.0 per cent of flaxseed powder more beneficial for maintaining blood haematological and serum Biochemical profile. Therefore, it may be recommended that incorporation of flaxseed powder in the basal diet of Giriraja birds improved their physiological status.

Keywords: Flaxseed Powder, Haematological and biochemical profile, Giriraja

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INTRODUCTION

Poultry has a crucial place in India, as the eggs and chicken meat are important and rich sources of protein, vitamins and minerals. Poultry provides rich organic manure and is an important source of income and employment to millions of farmers and other persons engaged in allied activities in the poultry industry. Chicken is the most widely accepted meat in India (Shunthwal *et al.,* 2017). Flaxseed contains high amounts of α-linolenic acid (52% of the total fatty acids), an essential fatty acid, making flaxseed a unique oilseed crop for oil production as well as for incorporation in foods (Beheshti *et al.,* 2017). Flaxseed is a good source of protein, oil, and α-linolenic acid, so it can be used for enrichments of poultry meat and eggs (Leeson and Summers, 2005). Due to anti collection of blood samples anti nutritional factors (ANF) present in flaxseed [non-starch poly saccharides (NSPs), cyanogenic glycosides, trypsin inhibitors, mucilages, linatine dipeptide (a vitamin B^6 antagonist), and phytic acid], flaxseed has been shown to adversely affect broiler performance (Hernandez, 2013). These ANF and NSPs are associated with increasing intestinal viscosity, reducing litter quality, and poor growth performance in broiler birds (Hall *et al.,* 2006). Therefore, present experiment is planned to determine flaxseed powder supplementation on the haemato-biochemical parameters of Giriraja birds

MATERIAL AND METHODS

The experiment was conducted at Poultry Unit, Department of Animal Husbandry and Dairy Science, Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli to evaluate the Effect of flaxseed powder supplementation on the haemato-biochemical parameters of Giriraja birds. For conducting the trial 140 Giriraja chicks were procured from Central Poultry Development Organization, Mumbai. On arrival, the chicks were weighed individually and randomly divided into five treatments *viz.* T_0: Control (basal ration), T_1: basal ration + 2 per cent flaxseed powder, T_2: basal ration + 3 per cent flaxseed powder, T_3: basal ration + 4 per cent flaxseed powder and T_4: basal ration + 5 per cent flaxseed powder with four replications of 28 chicks in each treatment and seven chicks in each replication. Before arrival of Giriraja chicks the pens, waterer (drinker), feeders, brooders floor were cleaned, washed, disinfected, and fumigated. First four weeks, all the experimental chicks were reared on deep litter system of rearing for brooding purpose. After that, chicks were allocated as per treatment wise up to 12 weeks of age.At the end of the experiment 1 bird per replication (4 birds per treatment) were selected randomly to collect blood sample in EDTA containing test tubes (1mg EDTAml-1 of blood) by wing veins. These anti-coagulated blood samples were subjected to determine hemoglobin (Campbell, 1995), LDL (Friedewald *et al.,* 1972), HDL

Table 1: Chemical composition of feed (% DM basis)

Parameters	Chick crumbles(%)	Grower crumbles (%)	Flaxseed powder (%)
Dry matter	88.00	88.00	93.04
Crude protein	19.00	18.00	18.00
Crude fat	4.00	4.00	42.00
Crude fiber	6.00	5.00	9.50
Nitrogen free extract	69.00	68.50	27.00
Total ash	4.00	4.50	3.50
Moisture	12.00	12.00	6.96

(Richmond, 1973) and cholesterol and triglycerides (Godkar, 1994). The data were analyzed using one way analysis of variance for testing the significance (Snedecor and Cochran, 1994) of various parameters for different treatment groups.

RESULTS AND DISCUSSION

Chemical Composition of Experimental Feed: The ingredients and chemical composition of basal ration has been presented in Table 1. Flaxseed powder used in present investigation contained 93.04, 18.00, 42, 9.5, 27 and 3.5 per cent of dry matter, crude protein, crude fat, crude fiber, nitrogen free extract and total ash, respectively. The findings of the chemical composition of flaxseed comparable with Shobha (2013) who recorded as 95.5, 19.8, 3.6 and 5.2 of dry matter, crude protein, ash, and crude fiber in flaxseed powder, respectively. Similar, findings were recorded by Khan *et al.* (2009). They reported crude protein, ether extract, crude fiber, ash and nitrogen free extract as 24.18, 37.77, 4.78, 3.50 and 25.86 per cent, respectively in flaxseed powder.

