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Prevalence of helminth infection in sheep in Udaipur district (Rajasthan)

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Abstract
Sheep farming is an important source of livelihood for upliftment of economy of India in general and Rajasthan in particular. A study on prevalence of helminths of sheep and goat in relation to age, sex, seasonal, tehsil and month wise was studied at Udaipur district, Rajasthan from May 2016 to January 2017 by faecal examination. Out of a 900 faecal samples, 510 samples were examined of which 410 (80.39%) in sheep and 390 samples examined in which 296 (75.89%) in goat were positive for one or more species of helminth parasites. Overall helminth prevalence was 78.44% across the 900 animals, *Strongyles* sp. were most prevalent (34.56%), followed by *Amphistome* sp. (22.80%), *Trichuris* sp. (15.86%), *Fasciola* sp. (7.64%), *Moniezia* sp. (2.97%) and *Strongyloides* sp. (0.56%). Mixed infection were (15.58%) in sheep and goat total. In sheep, seasonal analysis revealed highest prevalence in rainy season followed by summer and lowest in winter. Tehsil wise prevalence showed highest prevalence in Vallabhnagar tehsil in sheep. Sex wise observations showed females were more infected with helminth infection than the males in sheep respectively. The age wise prevalence of helminths infection reported highest prevalence in age group more than 2 years followed by 1-2 year group and group 6 month to 1 year in sheep. Month wise helminth infection showed higher prevalence in September Month in sheep.

Keywords: Prevalence, helminth parasites, small ruminants

Introduction
Sheep farming is an important source of livelihood for small and marginal farmers and landless labourers as it plays an important role in providing food, fibre, manure etc. Rearing of sheep plays an important role in the economy of Rajasthan for sustainable livelihood of poor people, because of inherent risk involved in the crop farming due to uncertainty of rainfall and occurrence of recurrent droughts (Pasha, 2000; Misra, 2005) [11, 9]. Parasitism in sheep is a substantial problem plaguing farmers across the nation. As gastrointestinal parasite infection is the most important limiting factor of sheep productivity, parasitism has a highly detrimental effect on the sheep industry (Jones, 2001) [2]. Helminthiasis, especially parasitic gastroenteritis, pose a serious health threat and a limitation to the productivity of small ruminants due to the associated morbidity, mortality, cost of treatment and control measures (Nwosu *et al*., 2007) [10]. Helminth infection remain one of the major constraints to small ruminant production in tropics (FAO, 1992) [3]. Ecological conditions like weather, texture of soil, population density, type and amount of vegetation, management system, host species and age of the animals play an important role in the prevalence of parasites (Thomas, 1982) [17]. In grazing animals, parasitic stages enter the body from the contaminated pasture and water (Levine, 1968) [7]. In western Rajasthan, where pasture is not luxuriant during all year small ruminants get cumulative infection throughout the year due to their specific grazing habit, hence studies on seasonal fluctuation in egg output of gastrointestinal helminth parasites seem to be important. So in the present study the Prevalence of helminth infection was studied in small ruminants in Udaipur district of Rajasthan.

Material and methods
The study was conducted from the month of May 2016 to January 2017 in six different villages of Udaipur district in Southern Rajasthan.

Sheep was randomly selected and faecal sample were collected and subjected to qualitative and quantitative examination. A total of 510 faecal samples were collected from sheep freshly during morning hours directly from the rectum of the each animal or during defecation with strict sanitation and placed in air and water tight polythene containers and then taken to the laboratory for routine examination. In the laboratory the samples were subjected to Floatation and Sedimentation technique to identify the eggs and Stoll's egg technique to count the number of eggs in each sample. The relevant information regarding place, rearing, age, sex, source of feed and water, deworming history, clinical signs etc. were also recorded. The prevalence studies were analysed by Genelarized Linear Model (Duncan Test).

