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Phukan SC
Department of Parasitology, College of Veterinary Science, Khanapara, Guwahati, Assam, India

Saleque A
Chief Scientist, Goat Research Station, Burnihat, CVSc, AAU, Khanapara, Guwahati, Assam, India

Choudhury D
Assistant Professor, Dept. of Parasitology, LCVSc, AAU, Joyhing Road, North Lakhimpur, Assam, India

Das S
Professor, Dept. of Microbiology, CVSc, AAU, Khanapara, Guwahati, Assam, India

Deka N
Department of Parasitology, College of Veterinary Science, Khanapara, Guwahati, Assam, India

Corresponding Author:
Phukan SC
Department of Parasitology, College of Veterinary Science, Khanapara, Guwahati, Assam, India

Effect of AAU/CI herbal formulation incorporated in urea molasses block on body weight gain in goats infected with spontaneous gastro intestinal nematodosis

Phukan SC, Saleque A, Choudhury D, Das S and Deka N

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Abstract
The study was conducted during 2018-19 to observe the body weight gain in goats after treatment with AAU/CI herbal formulation incorporated in urea molasses block (MUMB) in spontaneous gastro intestinal nematodosis infection. Forty two crossbred goats were taken irrespective of age, sex, and fed with standard feed ration, randomly divided into seven groups of six each. The faecal samples were collected from each animal for Egg per gram (EPG) and examined by modified Stoll's dilution technique (Soulsby, 1982). The EPG (ranged from 200-400) and body weights were recorded by using Avery platform, prior to the treatment (0 day) and every 15 days interval upto 100 days post treatment. The herbal formulation consisted of sample AAU/CI prepared by drying and grinding of the plant (leaf & stem) material incorporated in UMB. This MUMB (AAU/CI) were fed to the animal @ 15 g /animal/day in group 1 (stall feeding) by licking and group 3 (grazing) fed individually. To compare the herbal formulation with standard anthelmintic, Fenbendazole @ 0.5 mg/ kg body weight of goat was incorporated in UMB. This MUMB (FBZ) were fed to the animals of group 5 (stall feeding) by licking and group 6 (grazing) individually.
There was increase in body weight significantly (P<0.05) in all the animals of treated groups (group 1, 3,5 and 6) upto 100 days post treatment as compared to infected untreated animals in group 7. The EPG was decreased significantly (P<0.05) in all the treated animals and the reduction was 100% on 60 days post treatment in group 1 , 30 days in group 3 , 15 days in group 5 and 45 days post treatment in group 6 respectively as compared to group 2,4 and 7. From the above observation it is evident that there is increase in body weight gain significantly following the treatment with herbal formulation in nematodosis of goats while the faecal egg count decrease significantly.

Keywords: Anthelmintic, MUMB (Herbal), bodyweight, G.I. nematode, goat

Introduction
Parasitism has been considered as one of the major constraints of livestock production. Helminthiasis especially gastrointestinal nematodiasis overwhelming a severe havoc on health and production throughout the world due to impacts on economy also and market value of the living animals with a high rate of anthelmintic resistance prevalence (Aktaruzzaman *et al.* 2015) [3] Gastrointestinal nematodes cause significant economic losses in animals because of their high morbidity rates. Conventional use of anthelmintic results the resistance by nematodes in animals. The use of sustainable, integrated parasite control systems, using scientifically proven non-chemical methods and limited use of drugs is being considered to ensure animal health and food safety (Akanda *et al.* 2012) [2]. To increase the life of the existing anthelmintic resulting in the development of anthelmintic release devices and using them strategically. One is medicated urea molasses blocks and another dewormer medicated feed pelletes (MFP) can alternatively be used in strategic control programme (Sanyal P.K and Singh, D.K; 1995) [10]. The MUMB contain low doses of anthelmintic and are given to the animals to lick on daily basis. MFP is a technology in which divided dose of anthelmintic is more efficacious than a single dose on two consecutive days. Application of these anthelmintic delivery devices will not only reduce the worm burden but also increase the body weight and reduce the pasture contamination and increase production. There is no necessity of treating the animals in other months of the year.

