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Effect of Supplementation of *Coriandrum sativum* Seed Powder and Multienzyme on Performance of Broiler Chickens

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ABSTRACT

A study was conducted on broiler chickens to observe the effect of supplementation of coriander seed powder and multienzyme on performance traits. A feeding trial was conducted under standard feeding and management conditions with broiler starter (1-21days) and finisher (22-35 days) ration on two hundred forty day old Vencobb broiler chicks randomly divided into 4 treatment groups (T1 to T4) with four replicates of 15 chicks each. Birds were offered basal feed as per the BIS (2007). The treatment groups consisted of control group (T1) fed only with basal diet, group T2 was supplemented with 1% Coriander (*Coriandrum sativum* L.) seeds powder, group T3 with 0.05% multienzyme and group T4 with 1% Coriander (*Coriandrum sativum* L.) seeds powder and 0.05% multienzyme in basal feed. At the end of feeding trial, one bird per replicate under each treatment was randomly selected for digestion/metabolism trial. The supplementation of coriander seed powder and multienzyme showed highly significant effect ($P<0.01$) on feed consumption, crude protein digestibility and nitrogen balance. Significant ($P<0.05$) effect was observed on total body weight, body weight gain, performance index, protein efficiency ratio, feed conversion ratio, ether extract and dry matter digestibility. It can be concluded that inclusion of coriander seed powder and multienzyme @ 1.0% and 0.05% improved body weight gain, feed conversion efficiency and digestibility of nutrients in broilers.

KEYWORDS: Broiler, Coriander, Growth, Multienzyme , Performance,

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INTRODUCTION

The poultry sector of India has transformed from backyard rearing to a commercially organized, scientific and vigorous industry. The total poultry population in the country is 851.81 million in 2022 (DAHDF 2022). Chicken meat has become the most important due to its short production cycle, which permits producers to quickly increase supply. The biggest benefit of all type poultry products is that it has no religious taboo. India ranks 8th in chicken meat production in the world (Chauhan et al., 2024). The total poultry population in India is 851.81 million which is 16.81 per cent higher in number than 19th livestock census. The livestock sector contributes 4.11% of GDP and 25.6% of total agriculture GDP (DAHDF 2022).

In developing countries, average daily protein intake in human diets is well below recommended standards and poultry production is playing a major role to fill this gap. However, the poultry production in the tropics and developing countries has been challenged by the shortage and high prices of poultry feeds which make up to 60-80% of the total production cost for broilers (Khatoon et al., 2016). In the conventional production system, the use of antibiotic growth promoters (AGP) has been the cornerstone of broiler industry to enhance growth performance and stabilize the health of birds. Since 2006 ban of AGP in the European Union, the search for suitable natural alternatives with similar beneficial effects has been intensified, in order to minimize the emerging problem of microbial resistance,

alternatives to in-feed antibiotics mainly include acidifier, probiotics, prebiotics, feed enzymes, immune-modulators and herbal products/phytogenic feed additives.

Coriander *(Coriandrum sativum L.)* contains different phytochemicals such as terpinene, quercetin, and tocopherols, which may have anticancer, immune-boosting, and neuroprotective effects. It has been used in medicine for thousands of years (Nadeem et al., 2013). Certain parts of this plant, such as the leaves, flowers, seeds and fruit, possess antioxidant, diuretic, anti-diabetic, sedative, antimicrobial, anthelmintic and anti-mutagenic qualities (Pathak et al., 2011). The different phytochemicals present in coriander stimulate natural production of bile from the liver and digestive enzymes from the pancreas, enhancing overall gastrointestinal (GI) process (Mona and Shirif, 2020).

