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BROILER PRODUCTION BY USING POLYHERBAL MEDICATION (NEEM, NISHYINDA, TULSI AND TURMERIC EXTRACT)

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ABSTRACT: The present work was aimed at knowing the effect of polyherbal extracts {neem(N), nishynda(N), tulsi(T) and turmeric(T) i.e. NNTT} as growth promoter at the (i) growth performance of broiler and on the (ii) dressing percentage, relative weight of heart, gizzard, liver, spleen and pancreas of the broiler. A total of 50 day-old broiler chicks were purchased from kazi farms limited and randomly divided in two groups, viz., A and B. Group A served as control and was without any supplementation in drinking water. Whereas group B were supplemented with 1ml of polyherbal (NNTT) extracts per liter drinking water. Live body weight was recorded at on 7th day and the final weight was recorded on 42nd day, total feed consumption, feed efficiency and blood parameters of birds were recorded on 21st day and on 42nd day. The treatment groups i.e. B (1700±51.73) recorded significantly ($P<0.05$) higher means for live body weight than that of control group A (1600±31.23). The birds in group B supplemented with 1ml polyherbal extracts gained the highest live weight among the treated groups and showed the best feed conversion ratio (1.85). It is, therefore, concluded that dietary inclusion of polyherbal (NNTT) extracts in the drinking water may be used for economical and efficient production of broiler.

KEYWORDS: Growth Promoter, Dressing Percentage, Blood Parameter, Feed Conversion Ratio and Dietary Inclusion, Weight Gained.

1 INTRODUCTION

Most of the poultry farmers are interested in broiler production due to its quick returns, smaller marketing age, less space requirement, and higher weight gains. Several chemical compounds and antibiotics have been identified in herbaceous plants by researchers, which play a key role in human and animal health. Due to favorable conditions, many herbaceous medicinal plants are found in Bangladesh. The medicinal plant turmeric (*Curcuma longa)* is commonly used as a spice in human food. Turmeric is a perennial herb, and a member of *Zingiberacae* family. The plant grows to a height of 3 to 5 feet and has oblong pointed leaves, which bears funnel shaped yellow flowers. The rhizome is the part used both as spice and medicine. It is usually boiled, cleaned, and dried, yielding a yellow powder. The active ingredients found in turmeric are curcumin, demethoxycurcumin, bisdemethoxycurcumin, and tetrahydrocurcuminoids. Plant extracts were found to have and anti-oxidative value. Some pharmacological activities of Turmeric as nematocidal and anti-inflammatory were demonstrated. More over, protective effects of turmeric as food additives on aflatoxin-induced mutagenicity and hepatocarcinogenicity [14].

The poultry industry has become an important economic activity in many countries. It is conceivable that herbal agents could serve as safer alternatives as growth promoter due to their suitability and preference, lower cost of production, reduced risks toxicity and minimum health hazards. Interestingly recent biological trials of certain herbal formulations in India as growth have shown encouraging results and some of the reports have demonstrated improvement with respect to weight gain, feed efficiency, lowered mortality, increased immunity and increased livability in poultry birds [7]. Also these

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herbal growth promoters have shown to exert therapeutic effects against liver damage due to feed contaminants like aflatoxin [3]. Indo-Pak subcontinent is abundant in herbal wealth and innumerable medicinal plants possessing interesting pharmacological properties and still awaits exploitation by scientific evidences in the field of poultry feeding. Therefore, it is a matter of great interest to try some of our indigenous medicinal plants or herbs as growth promoter in poultry diets. Various herbal products are being used as growth promoter in the poultry rations like neem, tulsi,.nishyinda and Turmeric. The present work was designed to following objectives.

(i) The growth performance of broilers supplemented with neem, nishyinda, tulsi and turmeric extract in broiler.

(ii) The effect of neem, nishyinda, tulsi and Turmeric extract on body weight performance and on blood parameters of broiler.

2 MATERIALS AND METHODS

2.1 COLLECTION OF PLANT MATERIALS

Neem, nishyinda, tulsi leaves and Turmeric were selected for effectiveness as growth promoter on poultry. Mature and disease free neem, nishyinda and tulsi leaves were collected from BAU campus. Turmeric was purchased from K.R. Market, Bangladesh Agricultural University, Mymensingh.

