



EFFICACY OF NEEM LEAF, NISHYINDA LEAF AND TURMERIC RHIZOME SUPPLEMENTATION ON THE GROWTH PERFORMANCE OF BROILER CHICKEN

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ABSTRACT

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This experiment was conducted to evaluate the efficacy of Neem (*Azadirachta indica*) leaf, Nishyinda (*Vitex nogundo*) leaf and Turmeric rhizome (*Curcuma longa*) powdered supplementation in drinking water as a growth promoter in broiler chickens. A total of 40 day-old Cobb 40 broiler chicks were purchased from local hatchery (Nourish Poultry & Hatchery Ltd.) and after seven days of acclimatization chicks were randomly divided into two groups, A and B. The group A was kept as a control and not treated. The group B was supplemented with Neem, Nishyinda leaves and Turmeric dried powder with feed and water. Weekly observations were recorded for live body weight gain up to 5th weeks and hematological tests were performed at 7th and 35th day's age of broiler to search for hematological change between control (A) and treatment (B) groups. The initial body weight of groups A and B on 7th day of this experiment were 130±4.35 gm, respectively and after 35th day of experiment final body weight were 150±47.35 gm and 1600±58.56 gm, respectively; the net body weight gain were 1320±43.79 gm and 1470±54.25 gm, respectively and economics of production were analyzed and found that net profit per broiler was Tk. 17.24 and Tk. 30.00, respectively. The treatment group B was recorded statistically significant (at 1% level) increase for live body weight than that of control group A. The hematological difference, while Hb. estimation does not show significant difference from control group. The results suggest that better growth performance could be achieved in broilers supplemented with Neem, Nishyinda leaves and Turmeric rhizome extract.

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INTRODUCTION

Medicinal plants compete with synthetic drugs, and the majority have no residual effects (Tipu et al., 2006). Emerging health hazards are evident in animals and man by irrational use of antibiotics and antimicrobial growth promoters. As the world is becoming more advanced, new diseases are emerging in animals and human beings by irrational use of antibiotics and antimicrobial growth promoters. Now it is the need of the hour to work more extensively on the medicinal plants in the greater interest of mankind. Antibiotics and inorganic growth promoters are used in the poultry feed to protect the birds from different diseases, to promote growth of the birds, to improve feed conversion ratio (FCR), to increase weight gain and to maximize economic returns from the individual bird. However, these are also being misused. The antibiotic abuse occurs when these are used unnecessarily, over prescribed, employed in wrong combination, changed quickly over to the other drugs, used persistently, given in inadequate dosage, given in self-medication, used for preventive purposes and employed as unauthorized.

There are many factors leading to the occurrence of antibiotic residues in animal products e.g. failure to observe drug withdrawal period, extended usage or excessive dosages of antibiotics, non-existence of restrictive legislation or their inadequate enforcement, poor records of treatment, lack of advice on withdrawal periods, off-label use of antibiotics, availability of antibiotics to lay persons as over-the counter drugs in the developing countries, lack of consumer awareness about the magnitude and human health hazards associated with antibiotic residues in the food of animal origin. Due to the outbreaks of resistant bacteria and residues of antibiotics in products, currently there are several kinds of antibiotics alternative developed and used. Among the alternatives, medicinal plants with excellent pharmacological activity are getting attention by researchers.

