

Performance of Broiler Chicken's Fed Diets Containing Different Inclusion Levels of Black Cumin (*Nigella sativa* L.) seed powder

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Abstract

Broiler meat is one of the major protein sources in Sri Lanka. The broiler farming in Sri Lanka is becoming non-profitable among small holders mainly due to high feed cost. To utilize the feed efficiently some plant-based products are used as feed additives. Black cumin is one of the natural plant products used to improve the feed efficiency and performance of broilers. The present study was conducted to analyse the performance of broilers at different levels of black cumin diet. Three different levels of black cumin seed powder (0-control, 1, 2 and 3 g/kg feed) were included in broiler diet. Twenty five unisexed broiler chicks were randomly allocated among four treatments. The results of the study revealed that the performance parameters such as daily feed intake, average live weight, weekly weight gain, carcass weight, dressing percent and feed conversion efficiency were significantly different ($P < 0.05$) among different treatments. Feed intake (138.0 ± 4.2 g), live weight (2.3 ± 0.5 kg), weekly weight gain (211.0 ± 0.5 g), carcass weight (1.8 ± 0.8 kg), dressing percent ($77.7 \pm 6.3\%$) and feed conversion efficiency (0.58 ± 0.1) were significantly higher ($P < 0.05$) in broiler flock fed with black cumin at the rate of 1g/kg feed compared with other treatments. Further, significantly lowest ($P < 0.05$) values were recorded for all the performance parameters such as daily feed intake (132.8 ± 5.0 g), live weight (1.9 ± 0.2 kg), weight gain (158.0 ± 22.1 g), carcass weight (1.4 ± 0.4 kg) except feed conversion ratio, dressing percent and mortality in broiler flock fed with black cumin at the rate of 3g/kg feed. A zero percent mortality was observed in broiler flocks fed with black cumin at the rates of 2 and 3 g/kg feed. It was concluded that the black cumin at the rate of 1 g/kg feed have the potential of increasing the performance of broilers. However, further research related to mechanism of the action of black cumin and, its interaction with other factors of production are necessary.

Key words: Black cumin, Broiler, Feed conversion efficiency, Feed conversion ratio.

Introduction

Feed is the major component deciding the cost of production in poultry industry. Numerous efforts have been made to increase the efficiency of feed utilization and to minimize the cost of production. A range of growth promoters such as probiotics, prebiotics, enzymes, acidifiers, antioxidants and phytochemical additives have been used in the poultry industry. Antibiotics had been widely used as feed additives in the poultry industry for several decades. But it has been seriously criticized by policy makers and consumers since the development of microbial resistance to these products and the potential harm on human health.

In view of the ban on antibiotic as growth promoters, poultry scientists today are challenged to find out alternatives to synthetic growth promoters that could keep the poultry gut healthy and well balanced with normal micro flora that is recognized as a fundamental

precondition for cost efficient and environmentally sound poultry production. The use of aromatic plants and essential oils extracted from these plants are becoming more important due to their antimicrobial effects and their stimulating effect on animal digestive. Black cumin (*Nigella sativa* L) is an aromatic and annual herbaceous plant and identified as photogenic feed additive. Black cumin seed contains fats, crude fiber, minerals such as Fe, Na, Cu, Zn, P, Ca and vitamins like ascorbic acid, thiamine, niacin, pyridoxine and folic acid. Nutritionally, inclusion of black cumin seeds meal in broiler diets induces an increase in the weight gain of the birds. Many studies have been undertaken to find the efficiency of black cumin in improving performance of broilers (Guler et al., 2006; Mansoori et al., 2006) in several other countries. However in the dry zone areas of Sri Lanka no reports are available on broiler feeding with black cumin. In this context, a study was conducted to find the performance of

broilers under different level of inclusion of black cumin in broiler diets.

Materials and Methods

A study was conducted at Livestock farm, Eastern University, Sri Lanka during the period from March - June, 2012. For the trial, four different treatments were administered and replicated thrice. Twenty five broiler chicks strain (Cobb) of 21-day old were randomly allocated for each replicate. The level of black cumin powder in diets was the main testing factor. The birds in control and tested groups were fed with commercial diet standard diets. Three different levels of black cumin powder at the rate of 1g/kg feed, 2g/kg feed and 3g/kg feed were added to the standard diets. The diets and water were provided on wet ad-libitum basis. Artificial lighting was provided throughout the experimental period. Daily feed intake, balanced feed and mortality were recorded daily while body weight was recorded weekly and live weight and carcass weight were recorded at the time of slaughtering (42nd day). By using these basic parameters, weight gain and feed conversion efficiency and dressing percentage were estimated. Data collected were analyzed using SAS (Version 9.0) and Duncan Multiple Range T test were adopted to compare the means.

