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Effect of Different Levels of Feed Added Black Seed (*Nigella sativa* L.) On the Performance of Broiler Chicks

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Abstract: The study was conducted to investigate the effect of different levels of feed added black seed (*Nigella sativa* L.) on the overall performance and immunity of broiler chicks at NWFP Agricultural University, Peshawar in May 2005. Four experimental rations designated as A, B, C and D having black seed at the rate of 0, 20, 30 and 40 g kg^{-1} feed were fed to 160 broiler chicks, randomly distributed into 16 replicates, so as to have 4 replicates per group and 10 chicks per replicate. The experiment was lasted for 35 days. Average weight gain, feed consumption, feed efficiency, dressing percentage, weight of different body organs (breast, thigh, intestine), giblets (liver, gizzard), abdominal fat weight, antibody titer against ND, IB and IBD were used as criteria of response. Economics for each group was calculated at the end of experimental period. It was found that group D receiving 40 g kg^{-1} of black seed in the feed had a significant ($p<0.05$) effect on mean body weight gain, feed intake, feed conversion ratio, dressing percentage and weight of different body organs (breast and thigh). Non significant ($p>0.05$) effect was observed in gizzard, intestine, weight of abdominal fat and feed cost. Antibody titer against ND and IBD were higher in group D, however high antibody titer against IB was recorded in group C. Return per unit of feed cost and gross return were significantly ($p<0.05$) effected by group D.

Key words: Black seed, growth performance, antibody titer, cost, broilers

INTRODUCTION

Advances in chemistry and identification of plant compounds which are effective in the treatment of certain diseases have renewed the interest in herbal medicines. The World Health Organization (WHO) estimated that about 80% of the world population relies on traditional medicines for their primary health care. The black seed (*Nigella sativa* L.), belong to the family Ranunculaceae, is an annual spicy herb native to the Mediterranean regions and is now cultivated in other parts of the world including Middle East, North Africa and Asia. The black seed is a crop of great medical importance, particularly in Unani (Greek) and Ayurveda system of medicines. Recently the seeds are also used in pharmaceutical industries. It is used for edible and medicinal purposes in Pakistan, Saudi Arabia, Iran, Egypt and many other countries. Many medicinal properties have been attributed to its seed and oil including antineoplastic, antibacterial, antifungal, antihelminthic and treatment of asthma. The active components of *Nigella sativa* L. seeds are the volatile oils, thymoquinoline and dithymoquinoline, both of which have antitumor properties (Zahoor *et al*., 2004). Black seed also stimulates the immune system as shown in an experiment conducted with human lymphocyte (Vohora and Dandiya, 1992). Black seed is used for the treatment of toothache, intestinal parasites and is a valuable remedy in hepatic and digestive disorders (Sallal and Alkofahi, 1996). *Nigella sativa* L. is traditionally known in Middle Eastern countries as habbat-al-barakah, due to its powerful healing qualities. Black seed is the most famous among Muslim communities as Prophet Muhammad (PBUH) had stated Hold on to use of the black seed for it has a remedy for every illness except death. Black seed has high nutritional potential and contain 21% protein and 35.5% fat (Babayan *et al*., 1978). It contains the essential fatty acid Linoleic acid which is important for obtaining maximum body weight (Saleh-al-jassir, 1992). Keeping in view its nutritional value and numerous medicinal advantages, a research study was conducted with the objective to evaluate the effect of different levels of feed added black seed (*Nigella sativa* L.) on the overall performance, immunity and economics of broiler chicks.

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MATERIALS AND METHODS

This study was conducted at the poultry farm of NWFP Agricultural University Peshawar during winter season. The experiment was conducted in Completely Randomized Design (CRD). A total of 160 commercial day old broiler chicks were obtained from the local market and were divided into four groups A, B, C and D. Each group was further divided into four replicates having ten chicks per replicate. The birds were raised in cages in an open sided house. All the cages were located in one house to have identical environment. Each cage was provided with a feeder and drinker. All the chicks were vaccinated against NDV vaccine on day 07 (intra-ocularly) and on day 21 (drinking water). These chicks were also vaccinated against infectious bursal disease virus (IBDV) on 11th and 18th day.

Strict sanitation practices were maintained in the house before and during the course of experiment. Group B, C and D was given black seed in feed at the rate of 20, 30 and 40 g kg^{-1} of feed respectively, while group A was kept as control. Mean total body weight gain, feed intake, dressing percentage, weight of different body organs, giblets, intestine and abdominal fat were recorded. Feed Conversion Ratio (FCR) was calculated. At the end of experiment, three birds were randomly selected form each replicate, blood samples were collected and analyzed for Newcastle Disease (ND), HI antibody using the HI test described by Alexander and Chettle (1997). The serum antibody response against Infectious Bursal Disease Virus (IBDV) and Infectious Bronchitis (IB) was determined using ELISA according to the procedure described by Marquardt *et al.* (1980).

