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Prevalence of Cestodes and Comparative Efficacy of Various Anthelmintics in Rambouillet Sheep

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ABSTRACT

A project was planned to investigate prevalence of cestode and study relative efficacy of five different anthelmintics used for the control of cestodes in Rambouillet sheep under local conditions of Livestock Research Station (LRS), Jaba, district Mansehra, Pakistan. Out of the total animals examined, 28% were found infested with cestodes, carrying 545.35±48.12 eggs per gram (EPG) of fecal sample on the average with a coefficient of variation of 88.97%. Fecal examination for various species of cestodes revealed significantly ($p<0.05$) higher EPG of *Moniezia expansa* (388.85±23.55EPG) as compared to *Avitellina centripunctata* (144.64±48.22) and *Moniezia benedeni* (11.86±2.78). No EPG was found in fecal sample of group of sheep treated with Nilzan plus before and after treatment; whereas, Vety Vermicide was not effective to control cestodes. Treatment efficacy of Albex, systamex and Vety Wormex was 100%. Sheep drenched with Vety Wormex and Systamex should receive periodic deworming after 15th week, while Albex treated group after 14 weeks post-treatment. To be more accurate, regular examination of the fecal samples at weekly intervals would be the better option for deciding dewormers' use at LRS, Jaba. Use of Vety Vermicide should be discouraged for the control of cestodes.

Key Words: Anthelmintics; Cestodes; Rambouillet-sheep

INTRODUCTION

Sheep are usually more prone to internal parasites as they mostly depend on grazing. The situation could be more crucial in marshy areas where the internal parasites could more easily propagate as compared to relatively dry environment. Internal parasites could cause severe damages to sheep in terms of high mortality, reduced body weight gain, wool yield and birth rate (Ahmad, 1992). In order to keep the animal healthy and avoid economical losses, periodic drenching should be followed against internal parasites. Gill *et al*. (1990) also reported improvement in performance, lower incidence of diarrhea and less worm load in sheep drenched periodically against internal parasites. Chaudhry *et al*. (1984) reported higher conception rate (80%) in sheep treated for parasites as compared to untreated controls (37.5%). An increase in body weight gain by 6.5% in ewes and 15% in lambs has also been reported (Rood *et al*., 1992).

Cestodes are one of the internal parasites that could cause severe losses to sheep in terms of poor performance. Most commonly prevalent species of cestodes in sheep causing heavy economic losses have been reported to be *Moniezia expansa, M. benedeni* and *Avitellina centripunctata* (El-Mukdal, 1977; Al-Khafaji & Rhaymah, 1993; Celep *et al*., 1995). Thus, efforts shall be made to ensure its effective control for better performance of sheep. Now days, a number of broad-spectrum anthelmintics are available in the market, which claim better efficacy against internal parasites of domestic animals and sheep. However, their suitability against various species of internal parasites under various climatic conditions needs to be worked out. As all such drugs available may not be that much efficient for the treatment and control of internal parasites; thus, wide variability is expected in the results obtained from the use of such drugs. Praslick *et al*. (1995) also reported variable efficacy levels of 71.3, 81.8, 99.3 and 99.4% for four different drugs used at a sheep farm in Slovakia.

The present study would, therefore, be an effort to investigate prevalence of various species of cestodes and study relative efficacy of five different anthelmintics for their control in Rambouillet sheep maintained at Livestock Research Station (LRS), Jaba, Mansehra, Pakistan.

MATERIALS AND METHODS

The present project was undertaken to investigate prevalence of cestode and study relative efficacy of five different anthelmintics used for the control of cestodes in Rambouillet sheep under local conditions of Livestock Research Station (LRS), Jaba, district Mansehra. Ninety sheep selected at random were distributed in six groups (each comprising 15 sheep). Out of six, one group was kept control and the rest five groups were drenched with five different anthelmintics (each group with one anthelmintic). Each sheep in a group was given an identification number to facilitate data on individual basis. Fecal samples from all sheep were

manually and separately collected from the rectum and eggs per gram (EPG) of each fecal sample were counted prior to initiation of experiment. All the sheep were weighed before medication to estimate the amount of medicine to be drenched. Dose rates recommended by the manufacturers of each medicine were adopted for using following five drugs in the study;

1. Nilzan plus suspension (Levamisol HCl B.P, 1.5% w/v; oxyclozanide B.P, 3.0% w/v and cobalt sulphate, 0.382%).
2. Vety-Vermicide (Levamisole HCl, 1.5% w/v; Oxyclozanide, 3.0% w/v; Sodium selenite, 0.035%; Cobalt chloride 0.075%)
3. Albex (Albendazole, 5 % w/v)
4. Vety Wormex (Albendazole, 10 % w/v)
5. Systamex (Oxfendazole, 2.265 % w/v).

After drenching the sheep, fecal sample on weekly basis from each sheep was collected for counting the EPG. The experiment lasted for 15 weeks post treatment period. About 10 g fecal sample from each sheep was manually collected from rectum in clean polythene bags and preserved in 10% formaline solution (10 ml of Formaldehyde solution dissolved in 90ml of distilled water). Samples were prepared for identification of cestodes' eggs in saturated NaCl solution (Stoll, 1929; stoll, 1930). Eggs per gram (EPG) of fecal sample were counted to estimate the worm load using modified McMaster method (Anonymous, 1979).

