

Comparative efficacy of neem and ivermectin on body weight gain of bull

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ABSTRACT

This study was conducted to determine the comparative efficacy of neem (*Azadirachta indica*) leaves powder and ivermectin on the performance of body weight gain of bull. Fifteen calves of 1.5 years old were divided into three equal groups- I₀, I₁ and I₂ which were supplemented with neem leaf powder @100mg/kg bwt and ivermectin @200 µg/kg bwt, SC (subcutaneous). Weekly observations were recorded for live body weight and blood parameters of calves for a period of 28 days. All the treatment groups I₁ (4.17%) and I₂ (6.10%) recorded significantly higher means for live body weight than that of control I₀ (1.12%) group. The study suggests that neem may be used for better body weight gain in bull.

Key words: Bull, neem, ivermectin, body weight gain.

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INTRODUCTION

There is a great scarcity of animal protein for human consumption in Bangladesh. Despite highest cattle densities in Bangladesh, the current production meat is inadequate to meet the current requirement and the deficit is 77.4% (National Livestock Development Policy, 2007). Therefore, to meet up the deficiency, small scale bull calves fattening program is essential. In this context there is evidence of profitable beef production with male calves obtained from dairy farm, which was reported by Buaphun et al. (2000). Cattle fattening for beef production have become an important business of the small farmers in Bangladesh. In few areas of Bangladesh a small-scale commercial beef-fattening program has already been started. A large number of farmers are involved in bull fattening just before 3 or 4 months of Eid-ul-Azha (Muslim festival), when they sell the animals with profitable prices.

The acute shortage of feeds and fodder has long been identified as a serious constraint to optimum livestock production in Bangladesh. Farmers use rice straw of traditional varieties, green grass,

sugarcane tops, wheat and rice bran, molasses and locally available resources for beef fattening. The chemical treatment of straw is the most effective and economic method to improving the quality. Straw is mainly treated with urea and molasses and in some cases chemical treatment also done by the farmers. Urea molasses straw treatment in beef cattle resulted higher body weight, dressing percentage and also in better carcass quality than untreated straw. The nutritional factor is considered a major constraint to livestock productivity. Traditional grazing field is Scarce except in some pockets in Pabna and Sylhet districts. Farmers used three years old cattle for beef fattening and maximum growth rate between 1.1 to 1.4 years of age. Cattle fattening period is 4.5 months in rural areas of Bangladesh.

Parasites can impose a great burden on the welfare of ruminants, affecting their growth and productivity. Being such a significant threat to animal health, it is important to provide comprehensive information on environmentally, friendly and economically viable options for treatment of these internal parasites. The use of botanical dewormers is one these options.

Currently the major control strategy is the use of anthelmintics and the potential resistance to the drug threatens this strategy (Jackson, 1993). However the use of botanicals, such as the neem, provides as alternative to commercial anthelmintics, in the control of internal parasites and the possibility of reduce resistance. Therefore, the present study was designed with the objectives to compare the efficacy of neem and ivermectin against endoparasites and weight gain of bull.

MATERIALS AND METHODS

Preparation of plant material

Neem leaves were collected locally and proceed for preparing extract. The crude extract was by blending 1:10 ratio of minced leaf with water and stored in a refrigerator at 4°C until use. 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 25 mm mesh diameter sieve was used to obtain the fine dust, after then dust was preserved in airtight plastic container until they were directly used for screening and preparation of alcoholic extract.

Preparation of extracts

Leaves dust was used for preparation of plant extract. Hundred gram dusts were taken in a 500 ml beaker and separately mixed with 1 liter of alcohol. Then the mixture was stirred for 30 minutes by a magnetic stirrer (6000 rpm) and let stand for next 24 hrs. The mixture was then filtered through a fine cloth and again through filter paper (Whatman No. 1). The filtered materials were taken into a round bottom flask and then condensed by evaporation of solvent from filtrate in a water bath at 50°C for ethanol. After the evaporation of solvent from filtrate, the condensed extracts were preserved in tightly corked-labeled bottle and stored in a refrigerator at 4°C. During the experimental period different concentrations of the extract, viz 5, 10, 20 and 40 mg/ml, were used in normal saline.