Herbal agents could serve as safer alternatives as growth promoters due to lower cost, reduced toxicity and minimum health hazards. Biological trails of certain herbal formulations as growth promoter have shown encouraging results and some of the reports have demonstrated improved weight gain and feed efficiency, lowered mortality and increased immunity and viability in poultry (Kumar, 1991). Some herbal growth promoters exert therapeutic effects against liver damage due to feed contaminants like aflatoxin (Ghosh, 1992). Bangladesh is abundant in plants possessing interesting pharmacological properties, which await exploitation. Various herbal products are being used as growth promoters in poultry rations like nishyinda, black pepper and cinnamon. Antibiotics promote growth because of an effect on gut flora (de Man, 1975). The use of antibiotics as dietary growth promoters in poultry diets has reduced dramatically. Antimicrobial resistance in zoonotic pathogens including *Salmonella* spp., *E. coli* and *Enterococci* in food animals is of special concern to human health because these are likely to transfer to humans (Endtz et al., 1991). In 2006, the European commission banned the last four feed antibiotics (monensin sodium, salinomycin sodium, avilamycin and flavor phospholipol). To minimize resistance, different agencies are in favour of banning these feed antibiotics (Hileman, 2002). The phasing out of antibiotic growth promoters will affect the poultry industry. There is a need to find alternatives. There are a number of alternatives such as enzymes, inorganic acids, probiotics, herbs immunostimulants and management practices (Banerjee, 1998). Herbs and their essential oils have long been known for their antimicrobial activity (Chang, 1995). Polyherbal extracts have been worldwide for a range of medicinal properties like antibacterial, antiviral, antifungal, antiprotozoal, or hepatoprotective without adverse effects (Kale et al., 2003; Chowdhury et al., 2009). Nishyinda (*Vitex negundo* L.) is a hardy plant, flourishing mainly in the Indian subcontinent. It possesses phyto-chemical secondary metabolites, which impart a variety of medicinal uses. The leaves of nishyinda may be applied locally to swellings from rheumatoid arthritis and sprains. The juice of the leaves is used for the treatment of foetid discharges. The principal constituents of the leaf juice are casticin, isoorientin, chrysofenol D, luteolin, p-hydroxybenzoic acid and D-fructose. Black pepper (*Piper nigrum*) is a flowering vine in the family Piperaceae, cultivated for its fruit and used as a spice and seasoning. Dried ground pepper has been used for both its flavor and as a medicine, which is due to presence of piperine. Cinnamon (*Cinnamomum zylenicum*) is commonly used in the food industry. It has strong antibacterial, anti-candida, anti-ulcer, analgesic, antioxidant and hypocholesterolaemic activities (Mastura et al., 1999; Lin et al., 2003).

In view of these, the present work had been undertaken to investigate the growth performance of broilers supplemented with Neem leaf, Nishyinda and Turmeric rhizome and to examine the effect of Neem, Nishyinda and Turmeric powder on haematological parameters (TEC, Hb., ESR and PCV) of broilers.

MATERIALS AND METHODS

Broiler chicks and experimental design

The experiment was conducted in the Department of Pharmacology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh. A total of forty broiler chicks were collected from Nourish Hatchery and allowed to acclimatize for seven days. The birds were kept on a floor litter system in separate pens each measuring 0.9 x 1.2 metres. The pens were thoroughly cleaned, white-washed and disinfected before use. All the birds were provided same management. Fresh clean water was made available at all times.

The birds were randomly divided into two equal groups. Group A was kept as control without any supplement while group B was supplemented with polyherbal extract 1 mL/litre in drinking water. B-groups were received Neem leaves, Nishyinda leaves and Turmeric rhizome powder were used as growth promoter as treatment along with basal diet. The leaves of Neem and Nishyinda and Turmeric rhizome powder were prepared according to procedure of Molla et al. (2012). All the chicks of treated and control groups were closely observed for 35 days and clinical signs were recorded.

Hematological Parameters

Blood samples were collected from wing vein of chicken of both control and treated groups at 7th and 35th days to study the effect Neem, Nishyinda leaves and Turmeric rhizome and the following parameters were observed in the laboratory using standard procedure:

- a. Total Erythrocyte Count (TEC)
- b. Hemoglobin estimation (Hb)
- c. Packed Cell Volume (PCV) and
- d. Erythrocyte Sedimentation Rate (ESR)

Performance trial

During the 35 days experimental period, growth performance was evaluated. Body weight and feed consumption were recorded weekly and body gain and feed conversion were than calculated. Mortality was recorded throughout the study.

Statistical analysis

The data were analysed statistically between control and treated groups of chicken by Student's t-test.

RESULTS

The experimental units were kept on a floor litter system in separate pens. From the present study, table 1 revealed that, in control group (Group A) initial average live weight on 7th day was 130±3.56 gm, final live weight 1450± 47.35 gm, weight gain 1320±43.79 gm and feed conversion ratio (FCR) was 2.20. In Group B initial average live weight on 7th day was 130±4.35 gm, final live weight 1600±58.56 gm, weight gain 1470±54.25 gm and FCR 1.93.

The birds of group B using drinking water were supplemented with 1% Neem, Nishyinda and Turmeric powder utilized their feed statistically significantly (at 1% level) more efficiently than control group (Table 2). Statistical analysis of the data shows non-significant between the dressing percentages of the birds of two groups (Table 2).