Fecal samples (3g each) were taken in a pestle and 42ml water was added to it. The faces were then broken down into smaller pieces with the help of morter to make an even suspension, which was then poured through a wire mesh screen with an aperture of 0.15mm placed over a beaker. The fluid collected in the beaker was stirred thoroughly and then poured into two centrifuge tubes. The tubes filled up to 10mm of the top were centrifuged at 1500 rpm for 2 minutes. After centrifugation, the supernatant was poured off and discarded. A little saturated sodium chloride solution was added and the sediment in the tube was loosened by means of a pasture pipette. The tube was then filled with saturated sodium chloride solution to the same level as before. The contents of the tube after thorough mixing by inverting it five or six times with the thumb over the end, a sufficient amount of the fluid was drawn immediately with a Pasteur pipette and carefully allowed to run into one chamber of the McMaster counting slide (each slide comprising two chambers each of 1 cm^2). After further mixing a second sample was drawn and allowed to run into the other chamber of the slide. All the eggs in both squares were counted. The EPG in a fecal sample was obtained by multiplying the total number of eggs in the two squares by 50. The fecal samples were examined under microscope with magnification power of 4x, 10x and 40x to identify eggs (ova) of cestodes and its various species.

The data were analyzed using General Linear Model (GLM) procedure and univariate analysis. To study the effect of medicine and interval in weeks after medication on EPG of cestodes in sheep, following statistical model was constructed adopting the procedure of Steel and Torrie (1981);

$$Y_{ijk} = \mu + \alpha_i + \beta_j + e_{ijk}$$

Where,

Y_{ijk} = the k-th observation on egg per gram of nematodes in fecal sample obtained in i-th week from sheep treated with J-th anthelmintics,

μ = population constant common to all observations,

α_i = the effect of i-th week interval after medication; i = 1,...15,

$ß_j$ = the effect of j-th medicine used; J = Nilzan plus, Vety Vermicide, Albex, Vety Wormex and systamex.

e_{ijk} = random residual term, assumed to be normally identically independently distributed with mean zero and unit variance.

Percent efficacy for individual drug was calculated using the following formula reported by Fazli Malik *et al*. (1994).

$$\%\ efficacy = \frac{a-b}{a} \times 100$$

where "a" and "b" were the EPG of fecal sample prior to and after medication, respectively.

RESULTS AND DISCUSSION

Fecal examination of the Rambouillet sheep maintained at Livestock Research Station (LRS), Jaba, Mansehra revealed prevalence of three species of cestodes namely, *M. expansa*, *M. benedeni* and *A. centripunctata*. Out of the total animals examined, 28% were carrying cestodes. Average number of eggs per gram (EPG) of cestode in the fecal sample was 545.35±48.12 with a coefficient of variation of 88.97%. Among the Cestodes, EPG of *M. expansa* (388.85±23.55) was significantly higher ($P<0.05$) as compared to *Avitellina centripunctata* (144.64±48.22) and *M. benedeni* (11.86±2.78; Table I). El-Mukdal (1977), Al-Khafaji and Rhaymah, (1993) and Celep *et al*. (1995) also reported *M. expansa*, *M. benedeni* and *Avitellina centripunctata* to be the most common cestodes in sheep. The lower EPG of cestodes in sheep at LRS, Jaba, could be attributed to the periodic dewarming system followed at LRS, Jaba.

Treatment had a significant effect ($P<0.01$) on EPG of cestodes in Rambouillet sheep at LRS, Jaba, Mansehra. No EPG was found in fecal sample of group of sheep treated with Nilzan plus before and after treatment. Therefore, no conclusive evidence could be grasped from the findings regarding efficacy of Nilzan plus against cestodes. On the other hand group of sheep treated with Vety Vermicide resulted in a gradual increase in EPG of cestodes till 15 weeks post treatment period (Table II). However, the EPG observed at 15^{th} week post treatment was lower than the reported infested level (1000 EPG; Soulsby, 1982). Eggs per gram of cestodes in control group suggested a gradual increase till the end of experimental period as compared to treated groups (Table II).