Materials and Methods

Animals

Forty two crossbred goats of identical age and body weight positive for spontaneous nematodosis were randomly divided into seven groups of six each. The worm infection in all the selected animals was confirmed on the basis of morphology, shape and size of eggs by floatation technique. The eggs per gram (EPG) of faeces were counted in each animal by modified Stoll's dilution technique (Soulsby, 1982). The EPG was determined prior to the treatment (0-day) and every 15 days interval upto 100 days post treatment for each of the animal of each group. All the animals were subjected to detailed clinical examination. The body weights were recorded by using Avery platform, prior to the treatment (0 day) and every 15 days interval upto 100 days post treatment.

Medicated urea molasses block (MUMB, Herbal)

The herbal formulation consisted of powder of sample AAU/CI prepared by drying and grinding of the plant (leaf and stem) material. This is incorporated in Urea Molasses Block (UMB) @ 15 gram / animal / day. This MUMB (AAU/CI) were given to the animal for licking in group 1 (stall feeding) and MUMB (AAU/CI) fed to the animals once a day in group 3 (Grazing) individually. To compare the efficacy of herbal formulation with standard anthelmintic, Fenbendazole @ 0.5 mg / kg body weight of goat was incorporated in UMB. This MUMB (FBZ) were fed to the animal for licking in group 5(Stall feeding) and MUMB (FBZ) fed to the animals once a day in Group 6 (Grazing). The UMB without medication were given to the animal for licking in group 2 (Stall feeding) and once a day in group 4 (Grazing). The animals of group 7 were kept as infected untreated control.

The percentage of efficacy was determined by the following formula.

$$\text{Percent efficacy} = \frac{\text{No of eggs in control} - \text{No of eggs in treated}}{\text{No of eggs in control}} \text{ X } 100$$

For 12 No of goats (Medicated Urea Molasses Block)

Deoiled rice bran_____576g
Mineral Mixture _____14.4g
Sodium Chloride_____7.2g
Molasses_____252g
Gum acacia_____15g
Urea_____ 7.2g
Fenbendazole_____120mg (@ 0.5 mg / kg body wt of goat)
OR
AAU/CI _____180g (@ 15 g /goat)

The ingredient were thoroughly mixed and transferred into a suitable container, kept it for ten days at room temperature allowed to dry. The gum acacia helps to bind the ingredient and molasses promotes the palatability of the block.

Statistical analysis

The EPG data of each group (table) were statistically analyzed by Analysis of variance (one way classification) of Dunnet Test (Snedecor and Cochran, 1967) [11].

Results and Discussion

The mean EPG of the goats after treatment was significantly lowered as compared to the pretreatment EPG (Table-1). The MUMB (FBZ) administered once a day, the reduction in EPG was 100 percent on 15th day post treatment in group 5 which taken as standard for comparison with MUMB (Herbal). The MUMB (AAU/CI) fed once a day, the reduction in EPG was 100 percent on 30 day post treatment in group 3 in grazing animals, while the reduction in EPG was 100 percent on 60 days post treatment in group 1 in stall feeding animals. The overall efficacy of MUMB (AAU/CI) in stall feeding and grazing animal was 78.33 $\pm$ 11.33 and 90.48 $\pm$ 6.02 respectively. There was 100 percent efficacy of the MUMB (FBZ) administered in group 5 in stall feeding animal and 84.45 $\pm$ 9.99 percent in group 6 grazing animal respectively (Table-2). The overall efficacy of UMB administered in stall feeding and grazing animal showed 20.37$\pm$ 3.42 and 1.52 $\pm$ 1.52 percent respectively. From the above observation it is evident that the faecal egg count of helminth infected goats were significantly reduced after the treatment with the herbal formulation. The herbal formulation (MUMB (AAU / CI) fed orally to the grazing animal was found to be more effective in controlling the worm burden of goat.

In the recent years, the importance of Herbal drugs in Medicin e has tremendously increased because of their fewer side effects. The main advantages of the using *in vitro* tests to screen the anthelmintic properties of the plants and plant extracts are low costs and rapid turnover which allow to screen large scale of plants, an additional advantage, these tests measured the effect of anthelmintic activity directly on the processes of hatching, development and motility of parasites without interference of internal physiological functions of the host on pharmacodynamic and pharmacokinetic of the drug (Melo , 2003 and Githiori *et al*., 2006) [8]. Akanda, *et al.* (2012) [2] reports are in parallel with present findings. Lateef (2003) [7] suggested that the anthelmintic activity of herbal extracts on gastrointestinal nematodes of sheep and other animals could be attributed to alkaloids of this plant which might improve tonicity of the gastrointestinal tract of these animals resulting in expelling the worms or may have a direct effect on the nervous system of nematodes.