Ten percent neem leaves were prepared from processed dusts of the leaves in distilled water. Briefly, 10 gm of leaves dusts were mixed into

100 ml distilled water, then the mixture was stirred for 30 minutes by the same magnetic stirrer at 600 rpm as done earlier and left for 24 hours. The mixture was then filtered through filter paper (Whatman 42). The filtered fluid was the 10% aqueous extract of neem leaves ivermectin were purchased from local market.

Collection and management of calves

Thirty calves of 1.5 years old were randomly selected and purchased. Fecal eggs of parasites were counted. On the basis of fecal egg count, the calves found positive with eggs of *Ascaridia* sp. were separated. From the positive cases, 15 calves were again randomly selected for the experimental trial. The finally selected 15 calves were allowed to acclimatize for 7 days in the experimental shed. The body weights of assigned calves were recorded. During acclimatization, the calves were supplied recommended feed and water.

Fecal egg counts

For determinations of infectivity, fecal samples were collected and eggs were counted by modified McMaster as well as direct smear method as egg per gram (EPG).

Experimental design

Fifteen infected calves were randomly divided into 3 equal groups namely I₀, I₁ and I₂. Group 'I₀': was kept as control without giving any treatment. Group I₁ was treated with neem leaves extract orally @ 100 mg/kg bwt, Group I₂ was treated with ivermectin @ 200 µg/kg bwt, SC for consecutive three days.

Clinical examination

All calves of both the treated and control groups were closely observed for any illness and behaviors. The effect of the neem leaves extract and ivermectin on bwt, fecal egg count and hematological parameters were recorded before and during the treated period. The weight of each calf was taken in the morning, in noon and afternoon. The average of these three weights were calculated and recorded.

Hematological parameters

Blood samples were collected from Jugular vein of calves of both control and treated groups at pre-treatment and during treatment (21 days) period at 7 days interval to study the effect of the neem leaves extract, anthelmintics ivermectin on the following hematological parameters: Total erythrocyte count (TEC), Hemoglobin estimation (Hb), Packed cell volume (PCV), Erythrocyte sedimentation rate (ESR), Total leukocyte count (TLC) by using methods as described by Lamberg and Rothstein (1977).

Statistical analysis

Statistical analyses were carried out by Statistical package for social Science (SPSS) using F test. The data were analyzed statistically between control and treated groups of chickens by using paired sample t-test.

RESULTS AND DISCUSSION

Effects of treatment on body weight gain of bull

The effect treatments by patent drugs ivermectin and medicinal plant neem leaves on body weight were observed on day 7th, 14th, 21st and 28th respectively. The increased values of body weight in calves of the treated groups were not significant on day 7, day 14 or day 21 but that were highly significant ($p < 0.01$) on day 28 compared to control (Table 1).

Fecal egg count

The results of the efficacy of neem leaves and ivermectin are shown in the Fig. 1. Reduction of EPG count was found on 21st and 28th day in the group of calves of I₁, I₂ and on the other hand EPG count was found increased or same in the groups of I₀ (control).

Table 1

Effects of ivermectin and neem leave extract on body weight (kg) in bull.

Group (n = 5)	Drug with dose and route	Pre-treatment body weight (kg)	Post treatment body weight (kg)				% gain
			7 th day	14 th day	21 st day	28 th day	
I ₀	Control (Infected)	89	89	89	89.8	90	1.12
I ₁	Neem @ 100mg/kg bwt	120	120	121.5	121.75	125	4.17
I ₂	Ivermectin @ 200 µg/kg bwt, SC	100	100	103	104.5	106.01	6.10

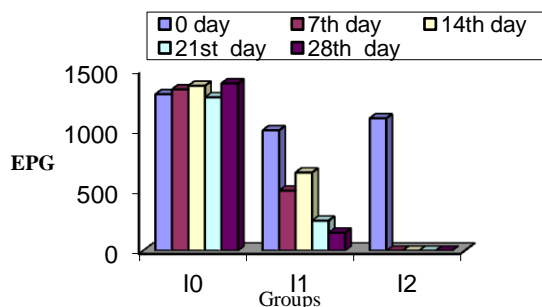


Figure 1
Effects of neem leaves and ivermectin on nematodes egg in bull.