Table I. Eggs of cestodes per gram of fecal sample of Rambouillet sheep at LRS, Jaba, Mansehra prior to and after medication with various anthelmintics

Cestodes species	Before treatment Mean EPG ± SE (#)	15 weeks after treatment Mean EPG ± SE (#)	CV (%)	Relative infestation rate (%)
Moniezia expansa	388.85_{a}±23.55	232.21_{b}±6.38	73.85	71.30
Moniezia benedeni	11.86_{c}±2.78	0_{d}	41.23	2.17
Avitellina centripuncta	144.64_{b}±48.22	15.75_{c}±1.15	58.74	26.55
Overall cestodes species (1+2+3)	545.35±48.12	247.96±6.82	88.97	

*Means with different subscripts were significantly different at $\alpha = 0.05$

Table II. Eggs of cestodes per gram in fecal sample of Rambouillet sheep at Livestock Research Station Jaba, Mansehra prior to and 15 weeks post-treatment with various drugs

Weeks	Vety Vermicide treated group		Albex treated group		Vety Wormex Treated group		Systamex treated group		Control group
	Mean±SE (#)	Efficacy (%)	Mean±SE (#)	Efficacy (%)	Mean±SE (#)	Efficacy (%)	Mean±SE (#)	Efficacy (%)	Mean±SE (#)
**0	40_{g}±28.46	0	112.5_{b}±57.28		2810_{a}±163.66		273.00_{a}±212.76		36.67_{d}±28
11	46.67_{gh}±20.62	0	0_{e}	100_{a}	50_{d} ± 193.62	98.22_{a}	56.66_{c}±23.33	79.25_{c}	37_{de}±22.78
22	50_{gh}±26.03	0	3.33_{d}	97.04_{a}	43.33_{d}±210.33	98.46_{a}	26.68_{d} ±133.48	90.23_{b}	70.33_{de}±33
33	56.69_{gh}±20.81	0	0_{e}	100_{a}	0_{e}	100_{a}	20_{d}±112.6	92.67_{b}	100_{de}±39
44	66.67_{g}±11.75	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	121_{de}±42.7
55	66.33_{g}±17.50	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	126.3_{cde}±48
66	76.70_{g}±30.42	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	163_{cde}±48.3
77	83.33_{g}±49.00	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	177_{bcde}±61
88	116.67_{f}±51.28	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	216_{bcde}±63
99	130_{f}±63.33	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	223.34_{bcde}±67.24
110	160_{ef}±82.95	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	257_{bcde}±72
111	196.66_{e}±126.00	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	280_{bcde}±82
112	290_{d}±156.46	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	320_{abcd}±91
113	366.69_{c}±201.76	0	0_{e}	100_{a}	0_{e}	100_{a}	0_{e}	100_{a}	403_{abc}±115
114	473.36_{b}±218.21	0	60.07_{c}±49.23	46.67_{b}	180.9_{c}±111.8	93.56_{b}	0_{e}	100_{a}	457_{ab}±136
115	613.33_{a}±218.91	0	160_{a}±86.25	0_{c}	306.5_{b}±135.7	89.09_{b}	160_{b}±103	41.39_{d}	523_{a}±154

Means with different subscripts across the rows for each column separately were significantly different at $\alpha = 0.05$.

However, EPG of cestodes was still below the infestation level (Soulsby, 1982) which could be attributed to low prevalence rate of cestodes in the study area and regular use of anthelmintics for the control of cestodes. Treatment efficacy of Albex, Systamex and Vety Wormex was 100%, suggesting that any one of the aforementioned drugs could be effectively used for the control of cestodes. Findings of the present study were in line with those of Theodorides *et al*. (1976), Craig *et al*. (1980), Corba *et al*. (1980) and Onar (1990) who reported 98-100% efficacy of Albendazole. Similar, findings were put forward by Westcott *et al*. (1979) and Corba *et al*. (1980). On the other hand Vety vermicide was not an effective drug to be used for the control of cestodes in sheep at LRS, Jaba.

Post treatment period in weeks had a significant effect on number of eggs of cestodes excreted in the faces of Rambouillet sheep. The EPG of cestodes in fecal sample of sheep was significantly ($P<0.05$) higher at 15th week (613.33±218.91) than at 1st through 12th week in Vety Vermicide treated group (Table II). The EPG of cestodes in sheep treated with Albex was reduced from 112.5±57.28 to zero immediately after first week of treatment and remained zero until 13th week post treatment. However, EPG was found significantly higher at 15th week after treatment (160±86.25) than the EPG observed before treatment (112.5±57.28; Table II). Thus, findings of the present study suggested effective use of Albex for the control of cestodes up to 14th week after medication. Eggs of cestodes per gram of fecal sample in Vety Wormex treated group were significantly higher ($P<0.05$) before treatment than at any stage till 15th week post-treatment. A reduction in EPG of cestodes was observed after treatment, right from first week until it reached to undetectable level at 3rd week (Table II). At 14th and 15th week post-treatment, cestodes were again detected in the fecal samples and attained the level of 180.86 and 306.5 EPG, respectively. A similar trend was observed in EPG of cestodes in sheep treated with Systamex (Table II). Similar, findings were observed by Westcott *et al*. (1979) and Bauer *et al*. (1990) using Albendazole (Albex and Vety Wormex) and Oxfendazole (Systamex) against cestodes for 3-7 days after medication. Findings of the present study suggested an effective use of Vety Wormex and Systamex till 15th week, while Albex till 14th week for the control of cestodes in sheep maintained at LRS, Jaba.

In untreated group a consistent increase in EPG of cestodes was observed suggesting infestation of the sheep flock with cestodes (Table II). Thus, regular use of anthelmintics and management measures would be necessary to control cestodes' infestation in sheep at LRS, Jaba.

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