



Comparative efficacy of probiotic, neem leaves and vitamin AD₃E as a growth promoter on broilers

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ABSTRACT

The study investigated the comparative growth promoting efficacy and haematological parameters (TEC, Hb content, PCV and ESR) in growing broilers fed with probiotic, neem leaves and vitamin AD₃E in normal broiler ration. A total of 28 days old broiler chicks were used in this study the chicks were divided into four groups with 7 chicks in each group. Group A designated as control group fed with normal broiler ration Group B with probiotic preparation (Gutpro®), Group C with neem leaf powder and Group D with vitamin AD₃E in drinking water. It was observed that probiotic, neem and vitamin AD₃E preparation enhanced the growth broilers. At the end of experiment the body weight was significantly increased ($P < 0.01$) in the treated groups in comparison with that of control group. TEC, Hb concentration, PCV, and ESR values were significantly increased in all treated groups than the control group. Among the treated groups neem showed lowest performance. The study suggests that by using of probiotics, neem and vitamin AD₃E preparation as growth promoters in broiler ration the farmers of Bangladesh can be benefited.

Key words: probiotic, neem leaves, vitamin AD₃E, broilers

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INTRODUCTION

Broiler farming is developed all over the country and recognized as a profitable enterprise in Bangladesh. It is a means of quick return. Its success depends on how rapidly a bird attains a maximum marketable age in a minimum period. The feed accounts 70% of the total cost of broiler production. Minimum production cost can maximize the benefit. A number of feed additives like antibiotics, steroids, vitamin, minerals and other growth promoters have been used to improve the performance of broiler growth (Raha, 2009). The excessive dependency on medications threatens the mankind in antibiotic resistance. However, it is also discouraged to use growth promoters because of their residual effect in boiler meat. The human beings are very much conscious of their health and their food quality. The demand

for quality broilers without antibiotics, chemicals and growth promoters is now a great concern.

Probiotics are feed additives that contain live microorganisms and promote beneficial effects to the host by favoring the balance of the intestinal microbes (Fuller 1989). The probiotics contain yeast, live bacteria, their metabolites and pH adjusters that contribute to maintain balance in intestinal microflora (Tortuero, 1973) leading to beneficial effects to the animal and antagonistic to harmful microbes (Green and Sainsbury, 2001). Probiotic microorganisms are responsible for the production of vitamin B complex and digestive enzymes and for stimulation of intestinal immunity, increasing protection against toxins produced by pathogenic organisms. The use of probiotic as a substitute for antibiotics in broiler industry has become an arena of great interest.

Probiotics are claimed to exert beneficial effects on live weight gain, feed consumption, feed conversion ratio and livability (Mohan et al., 1996). Various probiotic preparations are available in the market at present and their indiscriminate uses are in practice without much scientific information about it. Gutpro® is a multi-strain probiotic used in poultry production (Polchem hygiene Laboratories Pvt. Ltd, UK). It contains naturally occurring different species of beneficial microflora. However, information on the use of probiotics, their levels in broiler diets and its effect on growth performance is scanty in Bangladesh.

Application of drug to treat disease is costly. Small farmers of Bangladesh cannot afford vaccines or medicine for the prevention and control of diseases. Development of traditional medicinal system will be highly beneficial for them and for the overall improvement of poultry in Bangladesh. Neem (*Azadirachta indica*) is an indigenous medicinal plant. The medicinal property of neem leaves in Ayurvedic system of medicine is well recognized in Bangladesh, India and Pakistan. Among all the plant's part, the processed leaves play the most significant role in livestock health (Sharma and Reddy, 2002). The Neem leaves have potential effect against pain, fevers, infections and other complaints that it has been called the "village pharmacy". Even some of the most cautious researchers are saying that neem deserves to be called "wonder plant". In general, neem leaf extracts may be used therapeutically to control respiratory problems, constipation and also as health promoter (Agarwal, 2002). The different components of neem e.g. leaves, kernel cake, neem oil etc. exerts beneficial effects to improve broiler performances and performances of birds as well. Supplementation of processed neem seed kernel cake in the diet of the broiler chicks could not depress the feed intake and growth rate (Nagalaksmi et al., 1998).

