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## Effect of supplementation of black cumin (*Nigella sativa*) on growth performance and haematological parameters of commercial broilers

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**ABSTRACT:** A study was conducted to find out the effect of supplementation of black cumin seeds on growth performance and haematological parameters of commercial broilers. One hundred twenty day-old broiler chicks were randomly allotted into four treatment with three replicates of ten chicks each and fed with basal diet (T<sub>1</sub>), basal diet + black cumin seeds @ 0.5%, (T<sub>2</sub>), basal diet + black cumin seeds @ 0.75%, (T<sub>3</sub>) and basal diet + black cumin seeds @ 1.0% respectively for 42 days period. At the end of the experiment on 42<sup>nd</sup> days two birds from each replicate (six birds/treatment) were randomly sacrificed for estimate of haematological parameters. The result of the experiment indicated that dietary inclusion of black cumin seeds in broiler chicken increased body weight gain, decreased feed intake and improved feed conversion ratio (FCR) significantly (P<0.05) with best performance during all the periods was noted in group supplemented with 0.5 per cent of black cumin seeds. Among haematological parameters, TEC, TLC, PCV and Hb showed significant difference among treatment groups as compared to control group. On the basis of present study it can be concluded that black cumin seeds as an additive to broiler chicken feed @ 0.5-1.0 percent level may be recommended to improve the growth performance and Haematological parameters in broiler chicken.

**Key words:** Black cumin seeds, FCR, growth performance, haematological parameters

Commercial additives of plant origin like herbs and various plant extracts are considered to be a natural product in which consumers would have received an increased attention as possible antibiotic growth promoter replacement and improved broiler performance (Hernandez *et al.*, 2004). India is rich source of medicinal plants and a number of plant extracts are being used to produce organic egg and meat, improved production performance, anti-oxidant and protect poultry health etc. Many studies have been carried out on using additives including useful herbs and some medicinal plant seeds as alternatives to antibiotics, which directly or indirectly effects intestinal microflora in poultry products (Taylor, 2001). Black cumin one of such plant having a great medicinal potential is widely used throughout the world. Beneficial effects of black cumin seeds supplementation in animal and human being have been studied. It had been used as a natural medication for a lot of diseases for over 2000 years. Black cumin seeds can reduce triglycerides, LDL and total cholesterol while raises

HDL cholesterol (Ali and Blunden, 2003). Black cumin seeds contain high nutrient content as dry matter 93.03 per cent, crude protein 24.00 per cent, crude fiber 11.00 per cent and nitrogen free extract 38.10 per cent. The seeds of black cumin have antibacterial activity. However, their use in poultry is limited. Therefore, considering the above points the present study was undertaken to determine the effect of supplementation of black cumin seeds on growth and hematological parameters of commercial broilers.

## MATERIALS AND METHODS

The present study was conducted during 2017-18 at Instructional Poultry Farm, Nagla, of G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, with prior approval of Institute Animal Ethical Committee. One hundred twenty day-old broiler chicks belonging to same hatch were randomly divided into four treatment groups T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> respectively with three

replicates each having ten chicks per replicate. The  $T_1$  treatment was considered as control group in which no supplement was added to basal diet, while in treatment  $T_2$ ,  $T_3$  and  $T_4$  group black cumin seeds supplement was provided through feed at different concentration i.e. 0.5%, 0.75% and 1.0 % respectively. Standard feeding and all management practices were followed during experimental period. The treatment means - compared by critical difference and analysis of variance, weekly body weight gain and weekly FCR to access the effect of black cumin seeds supplementation on growth performance of broiler chicks. For estimation of haematological parameters at the end of experiment on day 42<sup>nd</sup> blood was collected at the time of slaughtering the experimental birds. Approximately 6ml blood was collected from 6 broiler birds of each replicate with the aid of needle and syringe and transferred immediately into a set of sterile plastic tubes with or without anti-coagulant for haematological test. The test tube were held in slanting position for serum separation and further centrifuged to get clean non-haemolysed sera and then preserved under deep-freezing in capped vials for further analysis. Haematological parameters viz., Haemoglobin (Hb), Total Erythrocytes Count (TEC), Total Leucocytes counts (TLC), packed cell volume (PCV), Mean Corpuscular Volume (MCV) and mean Corpuscular Haemoglobin (MCH) were analyzed with the automated haematology analyzer MS45 blood cell counter. The data were statistically analyzed using randomized design as described by (Snedecor and Cochran, 1994). All the data were subjected to ANOVA using the General Linear Model procedure of SAS software (SAS Institute, 2003). The treatment means were compared by Duncan's multiple range tests (DMRT) as modified by Kramer (1956).