Haemato-Biochemical Parameters

Haemoglobin (mg/dl): The effect of flaxseed powder supplementation on the average haemoglobin values (mg/dl) are presented in Table 2. The total Haemoglobin was significantly higher (P<0.05) in T_4 (8.6 mg/dl) than T_3 (8.4 mg/dl), T_2 (8.1 mg/dl), T_1 (8.0 mg/dl), and T_0 (7.9 mg/dl). The results of the present experiment are agreement with Al-Daraji *et al.* (2010). They observed that flaxseed group had a highest (P<0.05) means of haemoglobin concentration followed by the values of corn oil and fish oil group. However, Al-Zuhairy and Taher, (2014) recorded non-significant differences in Hb concentration between control and treatment groups.

Red Blood Cell count (10^6/mm^3): The effect of flaxseed powder supplementation on the average Red Blood Cell count (10^6/mm^3) are presented in Table 2. From the results revealed that the RBC count significantly higher in T_4 (2.501 10^6/mm^3) followed by T_3 (2.10310^6/mm^3), T_2 (2.06010^6/mm^3), T_1 (2.03010^6/mm^3) and T_0 (2.00110^6/mm^3). The findings of the present experiment are agreement with Al-Zuhairy and Taher, (2014), who recorded significantly increase in RBC count. Similar, results also recorded by Al-Daraji *et al.* (2010). They observed higher (P<0.05) value of RBC count fed flaxseed.

White Blood Cell count: The effect of flaxseed powder supplementation on the average White Blood Cell count (cell/mm^3) are presented in Table 2. From the results revealed that the White Blood Cell count significantly higher in T_4 (22165.5cell/mm^3) followed by T_3 (17733.6 cell/mm^3), T_2 (15400.2 cell/mm^3), T_1 (13298.9 cell/mm^3) and T_0 (8851.3 cell/mm^3). The results of the present experiment are agreement with Al-Zuhairy and Taher, (2014) who recorded significantly increase of WBC count. Similar, results also recorded by Al-Daraji *et al.* (2010). They observed that flaxseed group had a highest (P<0.05) value of WBC count followed by the values of corn oil and fish oil group.

Table 2: Effect of linseed powder Supplementation on Haematological parameters of Giriraja birds

Treatments	Hb (mg/dl)	RBC (10^6/mm^3)	WBC (cell/mm^3)	PCV (%)
T_0 (Control diet or basal ration)	7.9^e	2.001^e	8851.3^e	27.17^e
T_1 (Basal ration + 2 per cent flaxseed powder)	8.0^d	2.030^d	13298.9^d	28.30^d
T_2 (Basal ration + 3 per cent flaxseed powder)	8.1^c	2.060^c	15400.2^c	29.32^c
T_3 (Basal ration + 4 per cent flaxseed powder)	8.4^b	2.103^b	17733.6^b	30.65^b
T_4 (Basal ration + 5 per cent flaxseed powder)	8.6^a	2.501^a	22165.5^a	32.35^a
SEd ± 0.08	0.52	0.53	0.18	
C.D. @ 5 per cent	0.19	1.12	1.14	0.38

abcde means with different superscripts differed significantly (P<0.05)

Table 3: Effect of linseed powder supplementation on serum biochemistry parameters of Giriraja

Treatments	Cholesterol (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)	Triglycerides (mg/dl)
T_0 (Control diet or basal ration)	137.47[a]	43.50[ed]	54.95[e]	22.51[e]	112.5[e]
T_1 (Basal ration + 2 per cent flaxseed powder)	134.10[b]	49.32[d]	47.32[d]	21.76[d]	108.8[d]
T_2 (Basal ration + 3 per cent flaxseed powder)	118.77[c]	48.32[c]	47.15[c]	21.04[c]	105.2[c]
T_3 (Basal ration + 4 per cent flaxseed powder)	113.57[d]	53.22[bc]	45.60[b]	20.19[b]	100.9[b]
T_4 (Basal ration + 5 per cent flaxseed powder)	93.92[e]	53.50[a]	42.57[a]	19.11[a]	95.5[a]
SEd ±	0.57	0.75	0.29	0.09	0.47
C.D. @ 5 per cent	1.24	1.6	0.62	0.20	1.01

abcdemeans with different superscripts differed significantly (P<0.05)

