

## COMPARATIVE EFFICACY OF TOBACCO, JUTE AND LEVAVET® AGAINST GASTROINTESTINAL NEMATODES IN CATTLE

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### ABSTRACT

The effect of tobacco (*Nicotiana tabacum*, Linn., @100mg/kg bwt.), jute (*Corchorus capsularis*, Linn., @100 mg/kg bwt.) and Levavet® (levamisole, @ 7.5 mg/kg bwt.) against natural gastrointestinal nematodes were studied in cattle. Their effect on hematological parameters (TEC, Hb, PCV and TLC), biochemical parameters (ALT and AST) and clinical parameter (body weight) were also observed. Twenty four (24) naturally parasitized cattle of BAU Dairy Farm, Mymensingh were randomly divided into four groups, each consisting of six (6) cattle. Water extract of leaves of tobacco and jute were administered orally to the cattle of group A and B, respectively. Cattle of group C were treated with Levavet® orally. Cattle of group D was kept as infected control group. Fecal samples, body weight, hematological and biochemical parameters were examined before treatment and on 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup> and 28<sup>th</sup> day. A significant ( $p < 0.01$ ) reduction of EPG count was found following administration of tobacco (34.32-51.26%), jute (8.80-27.76%) and Levavet® (89.31-100%) in cattle. The EPG count of the control group (D) were significantly ( $p < 0.01$ ) increased up to the last day of experimental period. After treatment with tobacco, jute and Levavet®, total erythrocyte count (TEC), hemoglobin (Hb) content and packed cell volume (PCV) were gradually increased significantly ( $p < 0.01$  and  $p < 0.05$ ) in cattle. Conversely, the total leukocyte count (TLC) were decreased significantly ( $p < 0.01$  and  $p < 0.05$ ) in treated cattle. The alanine aminotransferase (ALT) and aspartate aminotransferase (AST) level were not significantly changed in the cattle. The body weight was increased significantly ( $p < 0.01$  and  $p < 0.05$ ) in tobacco, jute and Levavet® treated cattle whereas decreased in control group. It is found that water extracts of tobacco leaves were moderately effective and jute leaves were relatively less effective against mixed gastrointestinal nematode infections in cattle.

**Key words :** Tobacco, Jute, Levavet®, Gastrointestinal nematodes, Cattle

### INTRODUCTION

Parasitism is an important limiting Livestock is one of the important sectors in agriculture that play a vital role to promote human health and improve national economy in Bangladesh. It generates 13% of total foreign currency and provides full time employment to about 30% and partial employment to about factor that responsible for deteriorating the health and productivity of livestock. The agro-ecological and

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geo-climatic conditions of Bangladesh are highly favorable for the growth and multiplication of parasites. As a result about 50% apparently healthy cattle population has been demonstrated to be affected with different species of parasites. Among the parasitic diseases, gastrointestinal nematodes such as *Haemonchus* spp., *Trichostrongylus* spp., *Cooperia* spp., *Oesophagostomum* spp., *Trichuris* spp. and *Strongyloides* spp. are most common in Bangladesh (Qadir, 1981; Rahman and Mondal, 1983). The greatest losses associated with nematode infections are sub-clinical, and economic assessments have showed that financial costs of internal parasitism are enormous (Preston and Allonby, 1979; McLeod, 1995). Control of parasitic diseases has been mainly based on regular anthelmintic treatment in Bangladesh. However, as these are very expensive and unavailable to farmers in rural areas, livestock producers are not interested to use these anthelmintics. Furthermore, some serious disadvantages of using those anthelmintics, notably the development of resistance to helminth parasites (Waller and Prichard, 1985; Lans and Brown, 1998) against various anthelmintic compounds and classes, and their residues and toxicity problems possess hazards to livestock development. Medicinal plants are one of the most important natural resources of a country. World Health Organization (WHO, 1993) has recognized the necessity for investigation and mobilization of ancient medicinal practices to fulfill the primary health care systems of the man and animals. Anthelmintic activity has remained of great scientific interest despite extensive use of synthetic chemicals in modern clinical practices all over the world (Akhtar *et al.*, 2000). The present study was undertaken to evaluate the efficacy of tobacco, jute, Levavet® against gastrointestinal nematodes on the basis of fecal egg count in cattle. Their effect were also observed on TEC, Hb, PCV and TLC, ALT, AST and body weight.

## MATERIALS AND METHODS

The experiment was performed in the Department of Pharmacology, Faculty of Veterinary Science, Bangladesh Agricultural University, (BAU) Mymensingh, Bangladesh. The Dairy Farm (BAU) was selected as the site for this study. The research was carried out during the period from 1<sup>st</sup> June, 2005 to 28<sup>th</sup> June, 2005. On the basis of fecal sample examination 24 cattle of both sexes infected with gastrointestinal nematodes were selected for this study and randomly divided into four groups, each group consisting of six (6) cattle.

