The Pharma Innovation Journal 2022; 11(12): 5275-5278

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(12): 5275-5278

www.thepharmajournal.com
Received: 09-09-2022
Accepted: 12-10-2022

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Effects of graded level supplementation of black pepper and coriander seed powder on haematological parameters of broilers

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Abstract
The study in text was conducted in broiler chickens with an objective to explore the inclusion of black pepper (*Piper nigrum*) and coriander (*Coriandrum sativum*) at graded levels (0.5%, 1.0% and 1.5% of black pepper; 1.0%, 2.0% and 3.0% of coriander) either alone or in combination as an alternative to antibiotic growth promoter on haematological parameters viz Hb, PCV, TEC, TLC and DLC. Total 360, day old Vencobb broiler chicks were randomly divided into 10 treatment groups (T_1-T_{10}) with three replicates of 12 chicks each. Standard feeding and management practices were followed. At the end of 42 day feeding trial, blood samples were collected from wing vein while following all aseptic precautions. Non-significant effect was observed on haematological parameters in different treatment groups as compared to control group which indicates no harmful effect of these herbal supplementation. It can be concluded that black pepper and coriander powder at 1.5% level and 3.0% level could be safely included in broiler ration as an alternative to antibiotic growth promoter.

Keywords: Broiler, black pepper, coriander, PCV, DLC

Introduction
In India, the poultry industry has undergone a major shift in structure and operation during the last two decades. This transformation has involved a sizeable investment in breeding, hatching, rearing and processing activities. With the growing awareness and advancement in various technologies, the performance and production capacity of birds has also improved with growing integrated poultry operations. Poultry meat is preferred over other meat products as it is considered more hygienic and is available throughout the year across the country at relatively lesser prices than fish/mutton. India has 1.23 billion people and the number is growing every year. Healthy food at attractive price will therefore be the issue in focus. Now a days, chicken is accepted by almost all communities and is available across the country at reasonable prices. India is one of the world's largest producer of broiler meat. Poultry farmers prefer broiler production over layers due to quick returns, smaller marketing age, less space requirement, and higher weight gains. Chicken is considered as “food items” in place of “agriculture produce”. So, safety of these food items has become a priority.

The major structure and operation shift in poultry industry has brought new diseases in animals and human beings by irrational use of antibiotics and antimicrobial growth promoters. Dietary antibiotic growth promoters have played a key role in animal and poultry production by nutrient sparing effect as they inhibit the growth of pathogenic microflora in the gastrointestinal tract. But antimicrobial resistance in zoonotic entero-pathogens including Salmonella, *Escherichia coli* (*E. coli*), and Enterococci in food animals is of special concern to human health as these bacteria are likely to transfer from the food chain to humans (Endtz *et al.*, 1991) [6].

There are a number of nontherapeutic alternatives for antibiotics such as enzymes, inorganic acids, probiotics, prebiotics and Phytogenic feed additives such as herbs and spices (Banerjee, 1998) [17]. Herbs and spices have received substantial attention as a phytogenic/phytobiotic alternative to antibiotic growth promoters because of their antibacterial, coccidiostatic, anthelmintic antioxidant, anti-inflammatory potential, digestive stimulant, immune-stimulants, hypo-cholesterolemic, growth promoting properties (Eevuri and Putturu, 2013) [4]. When more than one herbs are combines it is commonly called ‘polyherbal’ which has attracted worldwide prominence due to its vast range of medicinal properties like antibacterial, antiviral, antifungal, antiprotozoal, hepato-protective and various beneficial properties without any adverse effects

(Kale *et al*., 2003, Chowdhury *et al*., 2009) [8, 2]. Herbs or the botanicals influence a favorable stimulation of the eubiosis of the gut.