The data were statistically analyzed with the standard procedures of analysis of variance (ANOVA), using completely randomized design. Means were compared for significance of differences by least significance differences (LSD) as suggested by Steel and Torrie (1981). Computer package SAS (1998) was used to perform the data analysis.

Addition of black seed (*Nigella sativa* L.) to feed: The seeds of *Nigella sativa* L. were ground and were added to commercial broiler starter and finisher rations at the rate of 20, 30 and 40 g kg^{-1} of feed for group B, C and D, respectively. Group A was kept as control.

RESULTS AND DISCUSSION

Mean of body weight gain per chick for the four experimental groups A, B, C and D having 0, 20, 30 and 40 g black seed per kg feed is presented in Table 1. The body weight gain data when subjected to analysis of variance revealed significant ($p<0.05$) differences among the groups. Group D has significantly higher weight gain than all other groups. As evident from the observations recorded in Table 1 addition of black seed at the rate of 40 g kg^{-1} feed resulted in maximum weight gain. The results of the present study support the findings of Al-Homidan *et al.* (2002), who reported improved growth rate in broilers by supplementing 2% black seeds in the ration. Similar results have been obtained by Siddig and Abdelati (2001), Osman and Barody, (1999), Hallel *et al.* (1999) and El-Bagir *et al.* (2006).

Table 1: Mean body weight gain, Feed intake and FCR in broiler chicks fed different levels of *Nigella sativa* L. seeds

Group	*Niglla sativa* L. seed kg^{-1} feed	Mean body weight gain $chick^{-1}$	Mean feed intake $chick^{-1}$	Mean FCR $chick^{-1}$
	----------(g)----------			
A	0 (Control)	1327.25^{d}	3554.35^{a}	2.68^{a}
B	20	1421.73^{c}	3068.33^{b}	2.16^{b}
C	30	1470.15^{b}	3053.70^{bc}	2.08^{c}
D	40	1570.53^{a}	3046.15^{c}	1.93^{d}

Means in columns with different superscripts are significantly different at $\alpha = 0.05$

Mean of feed consumption per chick at the end of the experimental period was 3554.35, 3068.33, 3053.70 and 3046.15 g for group A, B, C and D respectively (Table 1). The feed consumption data when subjected to analysis of variance revealed significant ($P<0.05$) differences among the groups. Higher feed consumption was recorded in the control group as compared to all other groups. However, the higher feed consumption in the control group did not cause proportionate increase in the body weight gain, therefore, resulted in lower efficiency of feed utilization. Feed consumption was lowest in group D. However, the significant factor to be considered here is the fact that inspite of this lower feed consumption, the higher weight gain was obtained, thus resulting in most efficient feed conversion ratio. Osman and Barody (1999) also reported increased feed consumption in broilers by feeding black seeds. Similarly Hallel *et al.* (1999) reported that supplementation of ethenal essential oil from black seed influenced feed intake in broilers.

Mean feed efficiency was 2.68, 2.16, 2.08 and 1.93 for treatment A, B, C and D, respectively (Table 1). Statistical analysis revealed significantly ($p<0.05$) better feed efficiency in group D as compared to the control. Similar results have been obtained by Al-Homidan *et al.* (2002), Osman and Barody (1999), Soliman *et al.* (1999) and Halle *et al.* (1999) in broilers, Denli *et al.* (2004b), El-Ghamry *et al.* (1997) and El-Sheikh (1998) in layers, Mandour and Rody (1997) in ducklings., Abdur-Rehman and Abu-Bakar (1997) in turkey pullets and Hassanin and Hassan (1996) in rats.

Average breast and thigh weight data in response to the four experimental treatments are given in Table 2. The breast and thigh weight data when subjected to statistical analysis showed significantly ($p<0.05$) higher weight in group D as compared to all other groups. The results of the present study are supported by the findings of Al-Homidan *et al.* (2002), Siddig and Abdelati (2001), Osman and Barody, (1999), Halle *et al.* (1999) and El-Bagir *et al.* (2006).

The mean dressing percentage at the end of experimental period was 59.08, 60.84, 61.19 and 61.23 for groups A, B, C and D, respectively (Table 2). The dressing percentage data when subjected to statistical analysis showed significant ($p<0.05$) differences among the groups. Dressing percentage was significantly higher in group D as compared to the control.

Mean liver weight was significantly higher in group D as compared to all other groups (Table 3). Mean weights of gizzard, intestine and abdominal fat were not altered ($p<0.05$) for group A, B, C and D as given in Table 3. Present findings could be correlated with the findings of Hernandez *et al.* (2004) who reported no difference in the mean weight of proventiculus, gizzard, intestine and pancreas in broilers fed on two herbal plants extract. The findings of the present study are in contrast to that of Denli *et al.* (2004a) who reported that black seed oil supplementation to quails feed significantly increased intestinal weight.