- Group A : Water extract of tobacco (*Nicotiana tabacum*, Linn.) leaves was administered @100 mg/kg bwt. orally
- Group B : Water extract of jute (*Corchorus capsularis*, Linn.) leaves was administered @100 mg/kg bwt. orally
- Group C : Levavet® (levamisole preparation, The ACME Lab. Ltd.) was administered @7.5 mg/kg bwt. orally
- Group D : Used as untreated control group

The fecal sample from all groups were examined by egg counting McMaster method as described by Soulsby (1986) before treatment (day 0) and at 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup> and 28<sup>th</sup> day of

post-treatment. Egg per gram (EPG) of feces were recorded. Blood samples were collected from the jugular vein of each cattle at different time intervals mentioned above. Various hematological parameters (TEC, Hb, PCV and TLC) were measured. Biochemical (ALT and AST) parameters were also examined by auto-analyzer (Reflotron® Plus) according to the method described by Deneke and Rittersdorf (1984 and 1985). To determine the body weight gain or loss of treated and untreated control groups, the main body weight was taken on day 0 (pretreatment) and on 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup> and 28<sup>th</sup> day of experimental period of cattle (Samad, 2001). Collected data were statistically analyzed between normal and treated values by Student's t-test by using the computer statistical package programme of Microsoft Excel.

## RESULTS AND DISCUSSION

The results of the efficacy of tobacco, jute and Levavet® against gastrointestinal nematodes in cattle are shown in Table 1. A significant ( $p < 0.01$ ) reduction of EPG count was found on 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup> and 28<sup>th</sup> day of tobacco (46.61%, 51.26%, 44.09% and 34.32%), jute (22.92%, 27.76%, 18.08% and 8.80%) and Levavet® (100%, 96.15%, 93.66% and 89.31%) treated cattle of group A, B and C, respectively. The EPG count of untreated control group (D) were significantly ( $p < 0.01$ ) increased about 4.76%, 15.33%, 28.57% and 42.86% on 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup> and 28<sup>th</sup> day, respectively. In conformity to the present findings, Iqbal *et al.* (2006) observed that crude aqueous extract of tobacco leaves (@3.0 g/kg) was 49.4% effective against gastrointestinal nematodes on 5<sup>th</sup> day post-treatment of sheep. Hossen and Mostofa (1999) also reported that tobacco leaves (@ 50 mg/kg) was 54.55% effective against gastrointestinal nematodes in cattle. Likewise, Rahman (2002) found that effect of water extract of jute (@ 2 gm/kg bwt.) was 42% against gastrointestinal nematodes in goat on 21 days of post-treatment. Shri-Kishan and Gupta (2004) observed efficacy of levamisole (@ 7.5 mg/kg bwt.) 100% against natural gastrointestinal nematode infections on 3 days after treatment in cattle in Haryana, India. The present finding was also in agreement with the works of Khan *et al.* (2003), Williams and Broussard (1995) on levamisole in cattle.

The results of the effect of tobacco, jute and Levavet® on different hematological parameters are shown in the Table 2. After treatment with tobacco, jute and Levavet®, total erythrocyte count (TEC), hemoglobin (Hb) content and packed cell volume (PCV) were gradually increased significantly ( $p < 0.01$  and  $p < 0.05$ ) in cattle. Conversely, the total leukocyte count (TLC) were decreased significantly ( $p < 0.01$  and  $p < 0.05$ ) in treated cattle. The present finding was also in agreement with the work of Rahman (2002). He observed water extract of jute (@2 gm/kg bwt.) increased TEC, Hb content and PCV and decreased TLC on 21<sup>st</sup> day of post-treatment in goat. Similar response also reported by Shri-Kishan and Gupta (2004); Khan *et al.* (2003) due to levamisole treatment in cattle. Shri-Kishan and Gupta (2004) observed levamisole (@ 7.5 mg/kg bwt.) improved significantly Hb content and PCV on day 21 post-treatment. Likewise, Khan *et al.* (2003) stated that levamisole increased significantly TEC and Hb content in cattle. The improved level of TEC of blood in treated cattle might be due to elimination of blood sucking gastrointestinal nematodes. The increase in hemoglobin content in cattle might be due to the increase of total erythrocyte count (TEC).