Statistical analysis of the data did not show any difference between the relative gizzard weights of the birds of two groups (Table 2). Statistical analysis of the data shows 1% level of significance of relative heart, liver, spleen and pancreas weight between the birds of two groups using drinking water with or without supplementation of Neem, Nishyinda and Turmeric (Table 2).

Economies of Production

The average rearing cost of broilers in two groups were Tk. 179.00 and Tk. 176.00 for A and B groups, respectively (Table 3), excluding the cost of labour because the experiment was conducted on the Department of Pharmacology research shed, Bangladesh Agricultural University, Mymensingh. Miscellaneous cost summed up Tk. 20 per broiler, which included the estimated cost of electricity, litter and disinfectant. The average live weight/broiler in groups A and B were 1.450 kg and 1.600 kg respectively. The broilers were sold in live weight basis at the rate of Tk. 140/kg. The net profit/ Kg live weight in the respective group excluding the cost of labour was found to be Tk.17.24 and Tk. 30.00, respectively.

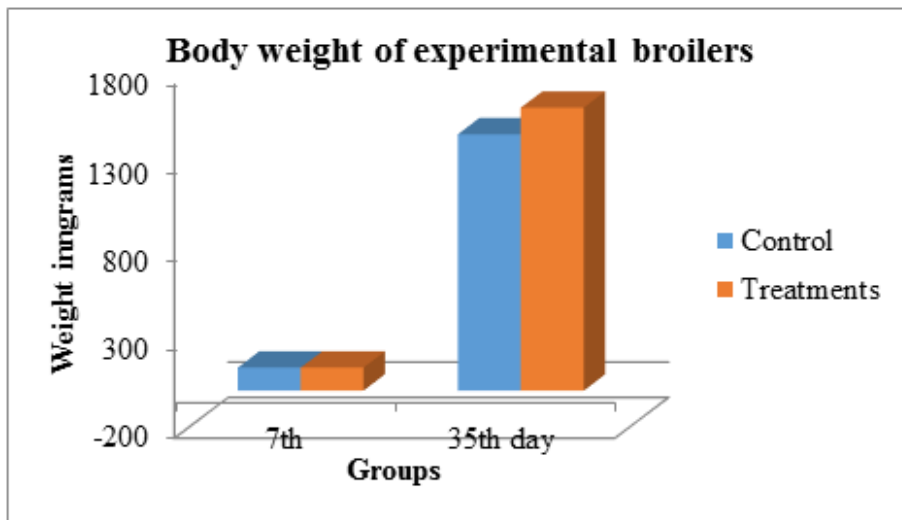


Figure 1. Body weight of experimental chickens

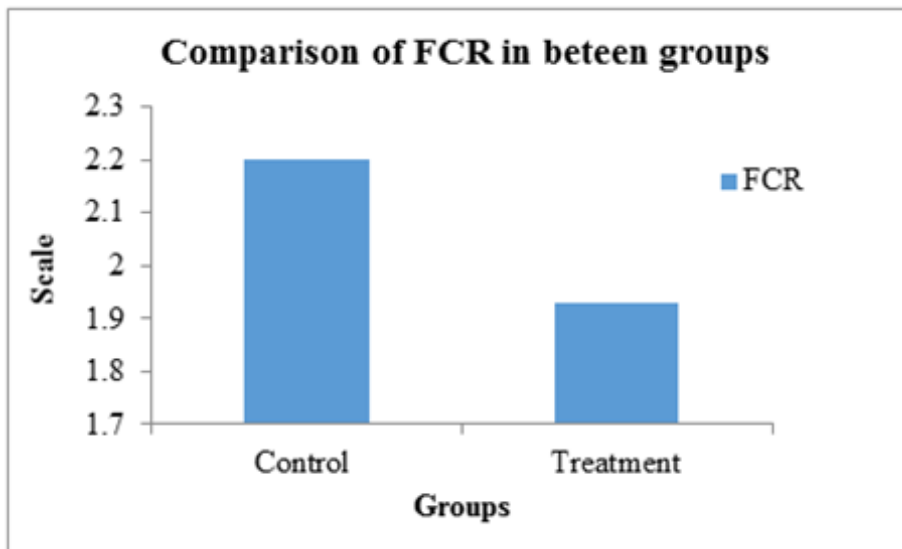


Figure 2. Comparison of feed conversion ration

Table 1. Initial and final live weight, weight gain, feed consumption and feed conversion ratio of broilers supplemented with or without neem leaf, nishyinda leaf and turmeric rhizome on 1-5 weeks of age

