



## Effects of Neem, turmeric and papaya leaf extract mixture on growth performance of broilers

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### ABSTRACT

The study was conducted to determine the efficacy of mixture of neem, turmeric and papaya leaf extract on growth performances of broilers. A total of 40 days-old broiler chicks, after 7 days acclimatization, were randomly divided into two equal groups. Group A (n=20) was reared as control group with normal feed and water, while group B (n=20) was supplemented with 2% neem, turmeric and papaya leaf extract @ 1 ml per liter of drinking water. No vaccination schedule was practiced and no antibiotics were added in rations. Weekly observations were recorded for live body weight, weekly gain in weight, weekly feed consumption, feed efficiency and blood parameters of birds for five weeks. Body weight in the treatment group was significantly increased ( $P < 0.05$ ). However, there was no significant difference in the blood parameters (TEC, Hb, PCV, ESR) between treatment and control groups. Supplementation of neem, turmeric and papaya leaf extract in the treatment group caused improvement in the feed efficiency as compared to that of control group. Treated birds had higher body weight, weekly gain in weight, feed consumption and feed efficiency. These results may be due to antimicrobial and anti-protozoal properties of neem, turmeric and papaya leaf extract which help to reduce the microbial load of birds and improved the feed consumption and feed efficiency of the birds. The study suggests that these medicinal plants may be used as an alternative to antibiotic growth promoters.

**Key words:** Broilers, neem, turmeric, papaya, weight gain

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### INTRODUCTION

In Bangladesh, the demand for broiler meat is increased rapidly, propelled by increased income and population growth and urbanization. Thereby, broiler farming seems to be a considerable part of meat production and consumption in the country. Broiler production has grown dramatically in the past two decades; these improvements are largely due to numerous researches and breeding programs which further enhanced feed utilization, growth rate and low levels of activity. Current commercial hybrids with high performance require high energy diets which would enable the maximum expression of their genetic potential (Sadeghi, 2005), in order to achieve this poultry farmers make use of antibiotic growth promoter to enhance feed utilization and growth performance of broilers. Recently, the use of antibiotic growth

promoter in poultry industry has been seriously criticized by governmental policy makers and consumers because of the development of microbial resistance to these products and the potential harmful effects on human health. Their use have shown many disadvantages like high cost, adverse side effect on health of birds and long residual properties and carcinogenic effect in humans (Butaye et al., 2003). In the presence of low levels of antibiotics, resistant cells survive and grow producing an antibiotic resistant population in the final products.

Researchers are now concentrating efforts on the use of ancient medicinal system to find beneficial herbs and plants, which can be safely used to increase production. Recently field trials on certain herbal formulations as growth promoters in India, Greece, UK and USA, have shown encouraging

**How to cite this article:** N Mahejabin, M Mostofa, F Akter, S Das and M Alam (2015). Effects of Neem, turmeric and papaya leaf extract mixture on growth performance of broilers. International Journal of Natural and Social Sciences, 2(2):17-21.

results as regards weight gain, feed efficiency, lowered mortality and increased livability in poultry birds. Therefore, the present study was carried out with the objective to evaluate the growth promoting efficacy of some indigenous medicinal plants and their influence on the broiler performance.

Neem tree (*Azadirachta indica*) possess wide range of medicinal properties like antibacterial, antiviral, antifungal, antiprotozoal, hepato-protective and various other properties without showing any adverse effects (Kale et al., 2003). Neem leaves extract has immunostimulant effect that activates the cell mediated immune response and therefore, creates an enhanced response to any future challenges occurred by disease organisms. So, the feeding neem leaves to immunosuppressed birds increased their humoral and cell mediate immune responses (Sadekar et al., 1998).

Papaya leaves are rich source of the proteolytic enzymes papain and chymopapain which have protein digesting properties and are useful in controlling digestive problems and intestinal worms (Burkill, 1985). Papaya leaves also contain carotene, provitamin A, which serves as many as 18-50 IU and can be used as a source of natural Xanthophyl. Papaya leaves contain vitamin C, vitamin E, calcium, phosphorous and iron. Beside that the leaves contain 20.88% crude protein, 0.99% calcium, 0.47% phosphorous and 2912 kcal / kg gross energy.

