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Effects of nishyinda and papaya leaf extract on growth performance and hemato-biochemical parameters of broiler

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ABSTRACT

The experiment was performed on "Cobb-500" broiler chicks to experience the effects of *Vitex negundo* (Nishyinda) and *Carica Papaya* (Papaya) leaf extract on growth performances and haemato-biochemical parameters. A total of thirty broiler chicks (16 days old) were randomly allocated into three equal groups (n=10). Two groups of broilers fed nishyinda and papaya leaf extracts apart at the rate of 2 ml/L with water for 22 days. Broiler chicks fed on commercial feed were considered as the control group. The results showed that the body weight of broilers increased when treated with nishyinda extract compared to the control group. After having completed the trial, the birds were sacrificed to collect the blood sample for hematological and biochemical analysis. Compared to the control group, growth performances were traced higher in the treated group. In the treated group, total erythrocytes count, hemoglobin content, and ESR values were found higher. Total cholesterol and triglycerides were found significantly abated in the medicated groups. Compared to controls, the serum alkaline phosphatase & HDL was significantly increased in treated groups. Further investigations are inevitable to determine the effects of nishyinda and papaya leaf extract on the quality of broiler meat and immune status to assure the safety for human consumption.

Introduction

Bangladesh is an intensely populated country where the requirement of protein for this booming population is a great threat (Chandan et al.2015). Broilers are chickens raised specifically for meat production as a source of protein. Existent commercial hybrids with high-performance demand high-energy diets (Sadeghi and Tabiedian, 2005). To accomplish this, poultry farmers put on synthetic growth promoters. Many of these synthetic drugs and growth promoters are supplemented to broiler diets to generate rapid growth, but their use has exhibited many disadvantages like high cost, unfavorable side effects on the health of birds, and long residual properties and carcinogenic effects in mankind (Butaye et al., 2003). In comparison to other livestock sectors, poultry asserts less investment with a short return of value and profit. Pharmaceutical companies accept this advantage. They are convincing farmers for using antibiotics as growth promoters. As a result, every broiler is storage of antibiotics causing serious human health hazards with drug residues. Medicinal plants are cheap and renewable sources of pharmacologically-active elements which are acquainted to produce particular chemicals naturally toxic to bacteria (Basile et al., 1999). Due to the adverse side effects of synthetic growth promoters, consideration should be given to alternative natural supplements. There are a lot of reports signifying the positive effects of herbs like anti-coccidial, anti-oxidant, anti-fungal, etc. Some of the medical effects of herbs are concerned with their secondary metabolites such as phenols, necessary oils, saponins, etc. Interestingly recent biological trials of certain herbal formulations as growth promoters have demonstrated improvement concerning weight gain, feed efficiency, lowered mortality, increased immunity, and increased livability in poultry birds (Kumar, 1991). Also, these herbal growth promoters have been shown to exert therapeutic effects against liver damage due to feed contaminants like aflatoxin (Ghosh, 1992).

Nishynida (*Vitex negundo*) is a hardy plant, flourishing mainly in the Indian subcontinent. It possesses phytochemical secondary metabolites. 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 fetid discharges. The principal constituents of the leaf juice are casting, isoorientin, chrysophanol D, luteolin, p–hydroxybenzoic acid, and D-fructose. Papaya (*Carica papaya*) originated in Central

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America. It contains many biologically active compounds. Two important compounds are chymopapain and papain (Poulter et al., 1985), which are useful in controlling digestive problems and intestinal worms (Burkhill, 1985). Papain also is used to treat arthritis. The level of the compounds varies in the fruit, latex, leaves, and roots. Except for infertility, the literature reviewed did not indicate any adverse reactions from the consumption of *Carica papaya* fruit, latex, or extracts. However, the leaves and roots of *Carica papaya* contain cyanogenic glycosides which form cyanide. The leaves also carry tannins. Both of these compounds, at high concentrations, can cause adverse reactions. Also, inhaling Papaya powder (high in the enzymes papain and chymopapain, can induce allergies. Given these, the present work has been undertaken to evaluate the effects of *Vitex negundo* (nishyinda) and *Carica papaya* (papaya) leaf extract on growth performance and hemato-biochemical parameters in the broiler.

Materials and Methods

The experiment was conducted to inquire about the effect of Nishyinda and Papaya leaf extract on cob-500 broiler chicks from day 16 to 38 of age to assess growth performance and some hematological and biochemical parameters.