Variables	Treatments	Average weight (Mean ± SEM)	P value	Significance level
Initial live weight (g) on 7 th day	Control	130±3.56	0.000	**
	Neem, Nishyinda and turmeric	130.4.35		**
Final live weight (g) on 35 th day	Control	1450±47.35	0.000	**
	Neem, Nishyinda and turmeric	1600±58.56		
Weight gain (g)	Control	3200±35.49	0.000	**
	Neem, Nishyinda and turmeric	3100±52.29		
FCR	Control	2.20		
	Neem, Nishyinda and turmeric	1.93		

Table 2. Dressing percentages, relative giblet weight (heart, gizzard, liver and spleen) and pancreas weight of broilers supplemented with or without neem leaf, nishyinda leaf and turmeric rhizome from 1-5 weeks of age

Variables	Treatments	Average weight (Mean ± SEM)	P value	Significance level
Dressing percentage	Control	64.400±0.404	0.939	**
	Neem, Nishyina and Turmeric	64.470±0.961		
Relative heart weight (gm)/chicks	Control	0.420±0.032	0.002	**
	Neem, Nishyina and Turmeric	0.511±0.032		
Relative gizzard weight (gm)/chicks	Control	1.460±0.034	0.606	**
	Neem, Nishyina and Turmeric	1.440±0.014		
Relative liver weight (gm)/chicks	Control	2.530±0.034	0.001	**
	Neem, Nishyina and Turmeric	2.610±0.032		
Relative spleen weight (gm)/chicks	Control	0.120±0.011	0.011	**
	Neem, Nishyina and Turmeric	0.130±0.015		
Relative pancreas weight (gm)/chicks	Control	0.230±0.011	0.001	**
	Neem, Nishyina and Turmeric	0.25±0.017		

**= Significant at 1% level of probability (0.00-0.01); NS = Not significant (≥ 0.05)

Relative weight (g) = Weight of organ/Live body weight of bird \times 100; Dressing % = Dress weight of bird/Live weight of bird

Table 3. Data Showing Economics of Broiler Production Kept Under Treatment and Control Groups from Day Old to 5 Weeks of Age

Description	Group-A	Group-B
Cost/chick(Taka)	30.00	30.00
Average feed consumed (Kg)/Chicks	3.200	3.100
Feed price/kg (Taka)	40.00	40.000
Cost of herbal growth promoters (Taka)	0.00	2.00
Feed cost (Taka)	128.00	124.00
Miscellaneous (Taka)	20.00	20.00
Total cost/broiler (Taka)	178.00	176.00
Average live weight (Kg)	1.450	1.600
Sale price/Kg live wt. (Taka)	140.00	140.00
Sale price/broiler (Taka)	203.00	224.00
Net profit/broiler (Taka)	25.00	48.00
Profit/Kg live weight (Taka)	17.24	30.00

Study of Neem Leaf, Nishyinda Leaf and Turmeric Rhizome on Hematological Parameters of Broiler

Observation of hematological parameter (RBC, Hb, PCV, ESR) on 7th day and 35th day did not show any significant difference ($P < 0.05$) between the control and Neem, Nishyinda leaves and Turmeric treated groups.

Table 4. Study of Neem Leaf, Nishyinda Leaf and Turmeric Rhizome on Hematological Parameters of Broiler

Days	Blood parameters	Treatments	Average parameters (Mean±SEM)	blood value	P value	Significance level
7 th Days	TEC	Control	192.39±1.037	0.000	**	
		Neem, Nishyinda and turmeric leaf	199.29±0.992			
	Hb gm %	Control	6.00±0.089	0.337	**	
		Neem, Nishyinda and turmeric leaf	6.37±0.438			
35 th Days	PCV %	Control	17.35±0.599	0.011	**	
		Neem, Nishyinda and turmeric leaf	17.97±0.456			
	ESR Mm/in 1 st hour	Control	10.68±0.316	0.000	**	
		Neem, Nishyinda and turmeric leaf	8.78±0.316			
35 th Days	TEC Million/m ³	Control	247.67±1.028	0.000	**	
		Neem, Nishyinda and turmeric leaf	298.39±0.751			
	Hb gm%	Control	6.92±0.491	0.241	**	
		Neem, Nishyinda and turmeric leaf	7.79±0.111			
PCV %	Control	18.00±0.134	0.000	**		
	Neem, Nishyinda and turmeric leaf	19.95±0.022				
ESR mm/in 1 st hour	Control	7.40±0.268	0.004	**		
	Neem, Nishyinda and turmeric leaf	5.24±0.554				

