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Evaluation of Dietary Supplementation of Ajwain on the Hematological and Economical Parameters of Pratapdhan Chickens

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A B S T R A C T

The present experiment was conducted to investigate the effect of dietary supplementation of Ajwain on the hematological response and economical parameter/benefit cost ratio of Pratapdhan chickens. An experiment was conducted on 120 unsexed Pratapdhan chicks (day old) randomly design in 4 treatment groups with 3 replicates, each consisting of 10 chicks. Three treatment groups were as follows – T_1: Basal diet as per BIS standards 2007; T_2: Basal diet as per BIS standards 2007 supplemented with 0.1% Ajwain; T_3: Basal diet as per BIS standards 2007 supplemented with 0.2% Ajwain; and T_4: Basal diet as per BIS standards 2007 supplemented with 0.3% Ajwain. The chicks were kept under uniform managemental conditions on deep litter system from day 0 up to 8th weeks of age. Among the hematological parameters, Hb found highest in T_3 (11.9 ±0.57) followed by T_2 (11.47±0.38), T_4 (11.37±0.21) and T_1 (10.50±0.36), PCV found highest in T_4 (40.45±0.11) followed by T_3 (40.18±0.07), T_2 (39.40±0.13) and T_1 (37.63±0.54), TEC found better in T_3 (11.9 ±0.57) followed by T_2 (11.47±0.38), T_4 (11.37±0.21) and T_1 (2.0±0.36), TLC found better in T_3 (28.02 ±0.03) followed by T_4 (28.01±0.04), T_2 (27.66±0.10) and T_1 (26.08±0.06). The highest Benefit cost ratio (1.85) was observed in T_3 groups followed by T_2 (1.78), T_1 (1.70), and T_4 (1.67). On the basis of the result of the present study, it is concluded that dietary addition of Ajwain at the 0.2 % level was found beneficial in improving hematological profile. It can also be concluded that Ajwain can be used as efficient, effective and economical alternative to chemical growth promoters in poultry industry.

Introduction

The broiler industry has gained an incredible growth over the past few decades in commercial poultry production. The broiler meat is easily available, cost effective and a good source of animal origin protein without any social tabbo (Sarkar *et al.,* 2008). Feed is

the major part of total prices of poultry venture as 80 % of the entire expenditure is on the procurement of feed. Feed additives are a group of nutrient and non-nutrient compounds which helps in raising the potency of feed utilization and therefore reducing the high cost of feed. Since long time, antibiotics growth promoter in animal feeds had positive impact on feed conversion efficiency and growth performance of chicken. However, the inclusion of those feed additives will increase not only the cost of production, however additionally increases the development of resistant microbes, produces residues in meat and eggs and alter the natural gut microbiota (Sojoudi *et al.*, 2012; Yang *et al.*, 2009). As a result, to replace them without adversely poignant the performance of birds, natural growth promoters like probiotics, probiotics, synbiotics, enzymes, plant extracts, etc., can be used to feed the broilers. Kabir, 2009 reported that the antibiotic ban, increasing the prevalence of resistance in poultry industry. Therefore, there is a paradigm shift from chemical growth promoter to phytogenic growth promoters.

In the last decade, herbal feed additives have attracted the attention of scientists as useful resource for improving productivity. Herbs could be expected to serve as feed additives due to their suitability and preference, reduced risk of toxicity, no residues in meat, lower cost of production, minimum health hazards and environmental friendliness (Devegowda, 1996). Further, the phenols and other active ingredients of herbs help in reducing the parasite load which affects health and performance of poultry (Akhtar *et al.*, 1984). Ajwain (*Trachyspermum ammi* L.) is an aromatic, grassy and annual medicinal plant belonging to Apiaceae (Umbelliferae) family. The Rajasthan, Gujarat and Madhya Pradesh are main Ajwain growing states in India. Ajwain is highly esteemed as a remedial agent for flatulence, flatulent colic, atonic dyspepsia, diarrhoea - in short, as a digestive aid and also as an antiseptic (Bentely and Wrimen, 1999). Ajwain, is reported to have platelet aggregation inhibitory action (Srivastava, 1988), antifungal potency (Dwivedi and Dubey, 1993) and blood pressure lowering action (Aftab *et al.*, 1995). Keeping in view the facts stated above, the present study was planned to study the effect of Ajwain supplementation in poultry diet on the haematological parameters and benefit cost ratio Pratapdhan breed of chicken.