There is an increase in body weight significantly (P<0.05) in all the animals of treated groups (group 1, 3,5 and 6) upto 100 days post treatment as compared to infected untreated animals in group 7 (Table-3). The EPG was decreased significantly (P<0.05) in all the treated animals and the reduction was 100% on 60 days post treatment in group 1 , 30 days in group 3 , 15 days in group 5 and 45 days post treatment in group 6 respectively as compared to group 2,4 and 7. From the above observation it is evident that there is increase in body weight gain significantly following the treatment with herbal formulation in nematodosis of goats while the faecal egg count decrease significantly.

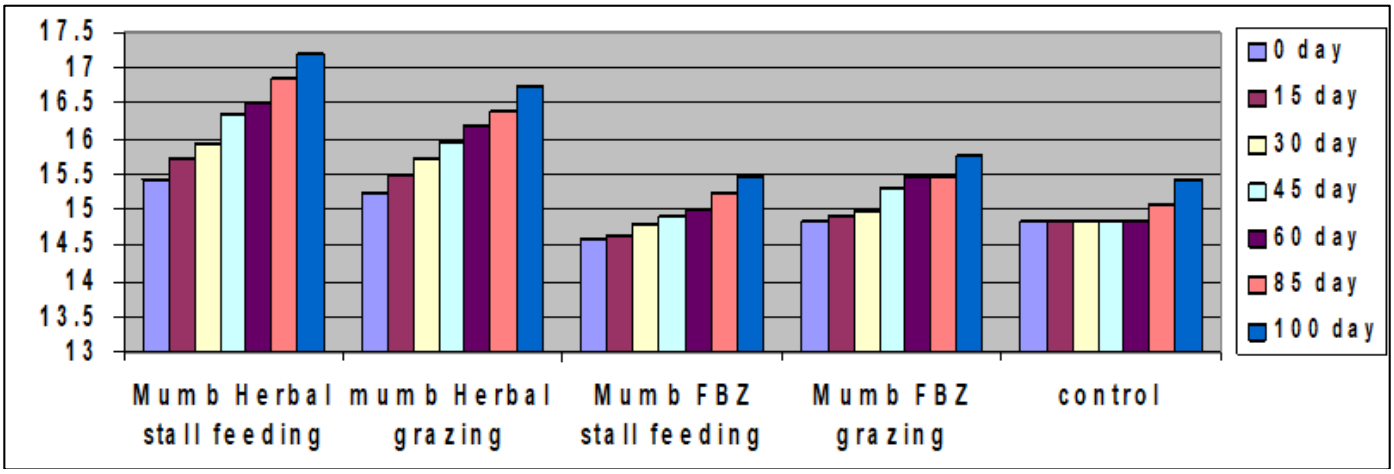

Fig 1: Effect of AAUIC I herbal form ulation on body weight gain incorporated in U MB in crossbred goat infected with spontaneous gastro intestinal nem atodosis

Table 1: Anthelmintic Activity of Herbal Formulation (Aau/C1) Incorporate In Umb and Its Effect on Body Weight Gain in Crossbred Goats

