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EFFECT OF KALO JEERA SEEDS AND PAPAYA LEAF SUPPLEMENTATION ON THE PERFORMANCE OF BROILER

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ABSTRACT

This experiment was conducted to determine the effect of papaya leaf (*Carica papaya*) and kalo jeera (*Nigella sativa*) seeds powdered supplementation in drinking water as a growth promoter in broiler chickens. A total of 20 Cobb-500 broiler chicks (day-old) were purchased from local hatchery (Nourish Poultry and Hatchery Ltd.) and after seven days of acclimatization chicks were randomly divided into two groups, A (n=10) and B (n=10). The group A was kept as a control and not treated. The group B was supplemented with papaya leaf and kalo jeera powder with feed and water. Weekly observations were recorded for live body weight gain up to 5th weeks and hematological tests were performed at 35th day's age of broiler to search for hematological changes between control (A) and treatment (B) groups. The initial body weight of groups A and B on 1st were 41.00±0.56 gm and 41.50±0.35 gm, respectively and after 35th day of experiment final body weight were 1470±57.35 gm and 1720±58.56 gm, respectively and economics of production were analyzed and found that net profit per broiler was Tk. 8.91 and Tk. 20.69, respectively. The treatment group B was recorded statistically significant (at 1% level) increased (17.00%) for live body weight than that of control group A. The hematological parameters total erythrocyte count (TEC), erythrocyte sedimentation rate (ESR) and hemoglobin (Hb) estimation value of treatment group shows significant difference, while hemoglobin estimation does not show significant difference from control group. The results suggest that better growth performance could be achieved in broilers supplemented with papaya leaf and kalo jeera seeds.

Keywords: Papaya leaf, kalo jeera seeds, growth promoter, broiler chicken

INTRODUCTION

Bangladesh is a densely populated country and growth of population is increasing very fast in comparison to its land size, as a result huge pressure is created on people's basic need. Demand of protein of this booming population is a great threat for us. It is evident that a substantial majority of the population suffers from varying degrees of malnutrition, including protein-energy malnutrition, micro-nutrient deficiencies, iodine deficiency disorder, iron deficiency, anemia, and vitamin deficiencies. In Bangladesh, per head intake of meat is only 11.27 kg and 30 eggs per year which is well below of standard level (WHO, 1997). Broilers are produced specifically for meat production, these includes small fryers to large roaster type chicken (Begum *et al.*, 2010). 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 and Tabiedian, 2005), in order to achieve this poultry farmers make use of synthetic growth promoters to enhance feed utilization and growth performance of broilers (Ansari *et al*., 2008).

The term "antibiotic growth promoter" is used to describe any medicine that destroys or inhibits bacteria and is administered at a low, sub-therapeutic dose (Islam *et al.*, 2013b). Infectious agents reduce the yield of farmed food animals and, to control these, the administration of sub-therapeutic antibiotics and antimicrobial agents has been shown to be effective. The use of growth-promoters is largely a problem of intensive farming methods. Many of these synthetic drugs and growth promoters are supplemented to broiler diets to effect rapid growth, but 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). Medicinal plants are cheap and renewable sources of pharmacologically active substances and are known to produce certain chemicals that are naturally toxic to bacteria (Basile *et al.*, 1999).

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Medicinal plants have been used for curing diseases for many centuries in different indigenous systems of medicine as well as folk medicines (Prasad *et al.*, 2011). Moreover, medicinal plants are also used in the preparation of herbal medicines as they are considered to be safe as compared to modern allopathic medicines. Many researchers are focusing on medicinal plants since only a few plant species have been thoroughly investigated for their medicinal is a source of nutrients such as acarotenoids, vitamin C, folate and dietary fiber (Ali and Blunden, 2003). Papaya skin, pulp and seeds also contain a variety of phytochemicals, including lycopene and polyphenols (Kale *et al.*, 2003). In preliminary research, danielone, a phytoalexin found in papaya fruit, showed antifungal activity against pathogenic fungus of papaya (Satyanarayanana *et al*., 1982). In some parts of the world, papaya leaves are made into tea as a treatment for malaria. In belief that it can raise platelet levels in blood, papaya may be used as a medicine for dengue fever. Papaya is marketed in tablet form to remedy digestive problems. Papain is also applied topically for the treatment of cuts, rashes, stings and burns. Papain ointment is commonly made from fermented papaya flesh, and is applied as a gel-like paste (Nath *et al*., 2012). Papaya seeds might contain antibacterial properties against *Escherichia coli*, *Staphylococcus aureus* or *Salmonella typhi* (Kibria *et al*., 2009). Papaya seed extract may have effects in toxicity-induced kidney failure. Among various medicinal plants, *Nigella sativa* is emerging as a miracle herb with a rich historical and religious background since many researches revealed its wide spectrum of pharmacological potential (Sarker *et al.*, 2014). *Nigella sativa* is commonly known as black seed which is native to Southern Europe, North Africa and Southwest Asia and it is cultivated in many countries in the world like Middle Eastern Mediterranean region, South Europe, India, Pakistan, Syria, Turkey, Saudi Arabia (Satrija *et al*., 1994).The seeds of *N. sativa* and their oil have been widely used for centuries in the treatment of various ailments throughout the world. And it is an important drug in the Indian traditional system of medicine like Unani and Ayurveda. *N. sativa* has been extensively studied for its biological activities and therapeutic potential and shown to possess wide spectrum of activities *viz.* as diuretic, antihypertensive, antidiabetic, anticancer and immunomodulatory, analgesic, antimicrobial, anthelmintics, analgesics and anti-inflammatory, spasmolytic, bronchodilator, gastro protective, hepatoprotective, renal protective and antioxidant properties (Sandhya and Veerannah, 1996). The objective was conducted to determine the effect of papaya leaf and kalo jeera seeds powdered supplementation in drinking water as a growth promoter in broiler chickens.