*Curcuma longa* L. (Zingiberaceae), commonly known as turmeric, is a medicinal plant widely used and native to southern and southeastern tropical Asia. The active ingredients found in turmeric) are curcumin, demethoxycurcumin, bisdemethoxycurcumin, (Wuthi-Udomler et al., 2000) and tetrahydrocurcuminoids (Osawa et al., 1995). A number of pharmacological activities of *Curcuma longa* have been reported which include anti-inflammatory (Ammon et al., 1993) and food additives on aflatoxin-induced mutagenicity and hepatocarcinogenicity (Soni et al., 1997) antibacterial Anwarul et al., 2006) and antiparasitic (Kumari et al., 2007).

Considering the beneficial effects the present study was undertaken to evaluate the growth

promoting efficacy of turmeric, neem and papaya leaf extract mixture in broilers.

## MATERIALS AND METHODS

### Preparation of plant extract

Neem and papaya leaves were selected for effectiveness as growth promoter on poultry. Mature and disease free neem and papaya leaves were collected from BAU campus. Fresh turmeric rhizomes purchased from local market and cleaned and sliced into small pieces. For the preparation of dust, the leaves were dried in sun for 10 days and followed by oven at 55-60°C for 2 days. The dried leaves were pulverized with a blender. A 25mm mesh diameter sieve was used to obtain the fine dust; the dust was preserved in air tight plastic container until they were directly used for screening and preparation of water extract. *Curcuma longa* rhizomes were cleaned and sliced into small pieces. Then rhizomes were made paste by mortar and pestle and water was added to for extract. For the preparation of 2% extract, 6.67 gram neem, 6.67 gram papaya gram leaf powder and 6.67 gm turmeric was added to 1000 ml of distilled water. Then it was shaken thoroughly at room temperature, heated and filtered. Sodium chloride was added 5 gm as preservative.

### Rearing of broilers

Forty commercial broiler day-old chicks were collected from Nourish Poultry and Hatchery Limited, Gazipur. The birds were kept on a floor litter system, each group in separate pens measuring 0.9×1.2 meters. The pens were thoroughly cleaned, white-washed and disinfected before use. Chicks were acclimatized for 7 days in the experimental shed and brooded at 35°C during first week and the temperature was reduced by 3°C every week until the temperature reached room temperature at 25 ± 1°C. All the groups were reared under the similar conditions of temperature, humidity, light, ventilation and floor space throughout the experimental period. Birds were fed commercial feed from Nourish Poultry Feed Limited and water ad libitum under strict biosecurity (Molla et al., 2012).

## Experimental design

All the 40 chicks were randomly divided into 2 equal groups of 20 birds in each group (A & B). Group 'A' was kept as control without any treatment given with normal feed & water, group 'B' was treated with 2% neem, turmeric and papaya leaf extract @ 1 ml per litre of drinking water. Weekly observations were recorded for live body weight, weekly gain in weight, weekly feed consumption, feed efficiency of birds for five weeks. Blood parameters (TEC, Hb, PCV and ESR) are measured at 35<sup>th</sup> day of the experiment. All the birds were reared without vaccination.

## Biosecurity and sanitation

Proper hygienic and sanitation programs were followed during the experimental period. To prevent the outbreak of disease strict biosecurity was maintained during the experimental period. The following measures were taken to maintain the biosecurity: Visitors were not allowed to enter in the house, all equipment's in the experimental house were kept clean, and dead birds were removed promptly.

## Clinical Examination

Body weight and feed consumption were measured weekly. Weekly growth rate, efficiency of feed utilization and mortality were calculated. At the end of the experiment, three birds from each group were picked randomly and slaughtered. The slaughtered birds were scalded in water at 82 - 88°C (Jull, 1976) then manually plucked. The weight of each carcass was recorded and dressing percentage calculated on the basis of dressed meat including giblets and skin. The heart, liver, gizzard, spleen and pancreas were weighed.

## Hematological parameters

Blood samples were collected from wing vein of chicken of both control and treated groups at 21<sup>st</sup> and 42<sup>nd</sup> day. The following parameters were observed: total erythrocyte count (TEC), hemoglobin content (Hb), packed cell volume (PCV) and erythrocyte sedimentation rate (ESR) with standard methods as described by Lamberg and Rothstein (1977).