Vitamin plays an important role in both nutrition and production. The optimum vitamin-mineral premix supplementation are required for poultry growth and formulating premixes are to be necessary (McDowel, 1989). Deficiency of vitamin causes various diseases and disease condition in poultry such as cessation of growth,

weakness, ruffled plumage, ataxia, blindness, xerophthalmia due to deficiency of vitamin A (Hill et al., 1961). Now, various type of vitamin AD₃E are available in the market. Renasol AD₃E® is a commercial product marketed by Renata Animal Health which contains vitamin A, vitamin D₃ and vitamin E. The poultry farmers are using vitamins preparation without much information about it. Since probiotic, neem and vitamin AD₃E are claimed to improve the performance, so it would be interesting to conduct an experiment on the comparative growth promoting efficacy of these products which help the farmers to select the appropriate product that is more potent growth promoter.

MATERIALS AND METHODS

Collection and preparation of neem dust

The neem plant was selected for study was mature and free from disease condition or other deformities. Neem leaves were collected from Bangladesh Agricultural University Campus and identified with the help of Botanists (Mostofa et al., 2007). After collection neem was washed in running tap water and the leaves were dried in the sun for 10 days. Then it was dried in the oven at 55-60°C for 2 days. The dried leaves were pulverized with a blender. A 25 (unit) mesh diameter sieve was used to obtain the fine dust, after then dust was preserved in airtight plastic container until they were used for the experiment (Mostofa et al., 1995).

Probiotic and vitamin AD₃E

Commercial probiotic Gutpro® (Avon animal health Bangladesh Ltd), market Renasol AD₃E® (Renata Animal Health Division Bangladesh) were purchased from local. The drugs are composed of a number of bacteria, yeast and vitamins (table 1) as described in the manufacturer catalogue.

Rearing of birds

Day old chicks marketed by CP Bangladesh Ltd. were purchased from local market. The body weight of birds ranged from 100 to 120 grams.

Table 1
Composition of Gutpro® and Renasol AD₃E®

Composition of Gutpro®			
Bacteria	Amount	Yeast	Amount
<i>Lactobacillus acidophilus</i>	2x10 ⁸ CFU/g	<i>Candida rogusa</i>	2x10 ⁸ CFU/g
<i>Lactobacillus bulgaricus</i>	2x10 ⁸ CFU/g	<i>Saccharomyces cerevisiae</i>	2x10 ⁸ CFU/g
<i>Lactobacillus plantarum</i>	2x10 ⁸ CFU/g		
<i>Streptococcus faecium</i>	2x10 ⁸ CFU/g		
<i>Bifidobacterium bifidus</i>	2x10 ⁸ CFU/g		
Composition of Renasol AD ₃ E®			
Components	Amount		
Vitamin A	10000000 IU		
Vitamin D ₃	2000000 IU		

The chicken was supplied with normal diet and water. The space given for each bird was 1 square feet. The bird was brooded with one 100 watt electric bulb in each pen from day old to 21 days. Brooding temperature was kept 32o C at the beginning of the first week of age and decreased gradually in subsequent week until adjusted to the normal environmental temperature. The experiment was started on day 10.

Immediately after distribution of chicks in the pens electrolyte and vitamin solutions were provided to drinking water for four hours. Then dietary treatment was applied to the chicks. Control (group A); Gutpro® 2 gm /liter (group B); neem 1 gm/liter drinking water (group C); vitamin AD₃E 1 ml/liter (group D), were supplied to the experimental birds. Feed was supplied four times daily for the first seven days and gradually reduced to three times. Feed was supplied adlibitum and water was made available all the times. The commercial broiler starter and pre starter diets manufactured by Nourish poultry feed Ltd. were purchase from the local agent in Mymensingh.

The birds were vaccinated against New castle disease at 5th day and infectious bursal disease (gumboro) at 16th day of age. 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.

Recording body weight

Body weight of chicks were recorded at 10th day and then weekly for each treatment. In each week, birds were weighed early morning prior to feeding.