Experimental Design

Thirty broiler chicks aged 16 days were randomly divided into three equal groups (n=10). One group of broilers fed on the commercial meal was computed as control and the rest were considered as treated groups. BIO-TOP (Daone Chemicals) is a multi-strain probiotic which were used for supplementation of diets. The extract was prepared from nishyinda and papaya leaf. Two groups of broilers were fed nishyinda and papaya extract separately with water. The body weight of individual birds was recorded at the beginning and on every seventh day up to the end of the experiment. The birds were sacrificed to collect a blood sample for hematological and biochemical analysis.

Layout of the Experiment

Management

Fresh and dried rice husk was used as a litter at a depth of 2 cm. Each pen (5 ft x 4 ft) was allocated for ten birds. To keep up the requisite temperature and humidity inside the pens, all the windows of the laboratory were kept open during the day and during the night a 100-watt bulb was provided as a source of heat.

Measurement of body weight

The body weight of each bird was measured on day 16 of age (day 1 experiment and subsequently at every seven days' interval up to the end of the experiment.

Collection of blood & Preparation of serum

About 5.0 ml of blood was collected from each bird for hematological studies. The hematological studies were performed within two hours of collection. The serum sample collected from the blood was centrifuged at 1000 rpm for 15 minutes to have a clearer serum. The serum samples were separated and stored at -20^0C till the analysis.

Determination of hematological & biochemical parameters

Total Erythrocyte Count (TEC), hemoglobin concentrations (Hb), and Erythrocyte Sedimentation Rate (ESR) were performed as per the technique described by (Lamberg and Rothstein, 1977). Total Cholesterol, triglyceride, high-density lipoprotein, and alkaline phosphatase of blood serum were determined according to the procedure described by (Trinder, 1969).

Statistical Analysis

The data were collected and the Mean ± SE was calculated by using descriptive statistics. An analysis of variance (ANOVA) table had been constructed. The mean difference among the treatments was determined as per Dancan's Multiple Range Test (Gomez, 1984).

Results and Discussion

The experiment was conducted to study the effects of nishyinda and papaya leaf extract on live and dressed weight and weights of liver, skin, legs, hematological (total erythrocyte count, hemoglobin content, and erythrocyte sedimentation rate) and bio-chemical (total cholesterol, triglyceride, high-density lipoprotein, and alkaline phosphatase) parameters in broilers.

Table 1: Body weights of birds on different days (mean ± SE).

Broiler Groups	Initial wt. (gm.)	After the 7th day wt. (gm.)	After the 14th day wt. (gm.)	Harvesting wt.(gm.)
Control	297.33±10.41	720.00±26.46c	923.33±87.37c	1186.67±80.83c
Nishyinda	300.00±20.00	798.67±25.17b	1183.33±76.38a	1460.00±85.44a
Papaya	301.33±10.41	800.67±51.32a	1150.00±70.00b	1426.67±75.33b
P value	0.072	0.002	0.0001	0.002
Level of sig.	NS	**	**	**

The values with a different superscript letter(s) in the same column differ significantly (p <0.05).

Table 2: Effects of nishyinda and papaya on weights (mean ± SE) of different organs in different groups of broiler

Broiler Groups	Wt. of legs (gm.)	Wt. of the liver (gm.)	Dressed Wt. (gm.)	Breast Wt. (gm.)	Wt. of skin including feathers (gm.)
Control	77.69±1.68^{b}	32.98±4.08^{b}	704.94±83.35	242.28±17.68	163.29±13.19^{b}
Nishyinda	87.02±1.40^{a}	42.55±0.70^{a}	820.79±14.91	263.34±8.24	194.01±6.15^{a}
Papaya	84.74±2.99^{a}	41.62±1.62^{a}	804.99±24.24	251.49±9.76	191.37±8.92^{a}
P value	0.004	0.007	0.062	0.442	0.002
Level of sig.	**	**	NS	NS	**

The values with a different superscript letter(s) in the same column differ significantly (p <0.05).

Table 3: Effects of nishyinda and papaya leaf extract on hematological parameters (mean ± SE) in different groups of broilers

Broiler Groups	TEC(Million/mm3)	ESR (mm in first hour)	Hb (gm/dl)
Control	2.0±0.10c	4.67±0.58b	7.07±0.12
Nishyinda	2.3±0.10b	5.67±0.58a	7.13±0.12
Papaya	2.5±0.10b	6.00±0.00a	7.33±0.31
P value	0.016	0.031	7.33±0.31
Level of sig.	*	*	NS

Values with different superscript litter in the same column differ significantly (P < 0.05).