DISCUSSION

Addition of herbal growth promote Neem, Nishyinda leaves and Turmeric Rhizome improved the weight gain of the broilers in this study. These results are in line with the findings of Misra and Singh (2000), who reported that higher weight gain in broilers, drinking water supplemented with Nishyinda and Turmeric extract. on Treatment 5 utilized their diets better which was evidenced by their higher carcass values. The percentages of back, wing, head and shank did not differ significantly across the treatments more so, these parts carry less value in terms of meat yield and consumer preference. The values for liver, heart, gizzard and lungs did not differ significantly, this could be linked to the absence of anti-nutritional factors in the diets, because higher physiological activities by these organs is triggered by the presence of anti-nutritional factors and their concomitant effect. In conclusion, results of the present study showed that supplementation of diet with 1% (NLM+PLM) improve performance, feed utilization, dressing percentage and carcass yield therefore this combination of neem leaf meal and pawpaw leaf meal can serve as an effective replacement for chemical based growth promoters in broiler production.

The birds supplied drinking water supplemented with herbal growth promoters, Neem, Nishyinda leaves and Turmeric rhizome utilized their feed more efficiently than those supplied drinking water without addition of the growth promoters. These results are in line with the findings of Ahmad (2005), who reported higher weight gain in broilers fed rations supplemented with garlic. The use of Neem, Nishyinda leaves and Turmeric rhizome extract with drinking water showed more increase in live weight of the birds as compared to control group in this study, which is also in agreement with the findings of Samanta and Dey (1991), who concluded that powdered garlic may be incorporated as a growth promoter in the ration of Japanese quails.

Supplementation of Neem, Nishyinda and Turmeric extract did not exhibit any effect on the dressing percentage values of the broilers in this study. The results of the present study are in line with those observed by Ahmad (2005), who reported a non-significant effect on broiler dressing percentage values due to the inclusion of garlic in the diet of broilers.

Inclusion of 1% Neem, Nishyinda and Turmeric extract with drinking water exerted significant effect on the mean relative heart, gizzard, liver, spleen, pancreas weights of the broilers used in this study. Use of various levels of herbal growth promoters in the rations exhibited an increase in the profit margin of the broilers as compared to those using ration without the addition of these growth promoters. Supplementation of 1% Neem, Nishyinda and Turmeric with drinking water was found to be more profitable than without garlic supplementation in broiler rearing. The results of the present study are in line with the findings of Ahmad (2005), who reported that dietary inclusion of garlic in the rations was more beneficial in broiler production.

Increase in the profit margin of the birds supplied drinking water containing herbal growth promoters may be attributed to the better efficiency of feed utilization, which resulted in more growth and better feed to gain ratio, ultimately leading to higher profit margin in the broilers reared on Neem, Nishyinda and Turmeric supplemented drinking water. Growth promoting effects in broilers by using medicinal plants was reported earlier in Bangladesh by Nath et al. (2012).

Supplementation of Neem & Nishyinda leaves and Turmeric in the treatment group caused improvement in the feed efficiency as compared to that of control group. Birds supplemented with Neem, Nishyinda leaves and Turmeric had higher body weight, weekly gain weight, feed consumption and feed efficiency.

CONCLUSION

It is concluded that supplementation of Neem, Nishyinda leaves and Turmeric Rhizome of treatment groups caused significant increase in live body weighed and improvement in weekly gain in weight and feed efficiency as compared to that of control group of broilers. The results of the present study may be due to antimicrobial and anti-protozoal properties of Neem, Nishyinda and Turmeric which help to reduce the microbial load of birds and improved the feed consumption and feed efficiency of the birds. Thus, polyherbal supplementation in broiler rations may be useful for the production of broiler as an alternative to commercial growth promoters.

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