Results and discussion

Out of a total of 900 faecal samples of sheep and goat, 706 (78.44%) samples were found positive for an overall prevalence for helminth infection in small ruminants (Table 1). The study is in accordance with several other investigators who have reported similar findings from various parts of India with (69.70%) overall prevalence from ladakh (Kuchai *et al.*, 2011) [6], (68.75%) overall prevalence from Mathura (Singh *et al.*, 2013) [14]. The prevalence was reported to be higher in sheep (80.39%) as compared to goat (75.89%) and it is in agreement with the findings of Khajuria *et al*., (2013) [5] who has reported 68.54% in sheep and 65.94% in goat. The higher prevalence of gastrointestinal helminths recorded in sheep may be attributed to the factors like ground grazing habit of sheep, relatively less cleanliness, management and extensive pasture grazing when compared with goats (Minnat, 2014) [8]. Among various overall helminth infections reported in the present study, *Strongyles* sp. (34.56%) were the most prevalent gastrointestinal helminth which is in agreement to the previous findings of Swarnkar *et al*., (2010) [16] who has reported 69.7% *Strongyles* from Rajasthan. The increase in *Strongyle* population may be attributed to the fact that the life cycle is direct and they are getting appropriate climatic factors to grow and perpetuate in soil easily. The variability for overall prevalence of helminth infection in small ruminants was found to be significant ($p< 0.05$)

Table 1: Overall prevalence of helminth infection in sheep and goat

Species	Examined	Infected	Mixed	*Strongyles*	*Amphistome*	*Trichuris*	*Fasciola*	*Moniezia*	*Strongyloides*
Sheep	510	410 (80.39)	53 (12.92)	152 (37.07)	92 (22.43)	67 (16.34)	31 (7.56)	13 (3.17)	2 (0.48)
Goat	390	296 (75.89)	57 (19.25)	92 (31.08)	69 (23.31)	45 (15.20)	23 (7.77)	8 (2.70)	2 (0.67)
Total	900	706 (78.44)	110 (15.58)	244 (34.56)	161 (22.80)	112 (15.86)	54 (7.64)	21 (2.97)	4 (0.56)

In Sheep, seasonal analysis revealed highest prevalence in rainy season (91.90%), followed by summer (75.62%) and lowest in winter (68.75%). which is on similar lines to the findings of highest seasonal prevalence during monsoon season (March - May) followed by summer season (June – August) whereas the lowest prevalence was recorded during winter season by Bhat *et al.*, (2014) [1]. Rainy season provides favourable climatic conditions for hatching, development, dissemination and survival of the larvae on to the pasture (Soulsby, 1966) [15]. The variability for sesonal prevalence of helminth infection in small ruminants was not found to be significant ($p<0.05$)

Table 2: Season wise Prevalence of helminths in sheep

Season	Examined	Infected	Mixed	*Strongyles*	*Amphistome*	*Trichuris*	*Fasciola*	*Moniezia*	*Strongyloides*
Summer	160	121 (75.62)	17 (14.04)	45 (37.19)	28 (23.14)	16 (13.22)	9 (7.43)	4 (3.30)	2 (1.65)
Rainy	210	193 (91.90)	21 (10.88)	72 (37.30)	44 (22.79)	35 (18.13)	15 (7.77)	6 (3.10)	0
Winter	140	96 (68.75)	15 (15.62)	35 (36.45)	20 (20.83)	16 (16.66)	7 (7.29)	3 (3.12)	0
Total	510	410 (80.39)	53 (12.92)	152 (37.07)	92 (22.43)	67 (16.34)	31 (7.56)	13 (3.17)	2 (0.48)

The tehsil wise prevalence of helminths infection showed that highest prevalence is in Vallabhnagar tehsil (81.25%) in sheep, among the Villages Navania (90.00%) followed by Gadriyawas (89.21%) showed highest prevalence followed by Kikawas (76.53%), then Piprauli (75.0%), Tarawat (73.43%) and Khemli (70.0%) respectively with the decreasing rate of prevalence. It is observed that the difference among the Villages of Mavli and Vallabhnagar tehsil in Udaipur district is due to variation in animal husbandry practices and pasture management of sheep in these two different tehsils where large number of uneducated population thrives. The variability for tehsil and village wise prevalence of helminth infection in small ruminants was found to be highly significant ($p<0.01$), where p=0.00