2.2 PREPARATION OF LEAVES NEEM, NISHYNDA, TULSI AND TURMERIC (NNTT) EXTRACT

For the preparation of dust, the herbal leaves neem, nishynda, and tulsi and turmeric were dried in sun for 10 days and followed by oven at 55-60°C for 2 days. The dried herbal leaves NNTT were pulverized with a blender. A 25 (unit) mesh diameter sieve was used to obtain the fine dust, after that dust was preserved in airtight plastic container until they were directly used for screening and preparation of water extract. A total 10g of herbal powder (2.5 gm from each ingradient i.e. neem, nishynda, tulsi and turmeric) was added to 90ml of distilled water and was shaken overnight at room temperature, filtered and distilled water was added upto 100ml to make 10% extract.

2.3 COLLECTION AND MANAGEMENT OF CHICKEN

Broiler chicks of 1 day old were collected from Kazi Farms Limited. The finally selected 50 chickens were allowed to acclimatize for 7 days in the experimental shed. The body weights (b.wt.) of assigned chicks were taken with digital weighting machine and the results were recorded. During acclimatization the chicken were supplied with recommended feed and water, whereas the chicks on both the extremes were discarded. During the acclimatization period the birds were fed a commercial broiler starter mash *ad libitum*. These chicks were randomly divided into 2 experimental units (replicates) having twenty five chicks each. These experimental units were further allotted to one treatment groups *viz.*, A control; B 1ml of Polyherbal (NNTT) extract . The experimental birds were fed (*ad libitum*) an experimental ration with or without supplementation of polyherbal. Group A served as control and without any supplementation of polyherbal (NNTT extract) in drinking water. Whereas group B supplemented with 1ml of polyherbal (NNTT extract) in drinking water. The experimental rations consisted of broiler starter mash and broiler finisher mash, which were fed from 2-4 and 5-6 weeks of age, respectively.

The experimental units were kept on a floor litter system in separate pens each measuring 3 x 4 square feet. The pens were thoroughly cleaned, white washed and disinfected before putting the experimental chick into these. All the birds were provided same management conditions like floor space, temperature, relative humidity, ventilation and light. Twenty-three hour light was provided daily through out the experimental period. The chicks were brooded at 35°C during first week and thereafter; the temperature was reduced by 3°C every week until the temperature reached to the room temperature i.e., 25±1ºC. All the groups were reared under the similar conditions of temperature, humidity, light, ventilation and floor space. 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. Fresh and clean water was made available at all the times. The experiment was conducted according to the completely randomized design and data about per replicate initial body weight, Final body weight, total feed consumption and mortality were recorded during the experimental period (1-6 weeks of age). The data collected were utilized to calculate growth rate, efficiency of feed utilization and mortality percentage. The data collected on the production cost of broiler were used to find the commercial viability of the herbal growth promoter, Cost of production of the broiler in each group was calculated on per kg basis to work out the economics of production of the birds for each group, three birds from each replicate were picked up randomly and slaughtered for their dressing percentage and giblet weight (heart, liver,

gizzard & spleen) on 42nd day. The weight of pancreas was also recorded. The slaughtered birds were scalded by immering them into the water at temperature ranging from 180-190°F [6]. After that, the birds were manually plucked by hanging them on shackles by their feet. The weight of each carcass was recorded and dressing percentage was calculated on the basis of dressed meat including giblets and skin. After evisceration, the heart, liver, gizzard, spleen and pancreas of the slaughtered birds were taken out and weighed for their absolute weight. The data thus obtained were used for the calculation of (a) dressing percentage (%) (Dress weight of bird/Live weight of bird) × 100) (b) relative weight of (i) heart (ii) liver (iii) gizzard (iv) spleen and (v) pancreas. After evisceration, relative weights (g) [(weight of organ/live body weight) X 100] of various internal organs such as liver, heart, gizzard, spleen and pancreas of the slaughtered bird were recorded. The data thus collected regarding weight gain, feed consumption, feed conversion ratio, dressing percentage and relative weights of heart, gizzard, liver, spleen and pancreas were subjected to the analysis of variance (ANOVA) technique in completely randomized design. The differences in the means were compared by the Duncan's Multiple Range following [15].