## RESULTS AND DISCUSSION

**Growth performance:** The result of body weight gain feed intake and feed conversion efficiency are presented in Table 1.

During starter, finisher and overall period the average body weight gain was significantly higher

in ( $T_4$ ) group as compared to control and other treated groups. During starter period, the average body weight gain was maximum in ( $T_4$ ) group ( $712.29 \pm 0.77$ g) which was statistically ( $P > 0.05$ ) similar to ( $T_3$ ) group. However, the average weight gain was minimum ( $694.88 \pm 0.63$ g) in the control group. During finisher and overall period ( $T_4$ ) group showed significantly ( $P < 0.05$ ) higher weight gain as compared to control and other treated groups. (Al-Beitwaia and El Ghousein (2008), Ismail (2011), Khalaji *et al.* (2011), and Islamet *et al.* (2016) also reported an increase in body weight gain in broiler chickens supplemented black cumin seeds. The present findings indicated that maximum weight gain for overall period was noted in supplemented group with 1.00 per cent black cumin seeds and body weight gain was improved by all the levels of dietary black cumin seeds supplementation.

Feed intake results (Table 1) during starter revealed that feed intake ( $1174 \pm 3.82$  g) was significantly lower in ( $T_2$ ) group as compared to control and other supplemented groups and in ( $T_4$ ) group it was significantly ( $P < 0.05$ ) higher ( $1230.3 \pm 0.40$  g). During Finisher and overall period the feed intake in ( $T_4$ ) group was significantly higher as compared to control and other treated groups. In present study the feed intake of supplemented group with black cumin seeds was higher than control. Durrani *et al.* (2007) reported higher feed intake in supplemented group of black cumin seeds in broilers.

The results of feed conversion ratio (Table 1) revealed that ( $T_2$ ) and ( $T_3$ ) groups ( $1.65 \pm 0.04$  and  $1.66 \pm 0.02$ ) respectively showed significantly ( $P < 0.05$ ) better FCR as compared to ( $T_1$ ) and ( $T_4$ ) but there was no significant difference in these two groups during starter period. During finisher and overall period ( $T_1$ ) control group showed significantly higher FCR as compared to treated groups, while ( $T_3$  and  $T_4$ ) groups had significantly ( $P > 0.05$ ) similar and ( $T_2$ ) group showed significantly ( $P < 0.05$ ) better FCR at overall period. During finisher stage there was significant difference among treated groups. The present findings regarding the effect of black cumin seeds are in accordance with the findings of Ismail (2011), Khalaji *et al.* (2011)

and Ali *et al.* (2014). Shokrollahi and Sharifi (2018) reported that supplementing at different level of black cumin significantly ( $P<0.05$ ) improved the FCR in broilers. However, in contrast to the findings of present study Nasir and Grashorn (2010) reported that black cumin had no significant ( $P<0.05$ ) effect on FCR in broilers. The findings of the present study indicated that FCR of all the supplemented groups was better than ( $T_1$ ) control group. The increase surface area of intestinal mucosa of the birds supplemented with the black cumin may be the reason for better utilization of nutrients and therefore lower feed gain ratio.

### Haematology

The results of haematological parameters of broiler chicken are presented (Table 2). There was significant difference ( $P<0.05$ ) in the haemoglobin, TEC, TLC, and PCV values among treatment groups, while MCH and MCV showed non-significant difference among treatment groups. Haemoglobin was significantly higher in

$T_4$  (12.66 g/dl) as compared to other treatment and control group. There was linear increase in haemoglobin values, maximum and significantly higher ( $p<0.05$ ) concentration was observed in  $T_4$  group, while minimum and lower concentration is observed in  $T_1$  group. The increase in haemoglobin (Hb) values in broiler chicken of supplemented group may be due to high nutrient content in black cumin seeds which favored the haemapoieses and thus increased the haemoglobin.

TEC values were significantly higher in  $T_4$  ( $2.41 \pm 0.02^{10^6}$   $\mu$ l) as compared to other treatments groups, while  $T_2$  and  $T_3$  groups had statistically ( $p>0.05$ ) similar values of TEC and minimum value was observed in control ( $T_1$ ) group. The increase in TEC values in broiler chicken of supplemented group may be due to erythropoietic action by black cumin.