Table 1. Comparative efficacy of Tobacco, Jute and Levavel® against natural gastrointestinal nematodes in cattle

Group	Treatment	Pre-treatment		Post-treatment											
		'0' day		3 <sup>rd</sup> day			10 <sup>th</sup> day			17 <sup>th</sup> day			29 <sup>th</sup> day		
		EPG Mean ± SD	EPG Mean ± SD	EPG Mean ± SD	EPG increase/ Decrease (%)	EPG mean ± SD	EPG increase/ decrease (%)	EPG mean ± SD	EPG increase/ decrease (%)	EPG mean ± SD	EPG increase/ decrease (%)	EPG Mean ± SD	EPG increase/ decrease (%)	EPG Mean ± SD	EPG increase/ decrease (%)
A	Tobacco	1311 ± 273.03	700 <sup>**</sup> ± 86.90	+46.61	696 <sup>**</sup> ± 95.32	+51.26	739 <sup>**</sup> ± 86.82	+44.09	861 <sup>**</sup> ± 98.13	+34.32					
B	Jute	1261 ± 154.03	972 <sup>**</sup> ± 135.51	+22.92	911 <sup>**</sup> ± 137.62	+27.76	1033 <sup>**</sup> ± 139.63	+18.08	1150 <sup>**</sup> ± 136.35	+8.80					
C	Levavel <sup>®</sup>	1300 ± 119.29	0 <sup>**</sup> ± 0	+100	50 <sup>**</sup> ± 78.20	+96.15	83 <sup>**</sup> ± 78.16	+93.66	139 <sup>**</sup> ± 87.90	+89.31					
D	Control	1050 ± 269.81	1100 <sup>**</sup> ± 279.91	-4.76	1211 <sup>**</sup> ± 276.99	-15.33	1350 <sup>**</sup> ± 236.20	-28.57	1500 <sup>**</sup> ± 237.67	-42.86					

The above values represent the mean ± standard deviation (SD) of 6 cattle

<sup>\*\*</sup> = Significant at 1 per cent level (p<0.01); \* = Significant at 5 per cent level (p<0.05)

'+' = Decrease, '-' = Increase

Table 2. Changes in hematological parameters in cattle at different intervals after treatment with Tobacco, Jute and Levavet®

Days after treatment	Tobacco treatment (group A)	Jute treatment (group B)	Levavet® treatment (group C)	Untreated infected control (group D)
Day 0				
TEC (million/cu.mm.)	8.51 ± 0.93	8.68 ± 0.47	8.37 ± 0.13	9.31 ± 0.71
Hb content (gm %)	9.03 ± 1.32	9.13 ± 0.83	9.37 ± 0.66	10.43 ± 1.14
PCV (%)	31.00 ± 2.28	31.67 ± 1.37	31.33 ± 1.21	33.17 ± 1.94
TLC (thousand/cu.mm.)	10.10 ± 1.16	9.85 ± 0.75	10.03 ± 0.56	9.11 ± 1.16
Day 3				
TEC (million/cu.mm.)	8.53 ± 0.96	8.69* ± 0.46	8.42** ± 0.12	9.24** ± 0.67
Hb content (gm %)	9.20** ± 1.25	9.33** ± 0.72	9.60** ± 0.75	10.20** ± 1.13
PCV (%)	31.33 ± 2.07	32.00 ± 1.10	31.67 ± 0.82	32.67* ± 1.75
TLC (thousand/cu.mm.)	10.02** ± 1.10	9.78** ± 0.73	9.93** ± 0.54	9.19* ± 1.14
Day 10				
TEC (million/cu.mm.)	8.71** ± 0.95	8.82** ± 0.47	9.15** ± 0.16	9.06** ± 0.67
Hb content (gm %)	9.80** ± 1.10	9.97** ± 0.66	10.47** ± 0.59	9.50** ± 1.01
PCV (%)	32.00** ± 1.90	32.83** ± 1.17	33.17** ± 0.75	32.00* ± 1.67
TLC (thousand/cu.mm.)	9.84** ± 1.08	9.64** ± 0.71	9.37** ± 0.58	9.48** ± 1.12
Day 17				
TEC (million/cu.mm.)	8.89** ± 0.92	8.90** ± 0.46	10.02** ± 0.15	8.88** ± 0.64
Hb content (gm %)	10.47** ± 1.00	10.53** ± 0.62	11.57** ± 0.35	8.60** ± 0.65
PCV (%)	32.33** ± 2.07	33.17** ± 1.17	34.17** ± 0.75	30.83** ± 2.04
TLC (thousand/cu.mm.)	9.65** ± 1.04	9.51** ± 0.74	9.11** ± 0.55	9.79** ± 1.11
Day 28				
TEC (million/cu.mm.)	8.99** ± 0.91	8.96** ± 0.47	10.6** ± 0.12	8.64 ± 0.59
Hb content (gm %)	11.13** ± 0.95	11.07** ± 0.65	12.63** ± 0.43	8.13** ± 0.48
PCV (%)	32.83** ± 1.94	33.50** ± 1.05	34.83** ± 0.98	30.33** ± 1.75
TLC (thousand/cu.mm.)	9.51** ± 1.07	9.43** ± 0.74	8.84** ± 0.57	10.08** ± 1.04