2.4 EXPERIMENTAL DESIGN

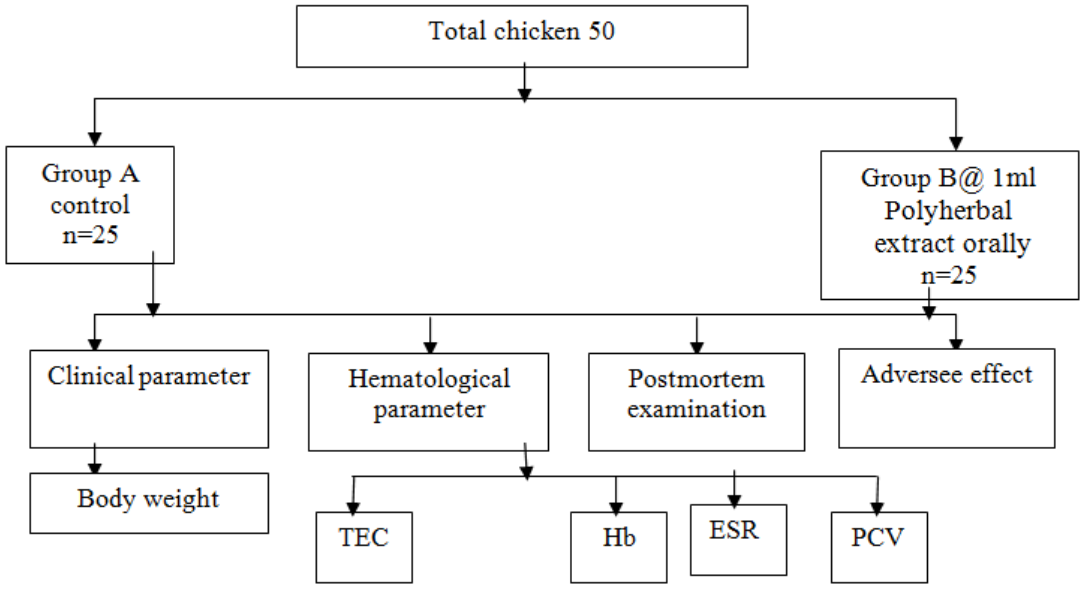

Fig. 1 Layout of the experiment

All the 50 chicks are randomly divided into 2 groups (A and B) for assessing the efficacy of Plants leaves extract as growth promoter on broiler

Chickens of group 'A': was kept as control and was not treated.

Chickens of group 'B': was treated with Polyherbal (NNTT extract) @ 1ml by dropper for consecutive six weeks.

All the chicken of treated and control groups were closely observed for 42 days after treatment and following parameter were studied:

2.5 CLINICAL EXAMINATION

I. The effect of the Polyherbal extract on body weight and feed consumption was recorded before and during administration of treatment.

II. Chickens under treatment and control groups were weighed with electric weighing machine. The weight of each chicken was taken before feeding in the morning, at noon and afternoon. The average of these three weights was calculated and recorded.

Mean live weight gain of each group of fowls on 7th and 42nd days was recorded.

2.6 HEMATOLOGICAL PARAMETERS

Blood samples were collected from wing vein of chicken of both control and treated groups on 21st and 42nd days. The effects of the polyherbal (NNTT) extract and the following parameter were observed:

(a) Total erythrocyte count (TEC)

(b) Hemoglobin estimation (Hb)

(c) Packed Cell Volume (PCV)

(d) Erythrocyte sedimentation rate (ESR)

2.6.1 DETERMINATION OF TOTAL ERYTHROCYTE COUNT (TEC)

Total erythrocyte count was done following the method described by [8]. Well-mixed blood sample was drawn with red blood cell diluting pipette exactly up to 0.5 marks of the pipette. Outside of the tip of the pipette was wiped with cotton. Then the pipette was immediately filled with the red cell diluting fluid (Hayem's solution) up to 101 marks. The free end of the pipette was wrapped around with the rubber tube stretching to both the ends and held with thumb and middle finger. The content of the pipette was mixed thoroughly by shaking with 8-knot motion for 3-5 minutes. Then the counting chamber was placed with special cover glass under microscope using low power (10x) objectives. After discarding 2 or 3 drops of fluid from the pipette, a small drop was placed to the edge of the cover glass on the counting chamber as the entire area under the cover glass was filled by the fluid. One-minute time was spared to allow the cells to settle on the chamber under the cover glass. Taking 5 larger squares (4 in the 4 corner and the central one) of the central large square, the cells were counted from all the 80 small squares (16 x 5) under high power objectives (45x). After completion of counting, the total number of RBC was calculated as number of cells counted x 10, 000 and the result was expressed in million/µl of blood.