Coriander (*Coriandrum sativum* L.) is a culinary and medicinal plant of economic importance since it has been used as flavouring agent in food products, perfumes and cosmetics. The major compounds present in essential oil are linalool (67.70%); α-pinene (10.5%); γ-terpinene (9.0%); geranyl acetate (4.0%); camphor (3.0%); and geraniol (1.9%) (H. Hossein and M. Mohammad, 2000). Powdered seeds or dry extract, tea, tincture have been recommended for dyspeptic complaints, loss of appetite, convulsion, insomnia and anxiety (Emamghoreishi *et al*. 2005) [18]. The essential oils and various extracts from coriander have been shown to possess antibacterial (Burt, 2004, Kubo *et al*., 2004) [19, 20], antioxidant (Wangensteen *et al*. 2004) [21], antidiabetic (Gallagher *et al*. 2003) [22], anticancerous, hypolipidemic, antimutagenic (Chithra & Leelamma, 2000) [23] and antimicrobial (Delaquis *et al*., 2002; Singh *et al*., 2002 & Elgayyar *et al*., 2001) [3, 14, 5] activities. Coriander has been used extensively in folk medicine for its antimicrobial, antianxiety, analgesic, anticonvulsant, carminative, antifertility, antiasthamatic and insulin like activity.

Black pepper (*Piper nigrum*) is a flowering vine cultivated for its fruit, which is usually dried and used as a spice and seasoning (Moorthy *et al*., 2009) [24]. Therapeutic efficiency of pepper is due to its compound: piperine, pipridine, curcumin, piperic acid, beta-pinene, cupsisin and cupsantine. Piperine is one of the compounds of black pepper with strong catalase activity which allay rheumatic ache (Mahady *et al*., 2008) [11]. Black pepper (*P. nigrum* Linn) was found to be rich in glutathione peroxidase and glucose-6-phosphate dehydrogenase (Karthikeyan and Rani, 2003) [9]. It has been shown that piperine can dramatically increase absorption of selenium, vit. B complex, beta carotene and curcumin as well as other nutrients (Khalaf, 2008) [10]. Piperine enhances the thermogenesis of lipid and accelerates (Malini *et al*., 1999) [12] energy metabolism in the body and also increases the serotonin and beta–endorphin production in the brain. Hence, the present study was conducted for the evaluation of the effect of Black pepper (*Piper nigrum*) and Coriander (*Coriandrum sativum*) as phytochemical feed additives on the hematobiochemical and carcass characteristics of broiler chicks.

Materials and Methods

The experiment was carried out on 360-one day old Vencobb-400 broilers chicks divided into ten treatment groups, with three replicates having 12 chicks each in a completely randomized design. In 42 days feeding trial all routine management practices were followed in respect to brooding, feeding, watering, bedding and vaccination. Commercially available readymade broiler starter and broiler finisher rations were procured and supplemented with black pepper and coriander as following:

Treatment Groups

Treatment Groups	
T1	Basal diet (Control)
T2	Basal diet +Black pepper at 0.50% level
T3	Basal diet + Black pepper at 1% level
T4	Basal diet +Black pepper at 1.5% level
T5	Basal diet + Coriander at 1% level
T6	Basal diet + Coriander at 2% level
T7	Basal diet + Coriander at 3% level
T8	Basal diet +Black pepper at 0.25% level + Coriander at 0.50% level
T9	Basal diet +Black pepper at 0.50% level + Coriander at 1% level
T10	Basal diet +Black pepper at 0.75% level + Coriander at 1.5% level

The experimental feed was analyzed for proximate constituents by procedures of AOAC (2016) [25] and presented in Table 1.

Table 1: Chemical composition of broiler starter, broiler finisher black pepper and coriander (%DM basis)

S. No.	Chemical composition	Broiler Starter	Broiler Finisher	Black pepper	Coriander
1	Dry matter	92.06	91.82	94.25	87.60
2	Crude protein	22.60	20.80	20.90	15.20
3	Ether extract	3.90	4.16	22.60	21.10
4	Crude fibre	3.95	4.30	37.50	32.60
5	Total ash	6.75	6.30	4.94	8.50
6	Nitrogen free extract	62.80	64.44	14.06	22.60
7	Acid insoluble ash	1.30	1.32	1.40	1.38
8	NDF	9.68	10.10	10.20	9.90
9	ADF	3.40	3.50	3.25	3.40
10	Calcium	1.13	0.90	0.35	0.20
11	Phosphorus	1.20	0.95	0.40	0.10
12	ME(Kcal/kg of feed)	2960	3100	-	-