## Postmortem examination

Post-mortem examination was carried out to see any lesions. Three chickens from each group were slaughtered to observe if there were any pathological changes occurred. There was no significant pathological change found in any internal organs of the chickens of treated group.

## Statistical analysis

The data were analyzed statistically between control and treated groups of chicken by paired student "t" test. The differences were considered statistically significant at  $P < 0.05$ .

## RESULTS AND DISCUSSION

Addition of extract of neem, turmeric rhizome extract and papaya leaf extract improved the weight gain of broilers in this study (Table 1). An increasing trend was found in body weight gain with increased levels of neem leaves infusion. The results of this study is in accordance with Sarag et al. (2001) who achieved highest body weight gain and best feed conversion ratio as compared to control when offered neem leaf extract to broilers from 1 to 5 weeks of age.

The results of present study is in agreement with the study of Chakarverty and Prasad (1991), who reported that boilers fed on diet containing neem leaves, had higher body weight gain. Similar findings have been reported by Tipu et al. (2002), who used salinomycin and neem fruit as feed additive and anticoccidial in broilers and reported better results in terms of weight gain. The higher body weight gain in broilers consuming neem leaves infusion could be due to its diversified effect on intestinal micro flora, thereby avoiding stressful conditions. The use of neem and papaya leaf extract with drinking water showed more increase in live weight of the birds as compared to control group in this study, which is also the agreement with the findings of Onyimonyi, et al. (2009) who reported that papaya leaf extract improved the weight gain of the broilers. The performance of birds supplement papaya showed significantly better result as compared to control group.

Table 1  
Effect of plant extract on body weight and feed consumption of broiler.

Variables	Control A (n=20)	Treatment B (n=20)
	Mean±SEM	Mean±SEM
Initial live weight (gm) of day old chicks	39.78±1.56	40.50±1.23
Initial live weight (gm) on 7 <sup>th</sup> day	112.67±1.93	113.43±1.52
Final live weight (gm) on 42 <sup>nd</sup> day	1300.86±39.93	1450.54±43.2
Weight gain (gm)	1188.65±38.00	1337.45±41.68
Feed consumption (gm)	2500.53±41.83	2600.32±21.32
Feed conversion ratio (gm feed consumed/ gm weight gain)	2.10	1.94

SEM= Standard Error Mean

Table 2  
Effect of plant extract on dressing percentages, relative organs weight of broiler.

Variables	Control, A (n=20)	Treatment, B (n=20)
	Mean±SEM	Mean±SEM
Dressing percentage	63.11±0.22	63.39±0.56
Relative heart weight	0.42±0.001	0.43±0.001
Relative gizzard weight	1.41±0.01	1.44±0.005
Relative liver weight	2.55±0.01	2.56±0.023
Relative spleen weight	0.10±0.004	0.11±0.004
Relative pancreas weight	0.24±0.008	0.25±0.007

Relative weight (gm) = (Weight of organ/ Live body weight of bird) × 100

Dressing % = (Dress weight of bird/ Live weight of bird) × 100

Table 3  
Effect of plant extract on haematological parameters of broiler (days 35).

Blood Parameters	Groups	Mean±SEM	P value
TEC (million/ $\mu$ l)	Treatment	290.67±12.12	0.242
	Control	245.67±13.87	
Hb (gm %)	Treatment	7.1±0.18	0.08
	Control	6.4±0.20	
PCV (%)	Treatment	23.16±1.11	0.260
	Control	20.5±1.50	
ESR (mm)	Treatment	5±1.00	0.234
	Control	0.58±0.10	

Al-sultan et al. (2003) and Kumari et al. (2007) who observed a significant increase in body weight of broilers fed with turmeric powder which support the results obtained in this study.

The haematological investigation in this study suggested that dietary neem, turmeric and papaya leaf extract has no deleterious effects on some physiological parameters of starter broilers (Table

3). Nagalakshmi et al. (1996); Gowda et al. (1998), however, reported that bitter principles of medicinal plants possess a strong influence on hematological traits particularly PCV and Hb, depending on their nutritional status.

## CONCLUSION

Inclusion of neem, turmeric and papaya leaf extract in diet has been effective in the growth performances of broilers. However, further studies are essential to assess the impact of these additives as immunomodulatory agents in broiler diets before drawing final conclusion.