TLC values ( $24.40 \pm 0.17^{10^3}$   $\mu$ l) of  $T_4$  group were significantly ( $P<0.05$ ) higher as compared to other

**Table 1: Performance of broiler chickens on diet supplemented with Black cumin seeds (Mean  $\pm$  SE)**

Variable	Periods	Dietary treatments			
		$T_1$	$T_2$	$T_3$	$T_4$
Weight gain(g)	Starter(1-3 weeks)	694.88 $\pm$ 0.63	701.23 $\pm$ 1.08	709.48C $\pm$ 1.06	712.29C $\pm$ 0.77
	Finisher(4-6 weeks)	1328.29H $\pm$ 0.29	1512.52 h $\pm$ 0.09	1517.44G $\pm$ 0.45	1524.28C $\pm$ 0.23
	Overall(1-6 weeks)	2024.17H $\pm$ 0.50	2213.74 h $\pm$ 1.00	2226.92G $\pm$ 1.50	2236.57C $\pm$ 0.56
Avg. Feed intake(g)	Starter(1-3 weeks)	1196.14 h $\pm$ 0.77	1174.18H $\pm$ 3.82	1200.14G $\pm$ h $\pm$ 0.24	1220.31C $\pm$ 0.46
	Finisher(4-6 weeks)	2770.32 $\pm$ 22.19	2740.32 $\pm$ 1.95	2741.37 $\pm$ 0.62	2779.69 $\pm$ 1.10
	Overall(1-6 weeks)	3966.46G $\pm$ h $\pm$ 22.73	3914.50H $\pm$ 5.55	3941.52 h H $\pm$ 0.55	4000.20C $\pm$ G $\pm$ 0.84
Feed conversion ratio	Starter(1-3 weeks)	1.69C $\pm$ 0.03	1.65G $\pm$ 0.04	1.66G $\pm$ 0.02	1.69C $\pm$ 0.03
	Finisher(4-6 weeks)	2.08C $\pm$ 0.05	1.81G $\pm$ 0.02	1.81G $\pm$ 0.01	1.82G $\pm$ 0.01
	Overall(1-6 weeks)	1.88C $\pm$ 0.04	1.73 $\pm$ 0.03	1.74G $\pm$ h $\pm$ 0.02	1.76G $\pm$ 0.02

Means values with different superscript within the column differ significantly ( $P<0.05$ )

**Table 2: Effect of black cumin seeds on mean haematological parameters of commercial broilers**

Parameters	Unit	Treatments			
		1	2	3	4
Hb	(g/dl)	10.89 $\pm$ 0.02	11.47 $\pm$ 0.12	11.90 $\pm$ 0.05	12.66 $\pm$ 0.132
TEC	( $10^6/\mu$ l)	2.01 $\pm$ 0.00	2.15 $\pm$ 0.03	2.21 $\pm$ 0.02	2.41 $\pm$ 0.02
TLC	( $10^3/\mu$ l)	21.53 $\pm$ 0.05	22.29 $\pm$ 0.08	23.81 $\pm$ 0.13	24.40 $\pm$ 0.17
PCV	(%)	22.60 $\pm$ 0.08	23.50 $\pm$ 0.17	24.31 $\pm$ 0.15	25.80 $\pm$ 0.04
MCV	(fl)	109.59 $\pm$ 0.02	107.10 $\pm$ 0.07	106.64 $\pm$ 0.24	105.59 $\pm$ 0.20
MCH	(Pg)	51.40 $\pm$ 0.53	53.44 $\pm$ 0.94	53.94 $\pm$ 0.64	53.93 $\pm$ 0.44

Means values with different superscripts within in the column differ significantly ( $P<0.05$ )



treatment groups while minimum value was observed in control ( $T_1$ ) group. The increase in TLC values in broiler birds of supplemented group may be due to chemical compound thymoquinone present in black cumin seeds.

The maximum and significantly ( $p < 0.05$ ) higher values ( $25.8 \pm 0.04\%$ ) of PCV were observed in  $T_4$  group as compared to other treatment groups. Black cumin supplementation in broiler chicken revealed a significant positive effect on PCV value. The increase in PCV values in broiler chicken of supplemented group may be due to nutrients and phytochemicals present in black cumin seeds (Khan *et al.*, 2012).

MCV values ( $109.59 \pm 0.02$  fl) of  $T_1$  group was significantly ( $P < 0.05$ ) higher than other treated groups, while there was no significant difference in MCH values in control and treated groups.

The present findings regarding the effect of black cumin on Hb, PCV and TEC are in accordance with the findings of Toghyani *et al.* (2010) and Khalaji *et al.* (2011) who reported that supplementing different level of black cumin seeds significantly improved the Hb, PCV and TEC while MCV and MCH values were not affected. In contrast to the present findings, Salam *et al.* (2013) reported that inclusion of black cumin seeds in broiler diets did not significantly affect leukocyte count.

## CONCLUSION

On the basis of present study it can be concluded that black cumin seeds as an additive to broiler chicken feed at 0.5-1.0 per cent level may be recommended to improve the growth performance and haematological parameters in broiler chicken.

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