Period	MUMB (Herbal) Stall feeding group-1		UMB Stall feeding group-2		MUMB (Herbal) Grazing group-3		UMB grazing group-4		MUMB (FBZ) stall feeding group-5		MUMB (FBZ) grazing group-6		Infected untreated control group-7	
	Body Wt.(kg)	EPG/g	Body Wt.(kg)	EPG/g	Body Wt. (kg)	EPG/g	Body Wt. (kg)	EPG/g	Body Wt. (kg)	EPG/g	Body Wt. (kg)	EPG/g	Body Wt. (kg)	EPG/g
0 days	14.5	100	15.5	200	19.0	200	15.0	200	16.0	100	15.5	200	16.0	100
	13.5	100	18.5	100	12.5	200	15.0	200	12.5	100	15.5	100	17.5	100
	14.0	200	14.0	100	16.0	400	15.0	100	19.0	200	12.0	200	8.0	100
	18.0	100	15.0	200	15.0	400	17.25	200	14.0	200	12.0	200	15.5	100
	17.0	100	21.0	100	15.0	100	12.0	300	10.5	100	19.0	300	17.5	200
	15.5	100	16.0	100	14.0	100	14.0	100	15.5	200	15.0	300	14.5	100
15 days	14.8	100	15.5	200	19.25	100	15.0	200	16.0	0	15.5	200	16.0	100
	13.8	100	18.8	100	12.75	100	15.20	200	12.5	0	15.5	100	17.50	100
	14.4	100	14.32	100	16.25	200	15.20	100	19.20	0	12.20	200	8.0	100
	18.3	100	15.30	200	15.25	200	17.5	200	14.20	0	12.20	100	15.5	100
	17.32	0	21.30	100	15.30	100	12.0	300	10.5	0	19.0	200	17.5	200
	15.80	100	16.30	100	14.25	0	14.0	100	15.5	0	15.0	200	14.5	100
30 days	15.10	0	15.82	100	19.30	0	15.0	100	16.20	0	15.5	100	16.00	100
	14.10	100	19.10	100	12.95	0	15.5	200	12.75	0	15.50	0	17.50	100
	14.70	0	14.64	100	16.50	0	15.5	100	19.20	0	12.20	100	8.00	100
	18.60	100	15.62	200	15.50	0	17.50	200	14.25	0	12.20	0	15.50	100
	17.02	0	21.62	100	15.55	0	12.0	300	10.75	0	19.20	100	17.50	200
	16.10	0	16.35	200	14.55	0	14.5	100	15.75	0	15.20	0	14.50	100
45 days	15.42	0	16.14	100	19.50	0	15.5	200	16.20	0	16.0	0	16.00	100
	14.42	100	19.40	100	13.00	0	15.85	200	12.75	0	15.75	0	17.50	200
	15.00	0	14.94	100	17.00	0	15.80	100	19.25	0	12.50	0	8.00	100
	19.00	100	15.94	100	15.75	0	17.75	200	14.45	0	12.50	0	15.50	100
	17.92	0	21.94	100	15.75	0	12.5	300	10.95	0	19.50	0	17.50	200
	16.40	0	16.67	100	14.80	0	14.5	200	15.90	0	15.50	0	14.50	100
60 days	15.72	0	16.44	100	19.70	0	15.75	200	16.45	0	16.20	0	16.00	200
	14.74	0	19.70	100	13.25	0	15.85	200	12.95	0	15.75	0	17.5	200
	15.35	0	15.24	100	17.20	0	15.80	100	19.25	0	12.70	0	8.00	100
	19.35	0	16.34	100	15.95	0	17.95	100	14.45	0	12.70	0	15.50	100
	17.22	0	22.34	200	15.95	0	12.75	300	11.00	0	19.75	0	17.50	200
	16.72	0	17.07	100	15.00	0	14.70	100	16.00	0	15.75	0	14.50	100
85 days	16.02	0	16.74	100	19.85	0	15.75	200	16.45	0	16.20	0	16.00	200
	15.04	0	20.30	100	13.45	0	16.00	200	13.00	0	15.75	0	17.5	200
	15.67	0	15.56	100	17.45	0	16.00	100	19.75	0	12.70	0	8.5	100
	19.65	0	16.66	200	16.00	0	17.95	100	14.75	0	12.70	0	16.00	100
	17.54	0	22.64	100	16.20	0	12.95	300	11.25	0	19.75	0	18.00	200
	17.04	0	17.37	100	15.30	0	14.70	100	16.20	0	15.75	0	14.50	100
100 days	17.00	0	16.90	100	20.00	0	16.00	200	16.65	0	16.50	0	16.50	200
	15.50	0	20.50	100	14.00	0	16.25	200	13.25	0	16.00	0	18.00	200
	15.87	0	15.80	100	18.00	0	16.25	100	19.80	0	13.00	0	8.5	100
	19.85	0	16.85	200	16.50	0	18.00	100	15.00	0	13.00	0	16.50	100
	17.75	0	22.85	100	16.50	0	13.00	300	11.50	0	20.00	0	18.00	200
	17.25	0	17.57	100	15.50	0	15.00	100	16.50	0	16.00	0	15.00	100

Table 2: Average Body Weight Gain After Treatment With Herbal Formulation (Aau/C1) Incorporated In Urea Molasses Block In Goats Infected With Spontaneous G. I. Nematodosis.