Blood was collected at 42nd day from wing vein for the estimation of different haematological parameters. Half of the blood was transferred in vacutainer tubes containing ethylenediamine tetra acetic acid (EDTA) for estimation of blood haemoglobin, erythrogram and leucogram. The remaining blood samples were transferred to non-EDTA tubes for serum separation. Subsequently, the serum was harvested through centrifugation of sample at 3000 rpm for 15 min and stored at -20 °C until further analysis. All the parameters of blood and serum were estimated in TVCC laboratory, CVAS, Bikaner. Haemoglobin and PCV were determined by Sahli-Hellige Haemoglobinometer and Micro-Haematocrit method, respectively. Differential leucocyte count (DLC) was carried out as per the standard method described by Jain (1986) [7]. Total erythrocyte count (TEC) and total leukocytes count (TLC) were carried out manually through haemocytometer as per standard method of Benjamin (1978) [1]. The serum samples were analysed for albumin (ALB), globulin, total

protein (TP), glucose, triglyceride and cholesterol by the Vet Test Chemistry Analyzer using kit supplied by Idexx laboratories, as per the manufacturer's subscribed procedure. Statistical analysis was performed according to the method described by Snedecor and Cochran (1994) [15] and results will be interpreted.

Results and Discussion

The statistical analysis of data revealed non-significant effect on hematological parameters viz Hb (g/dl), PCV (%), TEC (10^6cumm), TEC (10^6cumm) and DLC. Hematological parameters were statistically comparable among different treatment groups and control group. the present findings are in line with Nath *et al.*, (2012) [13[] who determined the efficacy of Tulsi (*Vitex negundo*) leaves, black pepper (*Piper nigrum*) and cloves (*Curcuma longa*) extract (TBC extract) as a growth promoter in broiler chicks and observed no significant change in the hematological parameters (TEC, PCV, Hb and ESR) on supplementation of TBC extract. However, Singh *et al.*, (2018) [16] studied the effect of supplementation of black pepper powder (BP) as phytogenic alternative to antibiotic growth promoters in broiler chicks and revealed that inclusion of black pepper powder at 0.5% level improved the haemoglobin concentration.

Table 2: Effect of supplementation of black pepper and coriander on haemoglobin and erythrogram

Treatment groups	Hb (g/ml)	PCV (%)	TEC (10^6/cumm)
T_1	10.8	27.86	2.57
T_2	11.22	29.00	3.10
T_3	10.29	29.17	3.12
T_4	10.93	28.84	3.11
T_5	11.64	31.34	3.2
T_6	11.21	30.00	3.21
T_7	11.34	30.00	2.80
T_8	11.92	30.84	2.65
T_9	12.28	30.84	3.20
T_{10}	12.12	31.00	3.41
SEM	0.679948	0.782113	0.055

Table 3: Effect of supplementation of black pepper and coriander on leucogram (TLC & DLC)

Treatment groups	TLC (10^3/cumm)	Lymphocyte (%)	Monocyte (%)	Heterophils (%)	Eosinophils (%)	Basophils (%)
T_1	24.43	63.61	5.12	26.04	2.14	2.15
T_2	25.67	65.66	5.08	23.93	2.17	2.15
T_3	26.24	65.27	5.09	24.76	2.14	2.21
T_4	24.80	65.24	5.06	24.55	2.12	2.12
T_5	26.14	64.94	5.03	24.34	2.11	2.14
T_6	25.35	66.74	5.16	25.69	2.1	2.12
T_7	25.16	65.29	5.08	25.86	2.2	2.15
T_8	26.76	65.43	5.15	25.53	2.16	2.14
T_9	25.44	65.79	5.09	24.68	2.18	2.12
T_{10}	25.32	66.09	5.1	25.74	2.13	2.17
SEM	0.376863	0.621334	0.027287	0.560212	0.042869	0.036732

Conclusion

For better meat production, herbal products or phytogenic feed additives in poultry have received higher consideration. An attempt was made to evaluate any harmful effect black pepper and coriander powder alone or in combination to broilers. In our study, it was observed that the supplementation of phytogenic additives have non-significant effect in different treatment groups as compared to control and can be safely used as an alternative to antibiotic growth promoter. Further, replication of feeding experiments at large scale is recommended before reaching to final recommendation before incorporation in broiler industry.

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