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European Journal of Experimental Biology, 2015, 5(5):81-84

ISSN: 2248 –9215
CODEN (USA): EJEBAU

Efficacy of an indigenous veterinary medication to control endoparasite infestation in clinically diagnosed large ruminants affected with diarrhoea amongst field conditions: Gujarat, India

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ABSTRACT

Endoparasite infestation is a common ailment affecting livestock production system in tropical regions of the world. Worm infestation in adult animals affects digestive capacity, results in depression and decrease in milk production. The lack of awareness in control measures for endoparasite causes stunted growth, poor welfare and mortality among calves. Stakeholders such as animal husbandry department, dairy cooperative societies had extensively advocated deworming campaign and provision of medication. However, limited evidenceswere available in engaging farmers to comprehend and make use of locally available low cost technologies. Indigenous veterinary system has been forefront in control of endoparasite infestation globally over several centuries. Knowledge holders of this system were held in high esteem in their village institutions, but younger generation are not keen to painstakingly follow and learn the usage of these folkloric systems. This experimental research study was aimed to test an endoparasite medication developed based on the knowledge of indigenous veterinary healers under field conditions. Animals in the study were clinically examined for symptoms of diarrhoea and observed57.14 percent incidence ofworm infestation among them. Villagers, particularly youth were involved throughout the observation period of experimentation and findings were shared with them.The mean Parasitic Egg Count (PEC) was found to be 60±27.27 ($\bar{x}\pm\alpha$) before the start of treatment. The indigenous herbal medication had reduced PEC to 12.50 ± 16.55 ($\bar{x}\pm\alpha$) after treatment. The study showed that the indigenous veterinary medication had significantly reduced the worm infestation at 5 percent level of significance. The broad-spectrum efficacy of indigenous veterinary medication was confirmed during the experimental period of nine days duration. The research study illustrated the need for engaging livestock owners and to successfully demonstrate such technologies for sustaining indigenous knowledge systems.

Keywords: Diarrhoea, Endoparasite, Indigenous, Knowledge holders, Parasitic Egg Count

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INTRODUCTION

The productivity of livestock has been affected worldwide by endoparasite infestation. Some of these parasites cause severe welfare issues such as depression, loss of body condition in infected animals and economic loss to livestock owners[1, 15]. Prevalence of helminthiasis in tropical and subtropical countries remains a challenge [21, 12].It has

to be reiterated that convenience of administration, minimum handling of animal as primary factors for livestock owners in prioritizing medications for control of parasites [6]. Livestock owners particularly in small holder system may not be realizing the harmful effect of worm infestation that causes delay in productivity cycle of animal. These infections had shown development of resistance against conventional medications in farming conditions [4]. Further, faecal residues of these drugs had shown unintended toxic effect on dung beetles [14]. Studies indicated that in spite of extensive research on helminth control, adoption of new technology has been minimum[8].Several innovative measures were nurtured in sustaining healthy ecosystem through public policy [18]. It was also well recognized that combination of affordable technologies and rural development in the field of veterinary parasitology can sustain food requirements of mankind [5]. These features necessitate the identification of robust alternative approach for development and standardization of novel medications.

Indigenous knowledge systems can fill this void as they exist over a period of time and minimize the effective duration in development of substitute medications. These systems has been in use over several years in different regions [23]. Studies were conducted in evaluating and providing dewormer as means to control endoparasite infestation. However, large animal population maintained by livestock owners for their sustenance find it difficult to comprehend and make use of such measures due to several reasons[19]. The service providers had to lend wide expertise beyond knowledge of disease for healthy flock management [11]. It was found that ecological background of stakeholders is equally important for effective interaction and opinion on farmers practices [9]. The custodians of this knowledge were generous in sharing their trial and error experimentation free of cost so as to make use of locally available medicinal herbs. Henceforth, successful demonstration of indigenous medications in control of endoparasite infestation is imminent. This will convince livestock owners for utilization and conservation of natural resources in their locale.

MATERIALS AND METHODS

Study locale:
The hamlet Indiranagar of Amarapur village, Mansa taluk, Gandhinagar district of Gujarat state, India was identified purposively. Group meetings with villagers were conducted before start of experimentation in their hamlet to understand, confirm the presence of diarrhoeic animals in their small holding livestock farming system.

Research design and sampling method with help of community:
The study was conducted as field experiment with help of livestock owners, known as Before-after design [20]. After the treatment period, post tests were administered to these experimental animals and differences were evaluated. The selection bias of experimental animals was controlled by randomly drawn experimental subjects from the population.

Clinical evaluation of animals:
A total of 28 large ruminants were selected based on clinical symptoms of diarrhoea. These animals were identified with the help of villagers as they had defined the problem of diarrhoea. Dung samples from these large ruminants were collected in separate plastic bags and labelled for parasitological examination. The dung samples were examined on Day 0 and efficacy of medication was assessed based on the parasitic egg count on ninth day of treatment.