Enzymes are the biological catalyst that helps in biochemical reactions without themselves undergoing any change. Since, poultry does not produce enzymes like cellulose, xylanase, phytase etc. required to digest non starch polysaccharides and phytase (Slominski, 2011). Supplemental exogenous carbohydrate and phytase can hydrolyse non starch polysaccharides and phytate (Angel et al., 2011) in broilers diet, respectively, there by improve nutrient utilization and performance. Enzymes like xylanase, glucanase which degrade the non- starch polysaccharide, are capable of improving metabolizable energy of viscous grains, such as wheat and barley. Addition of enzyme to diets can help to eliminate the effect of anti-nutritional factor and improve the utilization of dietary energy and amino acid, resulting in improved performance of chicken. Therefore present study was conducted on broiler chickens to observe the effect of dietary supplementation of *Coriandrum sativum* seed powder and multienzyme on the growth performance, digestibility of nutrients and nitrogen balance in broiler chicken.

MATERIALS AND METHODS

Bird management and diet

The experiment was conducted on two hundred forty unsexed apparently healthy day-old Vencobb broiler chicks procured from commercial hatchery and individually weighed and pen averages were adjusted so that no significant difference among pens was realized. The chicks were divided into four treatments with four replicates and 15 chickens in each. The broiler chicks were vaccinated for Ranikhet disease (f1 strain) on 7th day and Infectious Bursal Disease (IBD) on 14th day. The Broilers were maintained under standard management practices regarding brooding, feeding and watering throughout the trial period.

The required quantity of the feed ingredients and supplements for formulations of experimental diets were procured from the local market. The Coriander seed powder and multienzyme were procured from local market. The basal feed was formulated as per the BIS, 2007. The treatment group T1 was kept as control and no additives were added in basal diet. The broiler chicks of the treatment groups T2, T3 and T4 were fed basal diet with Coriander seed powder @ 1%, basal diet with multienzyme @ 0.05% and basal diet with combination of Coriander seed powder @ 1% and multienzyme @ 0.05% in respective groups.

Table 1. Ingredients and chemical composition of experimental feeds on DM basis

Ingredient (kg/100 kg)	Broiler Starter feed (0-21 days)	Broiler Finisher feed (21-42 days)
Maize	62.01	56.1
Rice polish	-	9.0
Soyabean	32.0	24.0
Mustard deoiled cake	-	5.0
Oil	1.0	1.0
Calcium Carbonate	1.6	1.6
DCP	2.0	2.0
Lysine	0.2	0.1
Methionine	0.3	0.3
Salt	0.4	0.4
Feed additives	Quantity (per 1000 kg feed)	Quantity (per 1000 kg feed)
Toxin binder	1.5 Kg	1.5 Kg
Trace Minerals	1 Kg	1 Kg
Liver tonic	250 g	-
Vitamins mix	300 g	350 g
Enzyme	250 g	250 g
Phytase	100 g	100 g
Choline chloride	500 g	1 Kg
Sodium bicarbonate (Meetha soda)	1.0 Kg	500 g
Chemical composition (% DM basis)		
Dry Matter	90.3	89.3
Crude Protein	22.4	20.3
Ether Extract	2.4	2.5
Crude Fibre	5	5
Total Ash	6.4	6.56
Nitrogen Free Extract	63.7	65.6
Metabolizable energy(Kcal/Kg)	3012	3160

Table 2. Composition of multienzyme

S.NO.	Enzyme	Quantity per Kg
1.	Amylase	29000 IU
2.	Beta-glucanase	4, 05,000 IU
3.	Phytase	44,500 IU
4.	Lipase	31,000 IU
5.	Protease	7, 40,000 IU
6.	Cellulase	5,500 IU
7.	Pectinase	1, 01,000 IU
8.	Hemicellulase	25,000 IU

Growth and digestion trial

A feeding trial of 35 days was carried out to observe the performance of broiler chickens under different treatment diets. The performance of broiler chicken was evaluated in terms of weekly body weight gain (WBWG), Feed consumption (FC), Feed conversion ratio (FCR), Performance index (PI) and Protein efficiency ratio (PER). Live weight gain at weekly interval was calculated from difference in body weight attained between the two consecutive weeks. Weighed amount of designated type and quantities of feed were fed to the experimental chicks. The left over residue was determined to estimate the feed intake on dry matter basis. The feed conversion ratio (FCR) was calculated by dividing the cumulative feed intake by body weight gain of chicks for every week. In order to take into account the feed efficiency as well as the growth rate, Performance index was obtained for each treatment by dividing the average weight gained by the feed conversation ratio. Protein efficiency ratio was calculated by dividing the weight gain by protein consumed.