The above values represent the mean ± standard deviation (SD) of 6 cattle

\*\* = Significant at 1 per cent level ( $p < 0.01$ ); \* = Significant at 5 per cent level ( $p < 0.05$ )

The results of the effect of tobacco, jute and Levavet® on biochemical parameters are shown in the Table 3. The alanine aminotransferase (ALT) and aspartate aminotransferase (AST) level were not significantly changed in the cattle. These findings cannot be compared due to lack of similar published reports.

The effects of tobacco, jute and Levavet® on body weight in cattle are shown in Table 4. Tobacco, jute and Levavet® significantly ( $p < 0.01$  and  $p < 0.05$ ) increased body weight in group A, B and C, respectively. Khan *et al.* (2003) also found that body weight was increased significantly due to levamisole in cattle. These results were agreeable with the

findings of Beriajaya *et al.* (1986) due to levamisole in sheep and Redl (1991) in cattle. The body weight was increased might be due to removal of parasitic load which facilitate the weight regain through proper digestion, absorption and metabolism of feed nutrients in the parasite free gastrointestinal tract.

Table 3. Changes in biochemical parameters in cattle at different intervals after treatment with Tobacco, Jute and Levavet®

Days after treatment	Tobacco treatment (group A)	Jute treatment (group B)	Levavet® treatment (group C)	Untreated infected control (group D)
Day 0 (Pretreatment)				
ALT (U/l)	20.22 ± 2.66	19.72 ± 1.54	20.03 ± 1.16	17.97 ± 2.21
AST (U/l)	32.17 ± 2.71	31.77 ± 1.66	32.13 ± 1.15	29.68 ± 2.60
Day 3				
ALT (U/l)	19.48 ± 2.48	19.58 ± 2.41	19.45 ± 2.23	18.22 ± 1.57
AST (U/l)	32.43 ± 1.97	31.05 ± 2.62	31.25 ± 2.19	29.67 ± 2.44
Day 10				
18.13±2.25	21.32 ± 3.12	19.91 ± 1.91	19.60 ± 1.63	18.13 ± 2.25
30.87±2.02	32.40 ± 2.20	32.72 ± 1.87	32.18 ± 1.70	30.87 ± 2.02
Day 17				
ALT (U/l)	19.92 ± 2.34	19.35 ± 1.98	19.33 ± 1.66	17.33 ± 2.54
AST (U/l)	32.10 ± 2.46	31.22 ± 2.41	30.88 ± 1.85	29.27 ± 2.27
Day 28				
ALT (U/l)	19.53 ± 2.56	18.60 ± 2.16	19.37 ± 1.93	18.65 ± 1.96
AST (U/l)	31.70 ± 1.96	32.58 ± 3.85	31.05 ± 1.79	30.90 ± 2.16

The above values represent the mean ± standard deviation (SD) of 6 cattle

\*\* = Significant at 1 per cent level (p<0.01), \* = Significant at 5 per cent level (p<0.05)

Table 4. Effects of Tobacco, Jute and Levavet® on body weight (Kg) in cattle

Group	Treatment	Pretreatment	Post-treatment			
		'0' day	3 <sup>rd</sup> day	10 <sup>th</sup> day	17 <sup>th</sup> day	28 <sup>th</sup> day
A	Tobacco	127.91 ± 4.83	128.33** ± 4.67	128.92** ± 4.43	129.58** ± 4.12	130.99** ± 3.83
B	Jute	127.58 ± 4.95	127.91* ± 4.79	128.75** ± 4.48	129.00** ± 4.53	129.25** ± 4.55
C	Levavet®	126.58 ± 2.01	126.83* ± 2.01	127.83** ± 1.99	129.42** ± 1.91	130.33** ± 1.78
D	Control	125.50 ± 2.65	125.25* ± 2.50	123.83* ± 3.24	123.17** ± 2.98	122.92** ± 2.63

The above values represent the mean ± standard deviation (SD) of 6 cattle

\*\* = Significant at 1 per cent level (p<0.01); \* = Significant at 5 per cent level (p<0.05)

It may be concluded that water extracts of tobacco leaves was moderately effective and jute leaves was relatively less effective against gastrointestinal nematode infections in cattle. Of course, the present study is a preliminary work on the medicinal plants in cattle in Bangladesh. However, further studies on its pharmacokinetic and toxic effects if any should be carried out before extensive field use in Bangladesh.

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