2.6.2 DETERMINATION OF HEMOGLOBIN CONCENTRATIONS (HB)

The N/10 hydrochloric acid (HCl) was taken in a graduated tube up to 2 marks with the help of a dropper. Well-homogenized blood sample was then drawn into the Sahli pipette up to 20 cm. mark. The tip of the pipette was wiped with sterile cotton and the blood of the pipette was immediately transferred into the graduated tube containing hydrochloric acid. This blood and acid were thoroughly mixed by stirring with a glass stirrer. There was a formation of acid hematin mixture in the tube by hemolysing red blood cells by the action of HCl. The tube containing acid hematin mixture was kept standing in the comparator for 5 minutes. After that distilled water was added drop by drop. The solution was mixed well with a glass stirrer until the color of the mixture resembled to the standard color of the comparator. The result was read in daylight by observing the height of the liquid in the tube considering the lower meniscus of the liquid column. The result was then expressed in g %. The above procedure was matched by the Hellige hemometer method as described by [8]

2.6.3 DETERMINATION OF PACKED CELL VOLUME (PCV)

The citrated well mixed blood sample was drawn into special loading pipette (Wintrobe pipette). The tip of the pipette was inserted up to the bottom of a clean, dry Wintrobe hematocrit tube. Then the Wintrobe tube was filled from the bottom by pressing the rubber bulb of the pipette. As blood came out, the pipette was slowly withdrawn but pressure was continued on the rubber bulb of the pipette so as to exclude air bubbles. The tip of the pipette was tried to keep under the rising column of blood to avoid foaming and the tube was filled exactly to the 10 cm mark. Then the Wintrobe hematocrit tube was placed in the centrifuge machine and was centrifuged for 30 minutes at 3000 rpm. Then, the hematocrite or PCV was recorded by reading the graduation mark; the percent volume occupied by the hematocrit was calculated by using the following formula [8]

PCV% = **Erreur !** X 100

2.6.4 DETERMINATION OF ERYTHROCYTE SEDIMENTATION RATE (ESR)

The fresh anticoagulant blood was taken into the Wintrobe hematocrit tube by using special loading pipette exactly up to 0 marks. Excess blood above the mark was wiped away by sterile cotton. The filled tube was placed vertically undisturbed on the wooden rack for one hour. After one hour the ESR was recorded from the top of the pipette. The result was expressed in mm/in 1st hour.

2.7 POSTMORTEM EXAMINATION FOR SIDE EFFECTS

Three chickens from each group were slaughtered to see if there were any pathological changes present on 42th day of treatment. There was no significant pathological change in any internal organs of the chickens of treated groups.

2.8 STATISTICAL ANALYSIS

The data were analyzed statistically between control and treated groups of chicken by the well know *student's test* ('t' test).

Plate 1. Neem tree (Azadirachta indica)

Plate 2. Neem leaves powder (Fine grinding)

Plate 3. Nishyinda plant (Vitex nigundo)

Plate 4. Leaves of tulsi (Ocumum sanctum)

Plate 5. Grinding of tulsi leaves.

Plate 6. Tulsi leaves extract.

Plate 7: Turmeric rhizome

Plate 8: Turmeric powder

Plate 9 : Day old broiler chicks

Plate 10: Broiler chicks (Growing stage)

Plate 11: Broiler in control shed.