Mean antibody titers against Newcastle disease virus, Infectious bursal disease virus and Infectious Bronchitis are presented in Table 4. Group D has high titer against Newcastle disease virus and Infectious bursal disease (IBD) virus as compared to other groups. Antibody titer against IB was higher in group C. Present results are in agreement with the findings of Yaseen (2003) who reported that equeous extract of black seed possess antiviral activity against Newcastle disease virus. The results of the present experiment are also in agreement with the findings of Osman and Barody (1999) and Soliman *et al.* (1999) who reported that black seed in broiler diets improved immunity. The results of the present experiment also support the findings of Salem and Hussain (2000) who reported that *Nigella sativa* L. oil possess antiviral properties. Similarly Swamy and Tan (2000) also reported that *Nigella sativa* L. oil possess immunopotentiating activities.

The average cost of feed per chick was Rs. 47.56, 48.83, 48.58 and 48.45 for groups A, B, C and D respectively (Table 5). No. significant ($p>0.05$) difference was found among wall treated groups for feed cost. Return per unit feed cost was Rs. 2.23, 2.33, 2.42 and 2.59 for group A, B, C and D respectively (Table 5) and was

Table 2: Mean weight of different body organs and dressing percentage in broiler chicks fed different levels of *Nigella sativa* L. seeds

Group	*Nigla sativa* L. seed kg^{-1} feed	Mean breast weight chick^{-1}	Mean thigh weight chick^{-1}	Mean dressing percentage chick^{-1}
		(g)		
A	0 (Control)	275.00^{d}	70.50^{b}	59.08^{d}
B	20	300.92^{c}	70.67^{b}	60.84^{c}
C	30	325.00^{b}	78.00^{a}	61.19^{b}
D	40	342.34^{a}	78.75^{a}	61.23^{a}

Means in columns with different superscripts are significantly different at $\alpha = 0.05$

Table 3: Mean giblet, intestine and abdominal fat weight in broiler chicks fed different levels of *Nigella sativa* L. seeds

Group	*Nigla sativa* L. seed kg^{-1} feed	Mean Liver weight chick^{-1}	Mean gizzard weight chick^{-1}	Mean intestine weight chick^{-1}	Mean abdominal fat weight chick^{-1}
		(g)			
A	0 (Control)	34.6^{b}	25.8	96.2	20.6
B	20	36.8^{b}	28.1	183.5	17.9
C	30	36.7^{b}	46.6	109.7	15.4
D	40	41.5^{a}	29.2	92.3	18.7

Means in columns with different superscripts are significantly different at $\alpha = 0.05$

Table 4: Antibody titer against different diseases in broiler chicks fed different levels of *Nigella sativa* L. seeds

Group	*Nigla sativa* L. seed kg^{-1} feed (g)	Antibody titer against ND	Antibody titer against IB	Antibody titer against IBD
A	0 (Control)	2.25	4.5	190.50
B	20	1.25	4.5	258.25
C	30	3.25	4.75	262.50
D	40	5.25	3.75	569.75

Table 5: Mean feed cost, return per unit feed cost and gross return chick^{-1} in broiler chicks fed different levels of *Nigella sativa* L. seeds

Group	*Nigla sativa* L. seed kg^{-1} feed (g)	Mean feed cost chick^{-1}	Mean return per unit feed cost	Mean Gross return chick^{-1}
			(Rs)	
A	0 (Control)	47.56	2.23^{d}	106.19^{d}
B	20	48.83	2.33^{c}	113.74^{c}
C	30	48.58	2.42^{b}	117.62^{b}
D	40	48.45	2.59^{a}	125.65^{a}

Means in column with different superscripts are significantly different at $\alpha = 0.05$

significantly ($p<0.05$) higher in group D. Gross return per chick was Rs. 106.19, 113.74, 117.62 and 125.65 for group A, B, C and D, respectively (Table 5). Significantly higher return of Rs. 125.65 per chick was recorded in group D. As evident from the findings there was an increase of Rs. 19.46 per chick, amounting to a significant amount of Rs. 19460 per 1000 boilers in group D as compared to the control. The higher return in group D may be due to the optimal level of *Nigella sativa* L. (40 g) in the ration, resulting in efficient feed utilization.

Findings from the present study highlight the importance that *Nigella sativa* L. seeds (black seed) at 40 g kg^{-1} feed made a significant improvement in the overall performance, immunity and economics of broiler production. Further research is needed to study its effects on meat quality and digestibility of broiler chicks and also in layers and breeders.

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