Materials and Methods

The experiment was conducted at Poultry farm, S.K.N. College of Agriculture, Jobner District Jaipur, (Rajasthan, India). Geographically Jobner is located 45.0 km west of Jaipur at $26^0$05' North latitude, $75^0$28' East longitude and at an altitude of 427 meter above the mean sea level. The area falls in agro-climatic zone III–A (Semi-arid eastern plain zone of Rajasthan). The 120 chicks (day old) of Pratapdhan breed of chicken were procured from the project "Aangan me Murgi palan", funded by R.K.V.Y. (Rashtriya Krishi Vikas Yojana) running in the department of Livestock Production Management at Sri Karan Narendra College of Agriculture, Jobner. The chicks were randomly distributed over four treatment groups each having 30 chicks. Each of the treatment was replicated three times, with ten birds per replicate in a Completely Randomized Design (CRD). Good quality Ajwain seed was purchased from the local market in one slot. The seed were grind to fine powder and mixed properly at appropriate concentrations in the feed as specified for different treatments. The chicks were offered all crumbled chick starter feed *ad libtum*, purchased from a private poultry feed manufacturing factory according to BIS (2007) specifications listed in Table 1. T_1 group was provided standard chick ration as per BIS (2007) specifications without any

supplementation and served as control, T_2 received standard chick ration with Ajwain powder supplementation in feed @ 0.1 %, T_3 standard chick ration with Ajwain powder supplementation in feed @ 0.2 % and T_4 standard chick ration with Ajwain powder supplementation in feed @ 0.3 %. The experimental birds were nearly equal in the live body weight at the start of the experiment. The experiment was extended up to 8 weeks of age. Feed and water were supplied adlibitum during the experimental periods. Chicks were grown in brooders with raised wire floors and exposed to 24 hours of constant light (12 hrs on day light and the rest on artificial lighting, using 40 watt bulbs). All chicks were kept under the same environmental and hygienic conditions. Live weight and feed consumption were recorded during the experiment period.

Hematological parameter

Collection of blood sample

Blood collection was carried out at the end of 8^{th} week of the experiment. The analysis of blood samples was carried at laboratory of state government located at Disease Diagnostic Lab, Gopinath marg, Panch batti, Jaipur. Eight birds from each replication of every treatment were randomly selected for blood collection. Disposable syringes with needles were used to collect blood from the wing veins. The blood was transferred immediately into a set of sterile plastic tubes with and without anti-coagulant for haematological test. The test tubes were held in slanting position for serum separation. The serum was centrifuged to remove the erythrocytes present, if any. The clear, non-haemolysed sera then collected in clean, dry and labelled vials**.** The blood samples were analyzed for Hemoglobin (Hb), Total erythrocyte count (TEC), Packed cell volume (PCV) and Total leucocyte count (TLC).

Analysis of blood samples

Hemoglobin estimation was done using Hellige hemometer method as described by Lamberg and Rothstein (1977). The analysis of Total erythrocyte count (TEC), Total leucocyte count (TLC) and Packed cell volume (PCV) were also done by method developed by Lamberg and Rothstein (1977).

Economic parameter

Benefit cost ratio

The benefit cost ratio was calculated on the basis of cost of raising the chicks which include the cost of chicks, feed, vaccine, Ajwain, labour and price of birds at the end of experimental period. All the expenditures and income was calculated on the basis of prevailing market rates and rate approved by the college as follows in Table 2.

Statistical analysis

Data obtained were subjected to statistical analysis as per Snedecor and Cochran (1994) using Completely Randomized Design (CRD). All the data were subjected to ANOVA using the General Linear Models procedure of SAS software (SAS Institute, 2003). The mean differences among different treatments were separated by Duncan's multiple range tests. Consequently, a level of ($P<0.05$) was used as the criterion for statistical significance (Duncan, 1955).

Results and Discussion

Hematological parameter

The results of hematological parameters of Pratapdhan chicken at 56 day are presented in Table 3. The results of hematological parameters showed significant ($P<0.05$) differences in the values of Hb, PCV, TEC

and TLC which were significantly higher in T_3 than control.

The range of Hemoglobin and PCV were 10.5 (T_1) to 11.9 (T_3) g/dl and 37.63 (T_1) to 40.18 (T_3) %, respectively. Total erythrocytes count (TEC) and total leucocytes count (TLC) among treatment groups ranging from 2.64 (T_1) to 2.76 (T_3) millions/mm^3 and 26.08 (T_1) to 28.02 (T_3) thousands/mm^3, respectively. Similar, results were reported by Siddqui *et al.,* (2007) and Sethy *et al.,* (2016).

However, Yadava *et al.,* (2009) and Elagib *et al.,* (2013) found non-significant difference in the Hemoglobin, PCV, TEC and TLC values among treatment groups. The difference in the values of lymphocyte, Monocyte, Heterophil, Eosinophil and Basophil was non-significant. The similar results were also reported by Yadava *et al.,* (2009) with broiler diet supplemented with enzyme and Elagib *et al.,* (2013) with supplementation of garlic.

Economic parameter

Benefit cost ratio

The cost of production of Pratapdhan chicken, considering the cost of chicks, feed consumed, Ajwain, vaccine and labour cost up to 8 weeks of age, reared under different treatments is presented in Table 4. The experiment was started with 30 birds in each treatment group. The initial cost of Pratapdhan was Rs. 35.00 per chick. Feed cost was calculated @ Rs. 26.4 per kg of feed. Vaccination and labour cost estimated rupees 5.00 and 8.75 for each chick, respectively. Ajwain was purchased @ 250 Rs./Kg from local market.