Results and Discussion

The results of the study revealed that the daily feed intake, average live weight, weekly weight gain, carcass weight, dressing percent, feed conversion efficiency and feed conversion ratio were significantly different ($P < 0.05$) among different treatments (Table 1). The significantly highest values ($P < 0.05$) were recorded for feed intake, average live weight, weekly weight gain, carcass weight, dressing percentage and feed conversion efficiency in broiler flock fed with black

cumin at the rate of 1g cumin/kg feed when compared with other treatments. The black cumin in general has growth promoting properties in addition to anti-bacterial and anti-viral properties. The growth promotion in broiler was very well confirmed in various studies (Ashayerizadeh et al. 2009, Mahmood et al. 2009). The positive effect of supplementation with 1g black cumin/kg feed on performance may also be due to its antimicrobial effects on the pathogenic bacteria, fungi and parasites in the digestive system and act as stimulants of trypsin and pancreatic amylase activity.

Further, significantly lowest values for feed intake, average live weight, weekly weight gain, carcass weight and feed conversion efficiency were recorded in broiler flock fed with black cumin at the rate of 3g black cumin/kg feed. The lower performance of broilers at higher level of black cumin suggests that the growth promoting property of black cumin is effective at a certain concentration. It was agreed with various other studies conducted to find the feed efficiency of broiler at different concentration of black cumin where the feed efficiency of broilers were high when broiler flock fed with 1% black cumin/kg feed (Ashayerizadeh et al., 2009; Guler et al., 2006; Al-Homidan et al. 2002).

The reason for the lowest performance of 2% and 3% black cumin treated groups compared with the 1% black cumin treated group might be due to negative effects of components such as alkaloids, saponin, volatile oils and other anti nutritional factors in black cumin. The results of the study further revealed that the feed conversion ratio was significantly higher ($p < 0.05$) in flock fed with black cumin at the rate of 3g/kg feed while it was lowest in flock fed with 1g/kg

Table 1: Effect of black cumin seed powder on broiler performance

Level of black cumin powder	Daily Feed Intake(g)	Live Weight (kg)	Weight gain (g)	Carcass weight (kg)	Dressing percent	Feed conversion efficiency (gain/feed)	Mortality (%)
0	138.0±4.2 ^a	2.3±0.5 ^a	211.0±10.2 ^a	1.8±0.8 ^a	77.7±6.3 ^a	0.58±0.1 ^a	15.0±0.0 ^a
1	133.0±3.2 ^c	2.1±0.4 ^b	180.0±19.7 ^b	1.5±0.7 ^b	73.4±3.7 ^b	0.50±0.0 ^b	0.0±0.0 ^c
2	132.8±5.0 ^d	1.9±0.2 ^c	158.0±22.1 ^d	1.4±0.4 ^c	70.8±1.2 ^c	0.45±0.1 ^d	0.0±0.0 ^c
3	134.7±2.2 ^b	2.1±0.3 ^b	178.0±15.8 ^c	1.4±0.3 ^c	67.9±2.0 ^d	0.49±0.0 ^c	14.0±0.2 ^b

feed. The lowest feed conversion ratio is beneficial to reduce the feed cost in broiler rearing.

The birds treated as control (T0) showed significantly higher value ($p < 0.05$) for dressing percent which was due to relatively highest average live weight. The zero mortality percent observed in broiler flocks fed with black cumin at the rates of 2 and 3g/kg feed indicated that the black cumin showed anti-viral and anti-bacterial property at highest level of black cumin. The results well agreed with the observation made among several other studies on the effect of black cumin on broiler.

Conclusion

Supplementation of the diets with black cumin at the rate of 1g/kg feed significantly improves the performance traits of broilers such as daily feed intake, average live weight, weekly weight gain, carcass weight, dressing percentage and feed conversion efficiency of broilers. However, the supplementation of black cumin in excess of 1g/kg feed had no additional beneficial effect on these production traits.

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