MATERIALS AND METHODS

This study was executed at the Department of Pharmacology, Bangladesh Agricultural University (BAU), Mymensingh during the period from 26th July, 2014 to 5th October, 2014. A total of 20, day-old Cobb-500 broiler chicks purchased from a local hatchery (Nourish Poultry and Hatchery Ltd.) and reared in experimental shed of Department of Pharmacology. All birds were provided same management conditions like floor space, temperature, relative humidity, ventilation and light. Immediately after enter into the shed all chicks were given vitamin C and glucose to prevent the stress for transportation. The broiler chicks were kept in the same compartment for 7 days and brooding temperature were correctly maintained. Optimum light was provided daily throughout the experimental period. The chicks were brooded at 35^{o}C during first week and thereafter; the temperature was reduced by 3^{o}C every week until the temperature reached to the room temperature. The litter management was also done very carefully. The starter and finisher broiler rations were supplied to the broiler chicken appropriately. A weighed amount of the ration was offered to the birds twice a day and the left over feed was collected to calculate feed consumption of the birds.

Papaya leaves were harvested green from Pharmacology Medicinal plants garden, BAU, the leaves were washed, chopped and air dried in a well-ventilated room for 10 days. The dried leaves were ground separately using the Mixture blender to produce Papaya leaf and stored in air-tight bags. Kalo jeera seeds were purchased from local K.R. Market, BAU, Mymensingh, washed and dried and crushed in mortar pestle to paste.

After 7 days all the 20 broiler chicks were randomly divided into 2 groups A (n=10) and B (n=10). Treatment group B was given the mixture of papaya leaf and kalo jeera (1% each in drinking water). All the chicks of treated and control groups were closely observed for 35 days and following parameters were studied. Broilers chicks of control and treatment groups were weighed with spring weighing machine. The weight of broiler

chickens was taken weekly. Mean live weight gains of each group of chicken on 1st, 7th, 14th, 21st, 28th and 35th days were recorded.

Blood samples were collected from wing vein of chicken of both control and treated groups at 35th days to study the blood parameters according to the method described by Lamberg and Rothstein (1977).

Statistical analysis

The data were analyzed statistically between control and treated groups of broiler by the analysis of variance (ANOVA) technique in completely randomized design (CRD). The differences were considered statistically significant at 5% level (P<0.05).

RESULTS AND DISCUSSION

The body weight gains were found higher in treated group compared to non-treated control group (Table 1). Similarly, Ahmad (2005) reported significant increase in the live body weight of broilers compared with control group. Statistical analysis of the data did not show any difference between the dressing percentage, relative gizzard weight, relative spleen weight and relative pancreas weight of the birds of different feeding group (Table 2). Wanker *et al*. (2009) reported increase in feed efficiency in kalo jeera seeds and papaya leaf fed group, which is in agreement with the findings of the present study.

The average rearing cost of broilers in A and B groups were Tk. 178.00 and Tk. 188.00 respectively (Table 3) excluding the cost of labor. Miscellaneous cost summed up Tk. 20.00 per broiler, which included the estimated cost of electricity, litter and disinfectant (Rahman *et al.*, 2014). The average live weight/broiler in groups A and B were 1.470 kg and 1.720 kg respectively. The broilers were sold in live weight basis at the rate of Tk. 130.00/kg. The net profit/kg live weight in the respective group was found to be Tk.8.91 and Tk. 20.69, respectively.