Plate 12. Measuring weight of chicken

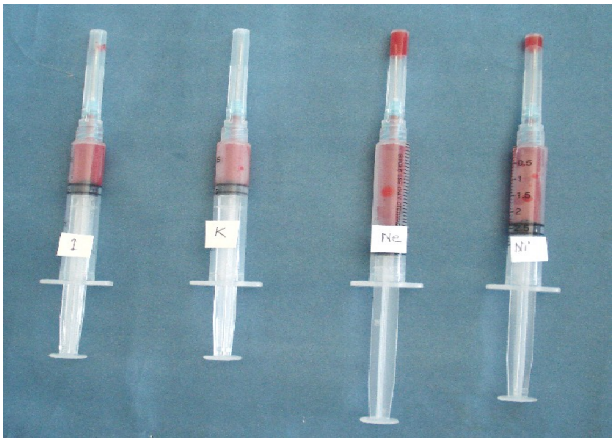

Plate 13: Blood samples for Haematological test

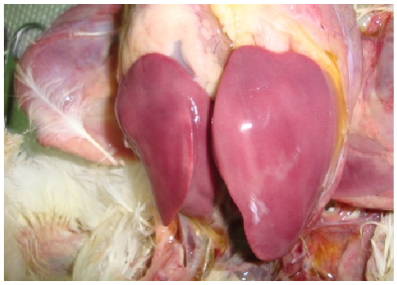

Fig: Liver

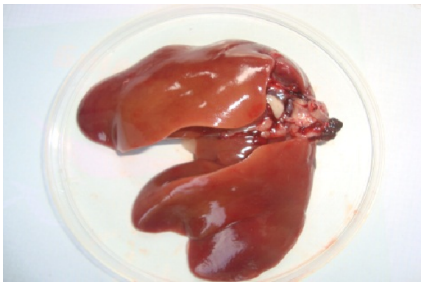

Fig: Liver

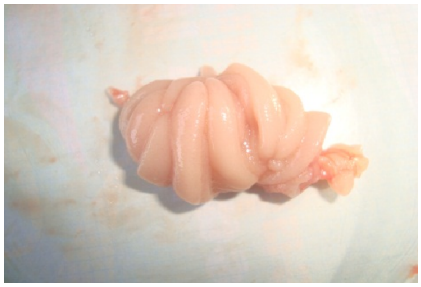

Fig: Bursa

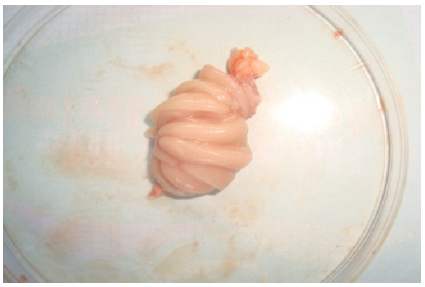

Fig: Bursa

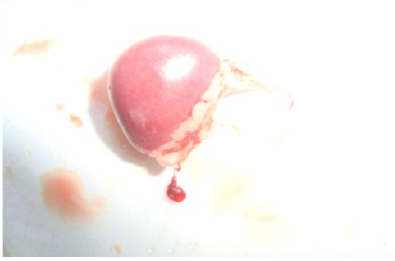

Fig: Spleen

Fig: Spleen

Fig: Gizzard

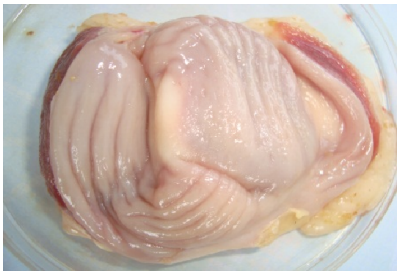

Fig: Gizzard

Control (group A) ***Treatment (group B)***

Plate 14: Post mortem examination of chicken

3 RESULTS AND DISCUSSION

3.1 EFFECT OF POLYHERBAL EXTRACT SUPPLEMENTATION ON GROWTH IN BROILER

The observations for live body weight (ml) means of A and B, groups for six weeks of the experimental period were 1600±31.23 and 1700±52·88, respectively. It is observed from the results in Table 1, that supplementation of polyherbal extract in A and B groups of broiler effected significant (P<0.05) increase in mean live body weights as compared to control (A) group. Similarly [9]. Supplemented neem leaf extract @ 1-2 ml/kg feed and reported significant increase in the live body weight of broiler in the neem fed groups when compared with control group. It is observed from Table1. That, the means of weekly gain in weight (ml) for A and B groups were 112±8.77 and 110±8. Respectively. All the treatment groups of broiler showed numerically higher body weight gain as compared to control (A) group.

The birds supplemented with polyherbal (NNTT extract) group B gained the highest live weight among the treated groups (Table I). Statistical analysis of the data revealed that the supplementation of polyherbal (NNTT extract) in the broiler rations did exhibited significant effect on the feed intake when compared to those of the control group (Table 1). Statistical analysis of the data did not show any difference (P<0.05) between the dressing percentages of the birds of different feeding groups (Table 2). Statistical analysis of the data did not show any difference between the relative gizzard weights of the birds of different feeding groups (Table 2). Statistical analysis of the data did not show any difference between the relative spleen weight of the birds of different feeding groups using ration with or without supplementation of polyherbal.

Table 1. Initial and final live weight, weight gain, feed consumption and feed conversion ratio of broiler fed on polyherbal (NNTT extract) from 1 to 6 weeks of age

Variables	Control	Treatment
	A	B
Initial live weight (g) on 7th day	112±8.77 n=25	110±8.70 n=25
Final live weight (g) on 42nd day	1600±31.23 n=25	1700±52·88 n=25
Weight gain (g)	1488±21.26 n=25	1590±42·02 n=25
Feed consumption (g)	3100	3155
Feed conversion ratio	1.93	1.84

Mean values within the same row, which have different supercripts, were significantly different (P<0.05). In this and other tables, A = control, B = 1ml

Table 2. Dressing percentages, relative giblet weight (heart, gizzard, liver and spleen) and pancreas weight of broiler fed on polyherbal (NNTT extract) from 1-6 weeks of age

Variables	Control	Treatment
	A	B
Dressing percentage	65.40	63.90
Relative heart weight	0.45	0.442
Relative gizzard weight	1.422	1.429
Relative liver weight	2.61	2.59
Relative spleen weight	0.11	0.10
Relative pancreas weight	0.27	0.25