## ETHICAL APPROVAL

All birds were maintained in the animal care facilities according to university animal care and use guidelines. All experimental protocol have been examined and approved by the appropriate ethics committee.

## REFERENCES

- Al-Sultan SI (2003). The effect of *Curcuma longa* (Turmeric) on overall performance of broiler chicken. *International Journal of Poultry Science*, 2(5): 325-354.
- Ammon HP, Safayhi H, Mack T and Sabieraj J (1993). Mechanism of anti-inflammatory actions of curcumin and boswellic acids. *Journal of Ethnopharmacology*, 38: 113-119.
- Anwarul HG, Abdul J, Muhammad N and Kashif M (2006). Pharmacological basis for the use of turmeric in gastrointestinal and respiratory disorders. *Life Science*, 76: 3089-3105.
- Burkill HM (1985). The useful plants of West Tropical Africa. Royal Botanic Garden, Kew, UK. Volume 3.
- Butaye P, Luc A, Devriese F and Haesebrouck F (2003). Antimicrobial Growth Promoters used in Animal feed: Effects of less well known antibiotics on Gram-positive bacteria. *Clinical Microbiology Reviews*, 16(2): 175-188.
- Chakarverty A and Parsad J (1991). Study on the effect of neem leaf extract and neem cake extract on the performance of broiler chicks. *Indian Poultry Advisory*, 24(9): 37-38.
- Gowda SK, Verma SVS, Elangovan AV, Singh AD (1998). Neem (*Azadirachta indica*) kernel meal in the diet of white leghorn layer. *British Poultry Science*, 39: 648-652.
- Jull AA (1976). *Poultry Husbandry*, 3rd Edn. Tata Mcgraw Hill Publishing Company Ltd., New Delhi, India
- Kumari P, Gupta R, Ranjan KK, Singh R and Yadava (2007). *Curcuma longa* as feed additive in broiler birds and its pathophysiological effects. *Indian Journal of Poultry Science*, 40: 137-141.
- Lamberg SL, Rothstein R (1978). *Laboratory Manual of Hematology and Urinalysis*. Avi. Publishing Company, Inc, West Port Connecticut, USSR.
- Molla MR, Rahman MM, Akter F and Mostofa M (2012). Effects of Nishyinda, black pepper and cinnamon extract as growth promoter in broilers. *The Bangladesh Veterinarian*, 29(2): 69 – 77.
- Nagalakshmi D, Sastry VRB, Agrawal RC, Ketiyar DK and Verma SVS (1996). Performance of broiler chicks fed on alkali-treated (*Azadirachta indica*) kernel cake as a protein supplement. *British Poultry Science*, 37: 809-818.
- Osawa T, Sugiyama Y, Inayoshi M and Kawakisi S (1995). Antioxidative activity of tetrahydrocurcuminoids. *Bioscience, Biotechnology and Biochemistry*, 59: 1609-1612.
- Sadeghi GH and Tabiedian SA (2005). Effect of different energy to protein ratio and allow supplementation on broiler performance. *International Journal of Poultry Science*, 4(12): 976-981.
- Sadekar RD, Kolte AY, Barmase BS and Desai VF (1998). Immunopotentiating effects of *Azadirachta indica* (neem) dry leaves extract in broiler, naturally infected with IBD virus. *Indian Journal of Experimental Biology*, 36(11): 1151-1153.
- Sarag AN, Pawar SP, Rekhate DH and Deshmukh GB (2001). Effect of different levels of neem (*Azadirachta indica*) oil in the performance of broilers. *PKV Research Journal Publication*, 25(2): 112-113.
- Soni KB, Lahiri M and Chakradeo P (1997). Protective effect of food additives on aflatoxin induced mutagenicity and hepatocarcinogenicity. *Cancer Letters*, 115(2): 129-133.
- Tipu MA, Akhtar MS and Raj ML (2006). New dimension of medicinal plants as animal feed. *Pakistan Veterinary Journal*, 26 (3): 144-148.
- Wuthi-Udomler, Grisanapan MW, Luanratana O and Caichompoo W (2000). Anti-fungal activities of *Curcuma longa* grown in Thailand. *South East Asian Journal of Tropical Medicine and Public Health*, 31(1): 178-182.