Investigation of hematological parameter

The changes in blood parameter were calculated. Estimation of Hemoglobin, Packed cell volume determination (PCV), Determination of Erythrocyte Sedimentation Rate (ESR) and Total Erythrocyte Count (TEC) were calculated according to the procedure described by Islam, et al., (2004), Sreekumar et al., (2007) and Wang, et al., (2009).

Statistical analysis

Statistical analysis of the data was done by using “t- test” (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The present research work was undertaken to evaluate the comparative efficacy of probiotic, neem and vitamin AD₃E. It was observed that probiotic, neem and vitamin AD₃E preparation enhanced the growth rate of broilers. At 21st day of experiment the body weight was significantly increased (P<0.01) in the treated groups in comparison to the control group. Total erythrocyte count (TEC), (Hemoglobin (Hb) concentration, Packed cell volume (PCV), and Erythrocyte sedimentation rate (ESR) values were significantly increased in all treated groups compare to the control group. Among the treated groups neem showed lowest performance.

Table 2
Effect on probiotic, neem and vitamin AD₃E on body weight (gm) in broilers

Groups	Drugs	Pre treatment		Post treatment		Weight gain (%)
		Day 0	Day 7	Day 14	Day 21	
A	Control	106±3.52	330±4.04	820±5.76	1050.66±7.78	89.84%
B	Probiotic	112±2.88	396.33±4.91	911.67±6.64	1636.68±8.81	93.16%*
C	Neem	104±3.21	350±5.77	841±3.21	1400.67±10.52	92.57%*
D	Vit. AD ₃ E	107±4.48	380±4.48	900±5.76	1522±7.57	92.97%*

*Significant (p<0.05) compared to control (group A)

Effect on body weight of birds

The effects of probiotic, neem, and vitamin AD₃E on the body weight of broilers are presented at table 2. The probiotic, neem leaf, vitamin AD₃E increased the percentage of body weight of chickens of groups B, C and D at 93.16%, 92.57% and 92.97% respectively on 21st day after treatment. Whereas the body weight of the chicken of control group was only 89.84%. The percent weight gain in chicken of group B, C and D were higher compared to control since the treated groups were provided with growth promoters. The probiotic treated group showed highest performance in this study. This result was agreed with Lima *et al.* (2002); Jin *et al.* (2000); Kalavathy *et al.* (2003) and Apata (2008). The results indicate that probiotic addition to broiler chick diets significantly improved growth performance, increased nutrient digestibility and body weight. The adding vitamin AD₃E also increase the body weight compared to control which is in agreement with the study of Islam *et al.* (2004). The addition of neem in broiler feed

showed more or less similar results with the probiotic and vitamin AD₃E suggest that neem as a cheap and available feed additive may contribute in reducing the cost for broiler production.

Effect on hematological parameters

Total erythrocyte count (TEC)

On day 7th of experiment the TEC in control group was 234.68±5.45 million/mm³ whereas in group B, C and D it was 225.63±17.70, 232.64±8.83, and 279.33±13.13 million/mm³ respectively. The highest TEC was observed in group D and the lowest in group B (table 3). On day 14th of experiment the TEC the highest number (288.34±8.68 million/mm³) of TEC was observed in group D. However, at the end of the experiment the TEC was reached at 268.33±3.28 million/mm³ in control group whereas in group B, C and D it was reached at 263.00±15.87, 261.33±4.09, and 309±8.68 million/mm³ respectively. The highest TEC count was observed in Vit. AD₃E treated group D and the lowest in neem treated group B.

Table 3
Effect on probiotic, neem and vitamin AD₃E on TEC (million/mm³) in broilers

Groups	Drugs	Pre treatment	After drug administration (post treatment)		
		0 day	7 th day	14 th day	21 st day
A	Control	210±6.65	234.68±5.45	251.67±4.91	268.33±3.28
B	Probiotic	210.33±6.48	225.63±17.70*b	243.67±17.29	263.00±15.87
C	Neem	207±5.56	232.64±8.83	246.33±5.48	261.33±4.09*b
D	Vit. AD ₃ E	215.33±4.25	279.33±13.13*a	288.34±8.68*a	309±8.68*a