Table 3. Data showing economics of broiler production kept under treatment group from 1 to 6 weeks of age

Description	A (n=25)	B (n=25)
Cost/chick (Tk)	47.00	47.00
Average feed consumed (Kg)/chicks	3.100	3.155
Feed price/kg (Tk)	40.00	40.00
Cost of herbal growth promoter (Tk)	0.00	3.00
Feed cost (Tk)	124.00	126.20
Miscellaneous (Tk)	16.00	16.00
Total cost/broiler (Tk)	187.00	189.20
Average live weight (Kg)	1.600	1.700
Sale price/Kg live wt. (Tk)	140.00	140.00
Sale price/broiler (Tk)	224.00	238.00
Net profit/broiler (Tk)	37.00	47.80
Profit/ Kg live weight (Tk)	23.13	28.12

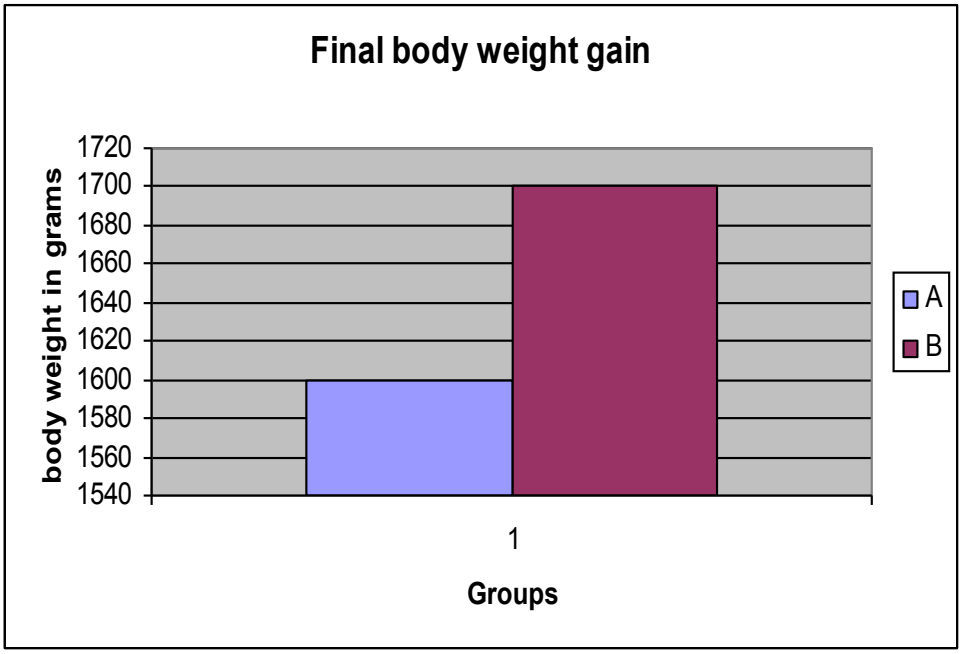

Figure.1 Final Body weight gain

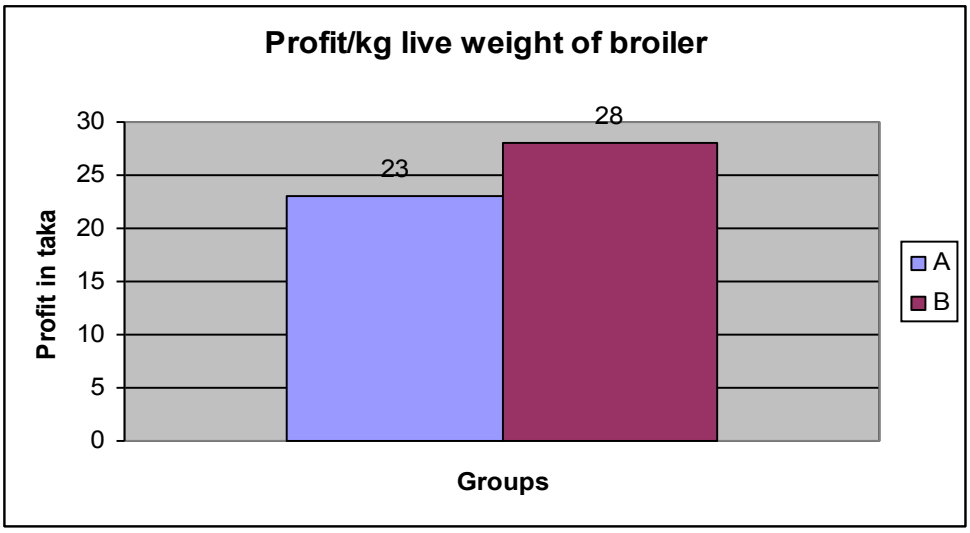

Figure.2 Profit/kg live weight

Ration without the addition of these growth promoter. Supplementation of polyherbal was found to be more profitable than 1.0% level in broiler rearing. However, dietary inclusion of Turmeric extracts fetched the maximum profit as compared to the other treatment groups. The results of the present study are in line with the findings of [1], who reported that dietary inclusion of polyherbal in the rations was more beneficial in broiler production. Similar results have been reported by [5], where the broiler fed rations with added Turmeric, fetched more profit than those using rations without supplementation of this herbal growth promoter. Increase in the profit margin of the birds fed rations containing herbal growth promoter 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 broiler reared on polyherbal supplemented rations.