Table 4: Effects of nishyinda and papaya leaf extract on biochemical parameters (mean ± SE) of broilers.

Broiler Groups	Triglyceride (mg/dL)	Total cholesterol (mg/dL)	HDL (mg/dL)	Alkaline phosphate (U/L)
Control	102.41±2.17^{a}	207.08±7.71^{a}	48.53±5.41^{b}	264.45±55.65^{b}
Nishyinda	64.66±8.46^{b}	202.72±6.11^{ab}	106.8±65.96^{a}	464.37±74.83^{a}
Papaya	74.90±10.93^{b}	192.92±0.24^{b}	50.73±6.90^{b}	384.20±19.93^{a}
P value	0.003	0.055	0.001	0.012
Level of sig.	**	*	**	*

Values with different superscript litter(s) in the same column differ significantly (P < 0.05).

Effects of nishyinda and papaya leaf extract on growth performance, different organs, hematological parameters & biochemical parameters of broilers are presented in Tables 1 to 4.

Body weight on (day 16 of age) initial day of the experiment was more or less similar. At harvesting day, the highest body weight was recorded in nishyinda group (1460.00 ± 85.44 gm.) and the lowest in the control group (1186.67 ± 80.83 gm). The treated values increased significantly (p<0.05) compared to the control but differences among treated groups were insignificant (p>0.05). Similarly, Kamal et al. (2015) provided Neem, Nishyinda, and Papaya leaves powder with drinking water and reported a significant enhancement in the live body weight of broilers

compared with the control group. Our results were also in line with those indicated by Molla et al. (2012) who maintained rations containing nishyinda, black pepper, and cinnamon, which manifested higher weight gain.

Compared to the control, the leg weight increased significantly ($p < 0.05$) in all treated groups. The liver & breast weight was recorded significantly ($p<0.05$) highest in nishyinda group followed by papaya group and lowest in the control group. The skin weight including feathers observed lowest in the control group significantly ($P<0.05$) compared to the other two groups & the highest was recorded in nishyinda group.

The values of total erythrocyte count (TEC) & hemoglobin (Hb) content in all treated groups and control group were more or less equivalent and the values were within the usual range. The values were recorded as highest in papaya group and lowest in the control group. Erythrocyte sedimentation rate varied significantly ($p<0.05$) in nishyinda and papaya groups compared to the control group. These results coincide with those of Molla et al. (2012) where the performance of birds that complied Neem and Nishyinda (D) showed significantly better performance on hematological traits as compared to the control group. Similar results of the current study were reported by Sorwar et al. (2016) who traced that papaya leaf had a higher total erythrocyte count and erythrocyte sedimentation rate.

Significantly ($p<0.05$) higher triglyceride was recorded in the control group compared to all others. In the control group, the highest total cholesterol was observed. Total cholesterol decreased significantly ($p < 0.05$) in the treated groups compared to the control group. The decreased level of cholesterol investigated in the treated groups of broilers in this study agreed with Obiakaonu et al., (2012) whose work indicated a decrease in the level of cholesterol as pawpaw leaf meal level rose in the ration of broilers. This observation was in disagreement with the work of Ezenwosu et al., (2022) who fed pawpaw leaf meal at different levels in the diet of broilers but recorded an increase in the level of cholesterol. This may be a result of the variation in the level of photochemical contained in pawpaw leaf meal, levels used in research, variety, and methods of preparation of the test materials. The lowest serum HDL was found in the control group and highest in nishyinda group. In the medicated groups there was an insignificant change between the two groups. Serum alkaline phosphatase value was lower in papaya group compared to nishyinda group. A significant difference in triglycerides, cholesterol, and HDL values were observed in this present study disagreed with the work of Muhammad et al., (2020) who administered pawpaw leaf extract to broilers and observed no significant differences in the values of triglycerides, cholesterol, and HDL among the treatments. This may as a result of the variation in the variety of the test material and levels used in both types of research. During exploration, no mortality was recorded in the broiler because of the antimicrobial, immune-stimulatory, anti-stress, fungi static, and insecticidal properties of these two herbal medicines (Kulkarniet al., 2008; Singh et al., 2020).

Conclusion

This studyrevealed that there is a positive relationship between the supplementation of nishindya & papaya on the body weight gain of broilers. Increase HDL in blood a very good observation which needs more justification through further study. However, these medicinal plant extract can be used for growth promoters in poultry industry.

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Ethical approval**:** The experiment was approved by the institutional animal ethics committee, Bangladesh Agricultural University.

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