Table.1 Specifications for chick starter feed (BIS Standards 2007)

No	Nutrient	Unit	Chick
1	Moisture	Max %	11.00
2	Crude Protein	Min%	20.00
3	Ether Extract	Min%	02.00
4	Crude Fibre	Max%	07.00
5	Ash	Max%	04.00
6	Salt as Nacl	Max%	0.50
7	Lysine	Min%	01.00
8	Methionine	Min%	0.45
9	Methionine + cystine	Min%	0.70
10	Metabolizable energy	Min% Kcal/kg	2800
11	Calcium	Max %	01.00
12	Phosphorous Available P	Min%	0.70 0.45
13	Manganese	Min mg	60.00
14	Iodine	Min mg	01.00
15	Iron	Min mg	70.00
16	Copper	Min mg	12.00
17	Selenium	Min mg	0.15
18	Zinc	Min mg	60.00

Table.2 Various items cost

No.	Item	Cost (Rupees)	Source of cost
1	Chicks	35/chick	Actual purchase rate
2	Labour	8.75/ chick	Approved college rate
3	Feed	26.4/kg	Approved college rate
4	Ajwain	250/kg	Local market
5	Vaccination	5/ chick	Local market
6	Chicks live weight	200/kg	Approved college rate

Table.3 Effect of Ajwain on mean hematological parameters of Pratapdhan chicken at 56 day

Parameter	Unit	T_1	T_2	T_3	T_4
Hb	g/dl	$10.50^{b} \pm 0.36$	$11.47^{a} \pm 0.38$	$11.90^{a} \pm 0.57$	$11.37^{ab} \pm 0.21$
PCV	%	$37.63^{c} \pm 0.54$	$39.40^{b} \pm 0.13$	$40.18^{ab} \pm 0.07$	$40.45^{a} \pm 0.11$
TEC	millions/mm^3	$0\ 2.64^{c} \pm 0.023$	$02.71^{b} \pm 0.012$	$02.76^{a} \pm 0.008$	$02.75^{a} \pm 0.003$
TLC	thousand/mm^3	$26.08^{c} \pm 0.06$	$27.66^{b} \pm 0.10$	$28.02^{a} \pm 0.03$	$28.01^{a} \pm 0.04$
Lymphocyte	%	69.15 ±0.03	69.17±0.03	69.21±0.02	69.23±0.02
Monocyte	%	00.85±0.006	00.87±0.006	01.01±0.028	01.02±0.030
Heterophil	%	29.35±0.009	29.28±0.033	29.12±0.034	29.05±0.026
Eosinophil	%	00.48±0.003	00.50±0.015	00.50±0.012	00.51±0.009
Basophil	%	00.17±0.007	00.18±0.003	00.18±0.009	00.19±0.015

(a)Each value is a mean of three replicates. (b)Means bearing different superscripts, differ significantly (P<0.05) row wise.

Table.4 Benefit cost ratio (per bird) of Pratapdhan under different treatments

Parameters	Treatments			
	T_1	T_2	T_3	T_4
Average weight (Kg)	1.13	1.16	1.20	1.14
Average feed consumption (Kg)	3.20	3.07	3.01	3.23
Expenditure	Cost of Input (Rs./chick)			
Chick	35.00	35.00	35.00	35.00
Feed	84.48	81.04	79.46	85.27
Ajwain	00.00	00.77	01.50	2.42
Vaccine	05.00	05.00	05.00	05.00
Labour	08.75	08.75	08.75	08.75
Total cost	133.23	130.56	129.71	136.44
Income	Output (Rs./bird)			
sale of bird (live weight) 200/kg	226	232	240	228
Benefit cost ratio	1.70	1.78	1.85	1.67

The data revealed that the benefit cost ratio was found highest 1.85 in T_3 treatment followed by 1.78, 1.70 and 1.67 in T_2, T_1 and T_4 treatment, respectively. The cost of feed was 9.5% less in 0.2 % Ajwain supplemented group (T_3) than control and it is the main reason for the increase of benefit cost ratio in the T_3 treatment even after inclusion of cost of Ajwain supplemented. These results are in agreement with the Hossain *et al.,* (2014) who concluded that benefit cost ratio was significantly ($P<0.05$) better in garlic, ginger, black cumin, cinnamon and chilli supplemented group than the control. Eevuri and Putturu (2013) also reported a decrease in cost of feed from 6.2 to 13.5% on supplemented Tulsi, turmeric, Amla and Aloe-vera in broiler feed. Similar observations were also reported by Reddy *et al.,* (2012), Yadava *et al.,* (2009) and Molla *et al.,* (2012). Although the Tazi *et al.,* (2014) reported profitability ratio of 1.45 at 1% black pepper supplementation in broilers. Singh *et al.,* (2015) reported that benefit cost ratio was significantly better in 1.5 % WBGP supplemented group than other treatment groups.

The study revealed that supplementation of Ajwain to the diet of broiler chickens has beneficial effects on the haematological responses and the growth performance. The best results were obtained at higher levels of inclusion i.e. 0.2 % Ajwain supplementation in mixed diet improves the haematology indices in chicken resulting in better growth. It is also profitable feed supplement and can be used as good alternative of antibiotics in broiler diet. Thus, the use of antibiotics in chickens should be discouraged as they can be replaced by Ajwain powder.

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