3.2 STUDY OF POLYHERBAL ON HEMATOLOGICAL PARAMETER OF POULTRY.

Observation of hematological parameter (RBC, Hb, PCV, ESR) on 21 day and 42 day did not show any significant difference ($P<0.05$) between the control and polyherbal (NNTT extract) treated groups (Table 2). Observation of birds also revealed low mortality rate among the birds without any vaccination programme.

Table 4. Study of Polyherbal on hematological parameter of broiler

Days	Parameters	Treatment (Neem, Nishyinda, Tulsi and Turmeric)	Mean±SEM	n value	P value	Significance value
21st day	RBC (mm^3)	Control	190.31±6·39	5	0.044	NS
		Polyherbal	190.87±7·50			
	Hb (gm%)	Control	5.98±0·10	5	0.11	NS
		Polyherbal	6.50±0·08			
	PCV (%)	Control	17·41±0·75	5	0.419	NS
		Polyherbal	20·02±0·59			
	ESR mm in 1st hours	Control	11·59±0·79	5	0.026	NS
		Polyherbal	8·81±0·90			

Days	Parameters	Treatment (Neem, Nishyinda, Tulsi and Turmeric)	Mean±SEM	n value	P value	Significance value
42nd Day	RBC (mm^3)	Control	249.60±12·82	5	0.238	NS
		Polyherbal	277·64±12·10			
	Hb (gm%)	Control Polyherbal 3ml	7..03±0·22 7.61±0·20	5	0.049	NS
		Polyherbal	7·67±0·20			
	PCV (%)	Control	17.0980±0·58	5	0.218	NS
		Polyherbal	22·02±0·29			
	ESR mm in 1st hours	Control Polyherbal 3ml i	7.10±0·58	5	0.236	NS
		Polyherbal	5.320±1·00			