Parasitic Egg Count - Laboratory diagnosis:
The laboratory observation of collected dung materials were examined through direct smear technique[22].One gram sample of dung was placed on a glass slide and mixed with two drops of saline; the mixture was then spread thinly over the slide (thin enough to read newsprint through it), and the slide was covered with a glass coverslip. The slide has been screened by standard protocol for eggs or oocysts[2]. These samples were examined microscopically for the presence of parasitic eggs, cysts and larvae. They were confirmed morphologically using 40x objective[16]. The parasitic egg count obtained from dung materials were recorded for understanding the efficacy of test medication.

Participation by community and recording of observation:
The parasitological diagnosis and confirmation of etiology were shared with livestock owners. This had enabled the community to visualize, understand the problem and affected animals were selected for experimentation. These animals were closely monitored by study team involving villagers as well. The dosage of medication *AHP/AM/DW/AD* was 80 grams twice a day for a period of four days orally. The dosage details were shared and villagers administered the medication for reducing the endoparasite infestation themselves. During the period of study, animals were maintained in support with the community under same environmental conditions.

Statistical analysis:
The enumerated data on Parasitic Egg Count before and after treatment were compared statistically through *t* test [10]. The variables like mean, standard deviation and percent reduction in Parasitic Egg Count (PEC) were calculated for understanding the efficacy of test medication *AHP/AM/DW/AD*.

RESULTS AND DISCUSSION:

The worm infestation had survived severe environmental stress and veterinary service had tried broad-spectrum anthelmintic for past 40 years [15]. Research studies had underlined the importance of evaluating affected animals for control of parasite. The laboratory parasitological examination of faecal sample had confirmed the presence of worm infestation. S*ixteen* animals were found positive for endoparasite infestation, reflecting an incidence of *57.14 percent* among diarrhoea affected animals in the village. The study conducted by [13] observed that in young animals mortality and morbidity were caused by amphistomes.

The morphological examination of eggs had shown the presence of flukes, tapeworm and roundworm infestation among experimental animals. The study illustrated the incidence of mixed endoparasite infestation in the field. The parasitic infestation of animals in farming situation was affected by various helminths as well as by protozoans [16].

Table. 1 Impact of antidiarrhoeal medication (*AHP/AM/DW/AD*)*

SN	Parasitic Egg Count (Before)	Parasitic Egg Count (After)	*d*	d^2
1	35	2	-33	1089
2	100	12	-88	7744
3	50	1	-49	2401
4	110	2	-108	11664
5	50	10	-40	1600
6	30	8	-22	484
7	55	10	-45	2025
8	50	55	5	25
	$(\bar{x}\pm\alpha)$ = 60±27.27	$(\bar{x}\pm\alpha)$ = 12.50 ± 16.55	$\sum d$ = -380	$\sum d^2$ = 27032

**t = 3.75 (calculated), v=7(n-1) $t_{0.05}$=2.365 (table value)*

The test medication was administered to eight animals that were confirmed with endoparasitic infestation (Table 1). It was observed that the parasitic egg count was 60±27.27 ($\bar{x}\pm\alpha$) before treatment and 12.50 ± 16.55 ($\bar{x}\pm\alpha$) after treatment. The calculated *t*value was greater than the table value at 5 percent level of significance. Hence it was reasonable to believe that the medication *AHP/AM/DW/AD* had significantly reduced the endoparasitic infestation. These indigenous systems were found to be an important solutions for implementing large scale parasitic control strategies.

The development of anthelmintic resistance worldwide had necessitated to develop cost effective methods [3]. The long duration and high failure cost of novel treatment methods in veterinary anthelmintic infections has been a challenge [17].The tested medication had shown significant reduction in faecal egg counts that were morphologically identified for flukes, tapeworm and roundworm. Under farming situation, the incidence of gastrointestinal parasites was common in India [7]. The broad-spectrum nature of indigenous test medication needs to be valued and these successful demonstrations have to be shared with farming communities. Various models for effective implementation strategies in field applications of these systems have to be studied and scaled up through on-farm experimentation for control of parasites.

CONCLUSION

Impact of the indigenous formulation
About 57 percent of examined animal population were found positive for endoparasite infestation. The experimental research study was conducted with the help of community and found that test medication had significantly reduced endoparasitic infestation till 9thday of post treatment. The percent reduction of faecal egg counts was found to be 79.16 percent for test medication AHP/AM/DW/AD at 9th day of post treatment. The study had validated claims of indigenous veterinary healers in farmer's field condition thereby promoting health care of livestock. The research study had generated evidence of *participative technology development* as livestock owners had adequate capacity to comprehend the usefulness of these environment friendly technologies. It can be concluded through the research experimentation that these novel technologies derived from indigenous systems were adopted by livestock owners. The nature of learning among farming communities need to be revived through such engagement. Initiatives for dialogue between indigenous livestock healers and service seekers such as dairy animal owners have to be reinforced.

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