Treatment	0 days	15 days	30 days	45 days	60 days	85 days	100 days
MUMB (Herbal) Stall feeding (Group-1)	15.42±0.72	15.75±0.72	15.94±0.68	16.36±0.73	16.52±0.68	16.83±0.68	17.20±0.63
MUMBG (Herbal) grazing (Group-3)	15.25±0.89	15.51±0.89	15.73±0.87	15.97±0.89	16.18±0.89	16.38±0.88	16.75±0.84
MUMB (FBZ) Stall feeding (group-5)	14.58±1.21	14.65±1.23	14.82±1.99	14.92±1.83	15.02±1.18	15.23±1.21	15.45±1.18
MUMB (FBZ) grazing (group-6)	14.83±1.07	14.90±1.03	14.97±1.01	15.29±1.07	15.48±1.07	15.47±1.07	15.75±1.06
UMB Stall feeding (Group-2)	16.66	16.92	17.19	17.51	17.86	18.21	18.41
UMB grazing (group-4)	14.71	14.82	15.00	15.32	15.47	15.56	15.75
Infected Untreated Control group-7	14.83±1.45	14.83±1.45	14.83±1.45	14.83±1.45	14.83±1.45	15.08±1.41	15.41±0.47

The plants in herbal formulation have been found to possess anthelmintic properties (Agrawal *et al*, 2005). Several experimental investigations, including *in vitro* and *in vivo* studies, using different part of these plants also indicated vermicidal activity which kills intestinal worms (Mishra *et al.*, 2007; Kanokwan and Nobuo, 2008) [9, 6]. The anthelmintic efficacy of the herbal formulation might be due to the "lactone function" of Andrographolide a phytochemical (Mishra *et al.*, 2007) [9] present in the leaves and stem of the plant. Athanasiadou *et al.* (2001) suggested that anthelmintic activity of herbal plants on larvae may be attributed to condensed tannins which have ability to blind the cuticle of larvae of nematodes, which is highly in glycoprotein, thus cause starvation of larvae and death.

Increase palatability of the molasses and additive effect of mixed formulation of other ingredients resulting in significant increase in body weight gain in the present investigation.

Summary and Conclusion

Examination of 42 crossbred goats of identical age and body weight positive for spontaneous nematodosis were randomly divided into seven groups of six animals in each. The worm infection in all the selected animals was confirmed on the basis of morphology, shape and size of eggs by floatation technique. The eggs per gram (EPG) of faeces were counted in each animal by modified Stoll's dilution technique (Soulsby, 1982). The EPG was determined prior to the treatment (0-day) and every 15 days interval upto 100 days post treatment for each of the animal of each group. All the animals were subjected to detailed clinical examination. The body weight was recorded by using Avery platform, prior to the treatment (0 day) and every 15 days interval upto 100 days post treatment.

The MUMB (FBZ) administered once a day, the reduction in EPG was 100 percent on 15th day post treatment in group 5 which was taken as standard for comparison with MUMB (Herbal). The MUMB (AAU/CI) fed once a day, the reduction in EPG was 100 percent on 30 day post treatment in group 3 in grazing animals, the reduction in EPG was 100 percent on 60 days post treatment in group 1 in stall feeding animals. The overall efficacy of MUMB (AAU/CI) in stall feeding and grazing animal was 78.33 ± 11.33 and 90.48 ± 6.02 respectively. There was 100 percent efficacy of the MUMB (FBZ) administered in group 5 in stall feeding animal and 84.45 ± 9.99 percent in group 6 grazing animal respectively (Table-2). The overall efficacy of UMB administered in stall feeding and grazing animal showed 20.37± 3.42 and 1.52 ± 1.52 percent respectively. From the above observation it is evident that the faecal egg count of helminth infected goats were significantly reduced after the treatment with the herbal formulation. The herbal formulation (MUMB (AAU / CI) fed orally to the grazing animal was found to be more effective in controlling the worm burden of goat. There is increase in body weight significantly (P<0.05) in all the animals of treated groups (group 1, 3,5 and 6) upto 100 days post treatment as compared to infected untreated animals in group 7 (Table-3). The EPG was decreased significantly (P<0.05) in all the treated animals and the reduction was 100% on 60 days post treatment in group 1 , 30 days in group 3 , 15 days in group 5 and 45 days post treatment in group 6 respectively as compared to group 2,4 and 7. From the above observation it is evident that there is increase in body weight gain significantly following the treatment with herbal formulation in nematodosis of goats while the faecal egg count decrease significantly. The present work summarizes that medicated urea molasses block (MUMB) AAU/CI has a good anthelmintic action and a significant effect on the body weight gain with Stallfed and grazing animal.

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