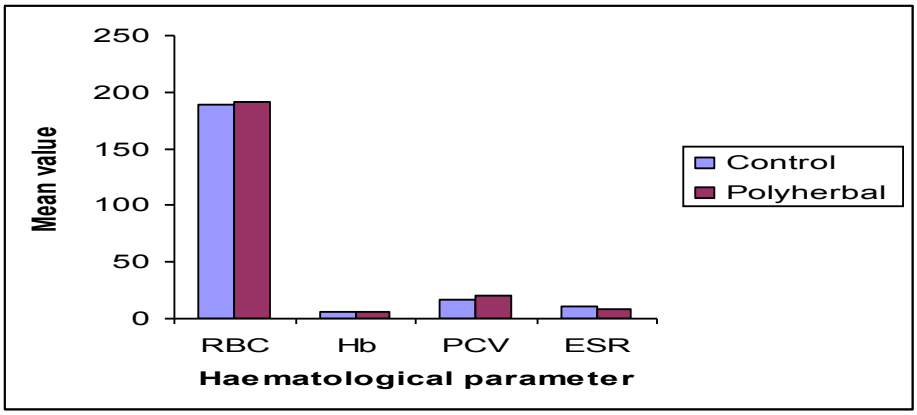

Fig. 3. Haematological parameter of broiler on 21st day

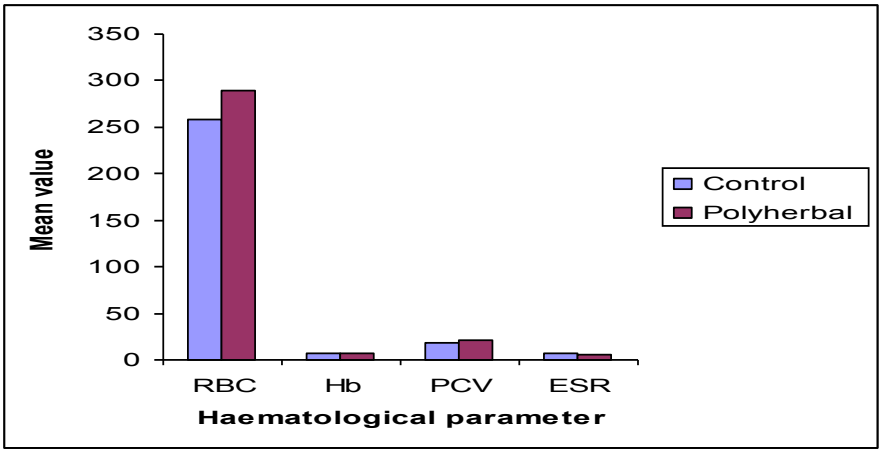

Fig. 4. Haematological parameter of broiler on 42nd day

Supplementation of polyherbal (NNTT extract) in the treatment caused improvement in the feed efficiency as compared to that of control group. Similarly [10] reported increase in feed efficiency in Neem fed groups, which is in agreement with the findings of the present study. Birds supplemented with polyherbal (NNTT extract) had higher body weight, weekly gain in weight, feed consumption and feed efficiency. These results may be due to antimicrobial and anti-protozoal properties [2] of neem and tulsi leaves, which help to reduce the microbial load of birds and improved the feed consumption and feed efficiency of the birds. It is concluded that supplementation with 1ml of polyherbal (NNTT extract) per liter of drinking water of treatment groups caused significant increase in live body weight and improvement of gain in weight and feed efficiency as compared to that of control group of poultry.

A mixed herbal growth promoter, polyherbal (NNTT extract) improved the weight gain of the broiler in this study. These results are in line with those reported by [12] in broiler fed rations containing turmeric. The improvement in weight gain of the birds using turmeric in their rations may probably be due to the fact that turmeric extract inhibits growth of intestinal bacteria such as *S. aureus* and *E. coli* as reported by [4]. Resultantly, when the load of these bacteria in the intestine is low, birds may absorb more nutrients, thus leading to the improvement in weight gain of the birds using rations supplemented with turmeric. The birds fed rations supplemented with herbal growth promoter, polyherbal utilized their feed more efficiently than those feed ration without addition of the growth promoter these results are in line with the findings of [1] who reported higher weight gain in broiler fed rations supplemented with turmeric. The use of polyherbal showed more increase in live weight of the birds as compared to 1% level in this study, which is also in agreement with the findings of [11] who concluded that powdered turmeric may be incorporated as a growth promoter in the ration of Japanese quails. Better feed conversion ratio of the broiler using rations supplemented with may be attributed to the antibacterial properties of these supplements, which resulted in better absorption of the nutrients present in the gut and finally leading to improvement in feed conversion ratio. Supplementation of of polyherbal (NNTT extract) did not exhibit any effect on the dressing percentage values of the broiler in this study. The results of the present study are in line with those observed by [1] who reported a non-significant effect on broiler dressing percentage values due to the inclusion of polyherbal in drinking water of broilers. Supplementation of polyherbal in drinking water did not exert any effect on the mean relative heart, gizzard, liver, spleen, pancreas weights of the broiler used in this study. The results of the study are consistent with those observed by ([1],[13]).

The effects of polyherbal (NNTT extract) on broilers after administration of 1 ml/ liter in drinking water for consecutive 36 days (from 7 day to 42 day). Blood sample were collected on 21st and on 42nd day (Table 4) showed no significant change in treatment group (TLC, PCV, Hb and ESR) than control group. This may be due to the medicinal plant did not produce any harmful or beneficial effects and this results have similarity with [2].

Therefore, concluded that polyherbal (NNTT ecxtract) has effects as alternative growth promoter on broiler. Care should be taken to ensure its safe use for medicinal references.

4 CONCLUSION

It is concluded that supplementation with 1ml of polyherbal (NNTT extract) per liter of drinking water in treatment group caused significant increase in live body weight and improvement in weekly weight gain and feed efficiency as compared to that of control group of broiler. Treatment groups are suitable for human health because there is no residual effect of commercial antibiotics therapy and also cost effective. My study showed that this formulations could be used as an alternative to growth promoters in broilers that helps to meet protein demand.

In Bangladesh, no much trial has been performed to evaluate the medicinal value of NNTT extracts. I performed this work in short-term basis (only 42 days) and modern equipments were also not available. To establish the polyherbal (NNTT extract) as growth promoter, it is necessary to do more intensive research works. I found in this experiment, the treatment groups are more profitable in comparison to the control group.

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