At the end of feeding trial, one bird per replicate under each treatment was randomly selected for digestion/metabolism trial for 5 days to assess the digestibility of different dietary principles and nitrogen balance. Samples of feed offered under different treatments and excreta voided were analysed for proximate principles as per AOAC (2005). The total nitrogen content of feed and excreta was determined through Kjeldahl's method using Kel plus Automatic Nitrogen Analyzer equipment.

Statistical analysis

The experimental data were subjected to statistical analysis (SPSS Ver. 24.0) using one way analysis of variance as described by Snedecor and Cochran (2004) to test for significant variation between treatment groups. Probabilities values of less than 0.05 ($P<0.05$) and 0.01 ($P<0.01$) were considered significant. Comparison of mean values was carried out by Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Feed consumption was significantly ($P<0.01$) high in coriander seed powder supplemented group than other treatment groups. The improvement in the feed intake with the addition of coriander seed could be due to essential oils and their main component, linalool, in coriander seeds. It has been reported that linalool has an appetizing effect in diets and stimulates the digestive process in animals (Cabuk et al., 2003). In agreement to this Essa et al. (2011) reported by the six week of the study that 0.5% coriander oil supplemented groups consumed significantly higher ($P<0.05$) feed than the control group. In support of present findings of multienzyme supplementation, Shahid et al. (2009) observed that feed intake during experimental period was not influenced ($P>0.05$) either by dietary Sun Flower Meal and Crude Fiber level or enzyme supplementation.

Total body weight of broiler chicken in all the treatment groups (T2, T3 and T4) were significantly ($P<0.05$) differed from control group and had higher body weight than control group. Siyag et al. (2024) also observed significantly improved body weight after supplementation of coriander seed powder @ 1, 2 and 3 per cent in the broiler diet as compared to control groups. The results of above findings are in agreement with Pourreza et al. (2007) who reported that added enzyme (xylanase) at different levels in feed significantly ($P<0.05$) improved body weight in broiler chicks. It is important to note that the increase in final live weight was not due to quantity of feed consumed but it could be due to the amount of nutrients available to the birds that were utilized. This is because feed intake was not significant in T1, T3 and T4 groups (Effiong et al., 2019).

Table 3. Effect of *Coriandrum sativum* seed powder and Multienzyme on Performance of Broiler Chickens

Attributes	Treatments				P value
	T1	T2	T3	T4	
Feed consumption (g/bird)	2625.91^{ab} ±24.273	2780.62^{b} ±30.692	2480.05^{a} ±93.957	2526.81^{a} ±36.322	0.009
Body weight (g/bird)	1310.28^{a} ±61.388	1511.87^{b} ±36.581	1524.36^{b} ±17.382	1575.75^{b} ±92.268	0.037
Body weight gain (g/bird)	1266.22^{a} ±61.390	1467.27^{b} ±35.914	1480.06^{b} ±18.338	1532.62^{b} ±92.116	0.036
Feed Conversion Ratio	2.09^{b}±0.107	1.90^{ab}±0.036	1.68^{a}±0.087	1.67^{a}±0.106	0.017
Performance Index	615.02^{a} ±58.647	775.07^{ab} ±32.491	889.58^{b} ±52.195	940.87^{b} ±113.913	0.032
Protein Efficiency Ratio	2.27^{a}±0.111	2.49^{ab}±0.048	2.83^{b}±0.132	2.87^{b}±0.182	0.018
Digestibility of dry matter (%)	68.54^{a}±5.339	74^{ab}±1.381	76.88^{b}±2.708	75.17^{b}±3.948	0.037
Digestibility of crude protein (%)	59.96^{a}±5.226	69.72^{b}±0.912	76.63^{b}±0.644	73.06^{b}±7.662	0.002
Digestibility of ether extract (%)	79.75^{a}±0.957	83.68^{b}±2.239	83.92^{b}±1.965	85.20^{b}±3.215	0.026
Nitrogen retention (g/bird)	2.43^{a}±0.376	3.01^{b}±0.058	2.84^{b}±0.091	2.76^{b}±0.035	0.009

a, b - Means superscripted with different letters within a row differ significantly from each other.