Hematological parameters

Effects on total erythrocyte count (TEC)

The mean values of TEC increased considerably in bull treated with the ivermectin and neem leaves extract on day 28 compared to that on day 0 but that were increased significantly ($p < 0.01$ in Group I₁ and I₂) on day 28 in all the treated groups compared to control. The values were variable among all samplings in control bulls.

Table 2
Effects of neem leave extract and ivermectin on TEC (million/cumm) in bull.

Group n = 5	Drug with dose and route	Pre- Treatment	Post treatment			
			7 th day	14 th day	21 st day	28 th day
I ₀	Control (Infected)	8.03	8.04	8.10	7.09	6.97
I ₁	Neem @ 100mg/kg bwt	8.10	8.16	8.23	8.39	8.58
I ₂	Ivermectin @ 200 µg/kg bwt, SC	8.02	8.19	8.30	8.40	9.00

Table 3
Effects of neem leaves extract and ivermectin on Hb (g%) in bull.

Group n = 5	Drug with dose and route	Pre- Treatment	Post treatment			
			7 th day	14 th day	21 st day	28 th day
I ₀	Control (Infected)	7.60	7.46	7.21	7.09	6.95
I ₁	Neem @ 100mg/kg bwt	8.20	8.25	8.35	8.45	8.75
I ₂	Ivermectin @ 200 µg/kg bwt, SC	8.00	8.70	8.90	9.00	9.20

Table 4
Effects of neem leaves extract and ivermectin on PCV (%) in bull.

Group n = 5	Drug with dose and route	Pre- Treatment	Post treatment			
			7 th day	14 th day	21 st day	28 th day
I ₀	Control (Infected)	30.60	30.40	30.25	30.15	29.10
I ₁	Neem @ 100mg/kg bwt	30.40	30.45	30.50	30.65	30.75
I ₂	Ivermectin @ 200 µg/kg bwt, SC	30.20	30.38	30.47	30.68	30.80

Table 5
Effect of neem leaves extract and ivermectin on ESR (mm/1st hour) in bull.

Group (n = 5)	Drug with dose and route	Pre- Treatment	Post treatment			
			7 th day	14 th day	21 st day	28 th day
I ₀	Control (Infected)	1.03	1.09	1.40	1.85	2.00
I ₁	Neem @ 100mg/kg bwt	0.30	0.25	0.18	0.08	0.05
I ₂	Ivermectin @ 200 µg/kg bwt, SC	0.28	0.19	0.10	0.05	0.02

Effects on Hemoglobin (Hb) estimation

The mean values of Hb were increased from Day 7 up to Day 28 in bulls of neem leaves extract and ivermectin treated groups, but that were decreased on the same sampling days in control bulls. The increased values of Group I₁ and Group I₂ were

statistically significant on day 28 compared to control.

Effect on Packed cell volume (PCV)

The mean values of PCV increased in the neem leaves extract and ivermectin treated bulls from starting of treatments up to the end of the

treatments, but that decreased in control bulls in the same way. The increased values in bulls of treated groups were not significant on day 7 and day 14 but that were highly significant ($p < 0.01$) on day 28 compared to control.

Effect on erythrocyte sedimentation rate (ESR)

The mean values of ESR decreased in the neem leaves extract and ivermectin treated bulls starting from day 7 and continued up to the end of the treatments, but that increased in control group bulls in the similar manner. The difference of the values on day 28 was highly significant ($p < 0.01$) in both the treated bulls compared to control.

In this research work, the continuous treatment with extract of neem (*Azadirachta indica*) produced a significant reduction ($p < 0.01$) of the endoparasites and ivermectin also reduced internal parasites. In neem there is no side effects and body gain was significance that groups I₁ (125 kg) and I₂ (106.01 kg) recorded significantly higher means for live body weight than that of control I₀ (90 kg) group. In Bangladesh, only few trials have been performed to evaluate the medicinal value of neem leaves. We did the work in short-term basis (only 28 days) and modern equipment's were also not available. The present study has similarities with the previous study of Rahman et al. (2009) where they also found that neem leaves increased body weight of calves compared to

ivermectin. However, to establish neem leaves as alternative anthelmintics and increase body weight further therapeutic study is needed.

ETHICAL APPROVAL

All calves 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.

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