Pack Cell Volume count: The effect of flaxseed powder supplementation on the averagePack Cell Volume (PCV) count are presented in Table 2. The resultsof present experiment revealed that the Pack Cell Volume count significantly higher in T_4 (32.35 %) followed by T_3 (30.65 %), T_2 (29.32 %), T_1 (28.30 %) and T_0 (27.17 %). The results of the present experiment are comparable with Al-Zuhairy and Taher, (2014). They observed significantly increment in PCV count. Similar findings also recorded by Al-Daraji *et al.* (2010).

Serum Biochemical Parameters

Serum total cholesterol: The effect of flaxseed powder supplementation on the average serum total cholesterol values (mg/dl) are presented in Table 3. The data of present experiment showed that significantly higher serum cholesterol recorded in T_0 (137.47mg/dl) followed by T_1(134.10 mg/dl), T_2 (118.77 mg/dl), T_3 (113.57 mg/dl) and T_4 (93.92 mg/dl). The results of the present study are comparable with Saleh *et al.* (2009). Similar finding also recorded by (Lopes *et al.,* 2013). They observed significant reduction in total cholesterol levels in broilers fed linseed oil based diet from 1-35 days compared to those fed from 1 to 21 days.

Serum High Density Lipoprotein Cholesterol (HDLC): The effect of flaxseed powder supplementation on the average serum high density lipoprotein cholesterol values (mg/dl) are presented in 3.From the data, it was revealed that the HDL was 43.50, 49.32, 48.32, 53.22 and 53.50 mg/dl in T_0, T_1, T_2, T_3 and T_4, respectively. However, there was significant increase in high density lipoprotein values in all groups as compared to control. This might be due to the increased level of linseed powder. The results of the present study are agreement with Alparslan and Ozdogan, (2006) who recorded improvement ($p<0.01$) in HDL cholesterol values in broilers incorporation of fish oil @ 2 or 4 per cent of diet. The present findings also agreement with Lopes *et al.* (2013). However,Safamehr *et al.* (2008) recorded reduction in LDL concentration after inclusion of fish oil.

Serum Very Low Density Lipoprotein Cholesterol (VLDLC): The effect of flaxseed powder supplementation on the average serum very low density lipoprotein cholesterol value (mg/dl) are presented in Table 3. The statistical analysis of data revealed that the average VLDL cholesterol value significantly ($p<0.05$) lower in T_4 (19.11 mg/dl) as compared to T_3 (20.19 mg/dl), T_1 (21.76 mg/dl), T_2 (21.04 mg/dl) and T_0 (22.51 mg/dl). The finding of present experiment are accordance with Lopes *et al.* (2013). Who reported that addition of linseed oil decrease VLDL cholesterol (19.06 mg/dl) than control (21.78 mg/dl).

Serum triglyceride: The effect of flaxseed powder supplementation on the average serum triglyceride values (mg/dl) are presented in Table 3.The results of present experiment showed that significantly lower value of serum triglyceride in T_4 (95.50 mg/dl) followed by T_3 (100.90 mg/dl), T_1 (108.80 mg/dl), T_2 (105.2 mg/dl) andT_0(112.50 mg/dl). The findings of the present study are agreement with Saleh *et al.* (2009). Similar, finding also recorded by Lopes *et al.* (2013). They observed significant reduction in plasma triglyceride in broilers fed linseed oil based diet from 1 to 35 days compared to those fed from 121 days.

CONCLUSION

The finding of experiment showed that inclusion of 5.0 per cent flaxseed powder significantly improved haemato-biochmical traits *viz.,* Hb, RBC, WBC, PVC, HDL, serum cholesterol, LDL, triglyceride and VLDL. Therefore, 5.0 per cent of flaxseed powder, more beneficial for maintaining blood haemato-biochmical profile. It may be recommendedthat incorporation of flaxseed powder in the basal diet of Giriraja birds improved their physiological status.

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