Body weight gain followed similar pattern as the body weight and was significantly (P<0.05) higher in all the treatment groups (T2, T3 and T4) than control group. In support of present finding Essa et al. (2011) reported that birds receiving 1% coriander oil (T3) had significantly (P<0.05) higher weekly weight gain than control group. Similar results were found by Tanwar et al. (2021) with aloe vera and tulsi supplementation. Swain et al. (2014) reported that body weight gain (BWG) was higher (P<0.05)) in broilers fed diet supplemented with Natuzyme @ 1.0 g or 1.5 g/kg at 3rd and 6th weeks of age than control group.

Overall higher FCR was recorded for control group which was comparable with T2. Significantly (P<0.05) lower FCR was recorded in T3 and T4 groups. Barad et al. (2016) observed that feed conversion ratio was non-significant (P>0.05) between control and coriander seeds supplemented groups but found lower FCR in coriander supplemented group. The beneficial effects of a coriander seeds on FCR are in agreement with finding of previous studies (Ahmad, 2016). Karnani et al. (2018) found similar results with supplementation of curry leaves powder. The beneficial effects of multienzyme on FCR observed are in agreement with finding of previous studies (Pourreza et al., 2007) who reported that enzyme supplementation significantly (P<0.05) improved the FCR. This may be attributed to the fact that the birds fed herbs and multienzyme utilized the nutrients more efficiently than the birds in control group.

Significantly (P<0.05) higher Performance Index was found in T3 and T4 groups which was comparable with T2 group. There was no significant difference between T1 (control) and T2 groups. In agreement to this Patel et al. (2014) reported non-significant (P>0.05) effect of fenugreek compared to control on performance index. However, author reported significant effect of garlic alone and in

combination with fenugreek on performance index of broiler chicks. Nizamuddin et al. (2013) also reported that values of PI were significantly (P<0.05) higher in dietary enzyme treated groups as compared to control. Sharma et al. (2022) found a highly significant (P<0.01) effect of supplementation of rosemary (0.5%) and multienzyme on performance index in broiler chickens.

Results for Protein efficiency ratio were similar as the results of Performance Index. Abdel-Azeem (2006) also reported that the biological feed additives especially at 0.50% (Fenugreek and Fennel) addition to broiler chicks diets significantly (P<0.05 or 0.01) improved PER values compared with those fed on the un-supplemented control diet during all the studied experimental period. Effiong et al. (2019) found that the result of protein efficiency ratio was significantly (P<0.05) higher in chicks fed feed with food grade enzyme 0.02% than the control group. Gaur et al. (2023) also found highly significant (P<0.01) effect in chicks on supplementation of amla powder (0.75%) and multienzyme.

Highly significant (P<0.01) effect on crude protein digestibility and significant effect (P<0.05) on dry matter and ether extract digestibility was observed due to supplementation of coriander and multienzyme. Hafeez et al. (2024) also found that the digestibility of crude protein and crude fat significantly improved in broilers supplemented with a 1% coriander. In agreement with the results of multienzyme, Hafeez et al. (2021) reported that the digestibility of crude protein and crude fat were significantly (P<0.01) higher in protease-treated birds compared to the control. All treatment groups (T2, T3 and T4) showed higher values for nitrogen balance as compared to control group. This result is in harmony with that reported by Meena (2015). The results of multienzyme are well supported by Omojola et al. (2014) who observed that addition of phytase to soybean meal significantly increased (P<0.05) nitrogen retention. Similarly, Alagawany et al. (2018) reported that ileal nitrogen digestibility was significantly increased with addition of mixture of enzymes.

CONCLUSION

From the finding of the present study, it can be concluded that supplementation with the coriander seed powder @ 1% and multienzyme @ 0.05% each in diet of broilers improved live body weight, weight gain and feed efficiency as compared to that of control group of broilers.

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