* Significant (p<0.05) compared to control (group A), a indicates increased, b indicates decreased

Effect on hemoglobin (Hb) content (gm %)

Hemoglobin (Hb) content in different groups of birds presented in table 4. On day 7th of post treatment the Hb level was significantly increased in group D (6.63±0.05) treated with vitamin AD₃E and significantly decreased in group B treated with probiotic (6.13±0.06) compared to control (6.33±0.07). On day 14th of experiment the Hb

level was only significantly changed in group D (6.93±0.03) compared to control 6.66±0.09. Similarly at the end of the experiment the significant changes in Hb content only observed in vitamin AD₃E treated group D. However, the data is in dissimilarity with the study published by Deepika et al. (2002).

Table 4

Effect on probiotic, neem and vitamin AD₃E on hemoglobin level (gm %) in broilers

Groups	Drugs	Pre treatment	After drug administration (post treatment)		
		0 day	7 th day	14 th day	21 st day
A	Control	6.40±0.13	6.33±0.07	6.66±0.09	7.00±0.09
B	Probiotic	6.50±0.11	6.13±0.06 ^b	6.63±0.12	7.03±0.14
C	Neem	6.50±0.20	6.36±0.22	6.53±0.08	7.13±0.08
D	Vit. AD ₃ E	6.73±0.08	6.63±0.05 ^a	6.93±0.03 ^a	7.96±0.06 ^a

*Significant (p<0.05) compared to control (group A), a- indicates increased, b- indicates decreased

Effect on packed cell volume (PCV) (%)

Effects on packed cell volume in different groups of birds showed that on day 7th of experiment the PCV in control group A was 19.68±.58 where as in group B was 21.00±1.16, in group C was 21.66±1.5, and in

group D was 23.00±1.15. On day 14th the PCV was significantly increased in Vitamin AD₃E treated group (24.00±1.15) compared to control 21.33±0.88. The PCV at 21st day of experiment was significantly increased (27.01±1.15) compared to control (22.33±0.88).

Table 5

Effect on probiotic, neem, vitamin AD₃E on the packed cell volume (PCV) in broilers

Groups	Drugs	Pre treatment	After drug administration (post treatment)		
		0 day	7 th day	14 th day	21 st day
A	Control	19.67±0.35	19.68±.58	21.33±0.88	22.33±0.88
B	Probiotic	20.66±1.45	21.66±1.5	23.33±1.45	25.34±1.20 ^a
C	Neem	18.65±0.88	21.00±1.16	22.00±1.15	23.00±1.52
D	Vit. AD ₃ E	22.00±0.57	23.00±1.15 ^a	24.00±1.15 ^a	27.01±1.15 ^a

*Significant (p<0.05) compared to control (group A), a- indicates increased

Table 6

Effect on probiotic, neem, vitamin AD₃E on the hematological parameters (ESR) (mm in 1st hour) in broilers

Groups	Drugs	Pre treatment	After drug administration (post treatment)		
		0 day	7 th day	14 th day	21 st day
A	Control	2.67±0.34	3.66±0.33	4.00±0.57	4.66±0.33
B	Probiotic	3.60±0.58	4.20±0.56	5.67±1.52	6.34±0.88 [*]
C	Neem	3.00±0.57	5.00±0.58 ^a	6.33±0.57 ^a	7.00±0.54 ^a
D	Vit. AD ₃ E	3.33±0.88	3.68±0.66	4.33±0.59	5.00±0.58

*Significant (p<0.05) compared to control (group A), a- indicates increased

Effect on erythrocyte sedimentation rate (ESR) (mm in 1st hour)

The data represented that Hb content. at 7th of experiment the ESR rate was significantly increased only in neem treated group C (5.00±0.58) compared to control (19.68±.58) Similarly on day 14th and 21st of experiment the ESR values were significantly increased only in group C (table 6) compared to controls. The result is in agreement with the results of Wang et al. (2009).

From the study it is clearly observed that probiotics, neem and vitamin AD₃E were all have beneficial effects on health of broiler. Therefore their combined used may speed up their performance in growth and production.

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