Table 1. Effects of papaya leaf and kalo jeera seeds on live body weight of broiler

Variables	Average weight (g) (Mean ± SEM)		P value	Significance level
	Control	Papaya leaf and kalo jeera seeds		
Initial live weight on 1th day	42.45± 2.56	42.89 ± 3.35	.000	**
Final live weight on 35th day	1480± 47.35	1740± 58.56	.000	**
Weight gain	1438± 43.79	1698± 54.25	.000	**
Feed consumption	3200 ± 35.49	3200 ± 52.29	.000	**
FCR		2.16 1.84		

** Significant (P<0.05)

Table 2. Effects of papaya leaf and kalo jeera seeds on body weight of broiler on dressing percentages, and relative weight gain of different organ of broiler from 2 to 5 weeks of age

Variables	Average value (Mean ±SEM)		P value	Significance level
	Control	Papaya leaf and kalo jeera seeds		
Dressing percentage	64.410 ± 0.414	64.470 ± 0.961	0.939	-
Relative heart weight	0.420 ± 0.032	0.501 ± 0.032	0.002	**
Relative gizzard weight	1.460 ± 0.034	1.440± 0.014	0.606	-
Relative liver weight	2.530±0.034	2.610±0.032	0.001	**
Relative spleen weight	0.120±0.011	0.130± 0.015	0.011	**
Relative pancreas weight	0.230± 0.011	0.250± 0.017	0.001	**

** Significant (P<0.05); relative weight (g) = weight of organ / live body weight of bird X 100; dressing % = dress weigh of bird / live weigh of bird

Table 3. Cost-benefit analysis of broiler production by using feed supplemented with papaya leaf and kalo jeera seeds from 2 to 5 weeks of age

Description	Group-A	Group-B
Cost/chick (tk)	30.00	30.00
Average feed consumed (Kg)/chicks	3.200	3.200
Feed price/kg (tk)	40.00	40.00
Cost of herbal growth promoters (tk)	0.00	10.00
Feed cost (tk)	128.00	128.00
Miscellaneous (tk)	20.00	20.00
Total cost/broiler (tk)	178.00	188.00
Average live weight (kg)	1.470	1.720
Sale price/Kg live weight(tk)	130.00	130.00
Sale price/broiler (tk)	191.10	223.60
Net profit/broiler (tk)	13.10	35.60
Profit/ Kg live weight (tk)	8.91	20.69

Supplementation with papaya leaf and kalo jeera seeds was more profitable than control group (Table 3) but the difference was not significant ($p>0.05$). Observation of hematological parameter (TEC, ESR and Hb) on 35th day showed significant difference ($P<0.05$) between the control and papaya leaf and kalo jeera seeds treated groups while Hb did not show any significant difference compared to control group (Table 4). This discrepancy could be explained by two ways. Firstly, the duration of the experiment period could have an influence on the hematological parameters as we know that the lifespan of RBC is approximately 120 days. Our experiment was limited for a short period of time (35 days) in comparison to other's work. Secondly, Papaya leaf and kalo jeera seeds having no significant effect on the hematological parameters in broiler may suggest that these herbs have no harmful effects, particularly on hematological parameters.

Table 4. Effect of papaya leaf and kalo jeera seeds on hematological parameters of broiler

Group	TEC (million/mm^3)	ESR (mm in first hour)	Hb (gm/dl)
Control	2.01±0.102	4.60± 0.58	7.10± 0.13
Treatment	2.57±0.23	6.13±0.64	7.35±0.13
P value	0.017	0.032	-
Level of significance	**	**	-

**Values shows in the same column differ significantly ($P<0.05$)

Birds supplemented with papaya leaf and kalo jeera seeds leave extract had higher body weight gain, weekly gain in weight, feed consumption and feed efficiency. These results may be due to antimicrobial and anti-protozoal properties (Meraj, 1998) of papaya leaf and kalo jeera seeds leaves, which help to reduce the microbial load of birds and improved the feed consumption and feed efficiency of the birds (Molla *et al.*, 2012). It is concluded that supplementation 2 ml of papaya leaf and kalo jeera seeds powder/kg poultry ration of treatment groups caused significant increase in live body weight and improvement in weekly gain in weight and feed-efficiency as compared to that of control group of poultry. Our results are in line with those reported by Mahejabin *et al.* (2015) who carried out a research work in broiler fed rations containing papaya leaf and kalo jeera seeds leave extract showing higher weight gain. In our study, the use of papaya leaf and kalo jeera seeds leave extract showed more increase in live weight of the birds as compared to control, which is also in agreement with the findings of (Poulter and Caygil, 1985) who concluded that papaya leaf and kalo jeera seeds may be incorporated as a growth promoter in the ration of Japanese quils (Samanta and Dey, 1991).

Better feed conversion ratio of the broiler using rations supplemented with papaya leaf and kalo jeera seeds leave extract may be attributed to the antibacterial properties of these supplements, which resulted in better absorption of the nutrients present in the gut and finely leading to improvement in feed conversion ratio of the rations (Khatun *et al*., 2013). This study has revealed that papaya leaf and kalo jeera seeds extract had no significant effect on the hematological parameters (Table 4). This findings, however, does not agree with Islam *et al.* (2013a) who reported that bitter principles of medicinal plants possess a strong influence on hematological traits particularly Hb, depending on their nutritional status.

CONCLUSION

From this study it is evident that the treatment groups are more profitable than the control group. Besides these, treatment groups are suitable for human health because there is no residual effect of medicine and also cost effective. This preliminary study showed that the formulation could be used as an alternative to commercially available growth promoters. However, further studies are essential to assess the impact of these medicinal plants on the quality of broiler meat and immune status to ensure the safety of human consumption.

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