Table 3: Tehsil and Villages wise Prevalence of helminths in Sheep

Tehsil	Village	Examined	Infected	Mixed	Strongyles	*Amphistome*	*Trichuris*	Fasciola	*Moniezia*	*Strongyloides*
(Vallabhnagar)	Navania	110	99 (90.00)	16 (16.16)	32 (32.32)	20 (20.20)	19 (19.19)	8 (8.08)	3 (3.03)	1 (1.01)
	Kikavas	98	75 (76.53)	12 (16.0)	26 (34.66)	18 (24.0)	11 (14.66)	6 (8.0)	2 (2.66)	0
	Tarawat	64	47 (73.43)	6 (12.76)	20 (42.55)	10 (21.27)	6 (12.76)	3 (6.38)	2 (4.25)	0
	Total	272	221 (81.25)	34 (15.38)	78 (35.29)	48 (21.71)	36 (16.28)	17 (7.69)	7 (3.16)	1 (0.45)
(Mavli)	Gadriayavas	102	91 (89.21)	12 (13.18)	32 (35.16)	20 (21.97)	15 (16.48)	8 (8.79)	3 (3.29)	1 (1.09)
	Khemli	80	56 (70.0)	3 (5.35)	23 (41.07)	14 (25.0)	10 (17.85)	4 (7.14)	2 (3.57)	0
	Piproli	56	42 (75.0)	4 (9.52)	19 (45.23)	10 (23.80)	6 (14.28)	2 (4.76)	1 (2.38)	0
	Total	238	189 (79.41)	19 (10.05)	74 (39.15)	44 (23.28)	31 (16.40)	14 (7.40)	6 (3.17)	1 (0.52)

Higher Prevalence was noted in female (85.14%) than in male (70.0%) in sheep. The results are in accordance with those of Kakar *et al.*, (2013) [4] with female (56.87%) and male (42.08%). Sex plays a significant role in the preponderance of helminth infection but environmental, managements and climatic conditions have a greater role to play on the onset of helminth infection in sheep and attributed to genetic predisposition and differential susceptibility owing to

hormonal variations. The variabsility for sex wise prevalence of helminth infection in small ruminants was found to be highly significant ($p<0.01$), where p=0.00

Table 4: Gender wise Prevalence of helminths in Sheep

Gender	Examined	Infected	Mixed	*Strongyles*	*Amphistome*	*Trichuris*	*Fasciola*	*Moniezia*	*Strongyloides*
Male	160	112 (70.0)	15 (13.39)	30 (26.78)	22 (19.64)	33 (29.46)	8 (7.14)	4 (3.57)	0
Female	350	298 (85.14)	38 (12.75)	122 (40.93)	54 (18.12)	34 (11.40)	23 (7.71)	9 (3.02)	2 (0.67)
Total	510	410 (80.39)	53 (12.92)	152 (37.07)	92 (22.43)	67 (16.34)	31 (7.56)	13 (3.17)	2 (0.48)

The age wise prevalence of helminths infection reported highest prevalence in age group of more than 2 year (88.94%) followed by 1-2 year group (77.05%) and 6 month to 1 year group (73.33%) in sheep, which is on similar lines to the findings of the infection in which it was higher in adults (43.4%) than young animals (23.6%) as reported by Shah *et al., (*2015) [12]. The reason for variation of helminthic infection in adults compared to young in our study may be because adult animals may acquire immunity to parasites through frequent challenge and expel the ingested parasites before they establish infections (Dunn, 1978 and Shah-Fischer and Say, 1989) [18, 13]. The variability for age wise prevalence of helminth infection in small ruminants was not found to significant ($p<0.05$)

Table 5: Age wise Prevalence of helminths in Sheep

Age	Examined	Infected	Mixed	*Strongyles*	*Amphistome*	*Trichuris*	*Fasciola*	*Moniezia*	*Strongyloides*
(6 month to 1 year)	150	110 (73.33)	17 (15.45)	43 (39.09)	24 (21.81)	18 (16.36)	6 (5.45)	2 (1.81)	0
(1 to 2 year)	170	131 (77.05)	20 (15.26)	48 (36.64)	28 (21.37)	21 (16.03)	9 (6.87)	5 (3.81)	0
(More than 2 year)	190	169 (88.94)	16 (9.46)	61 (36.09)	40 (23.66)	28 (16.56)	16 (9.46)	6 (3.55)	2 (1.18)
Total	510	410 (80.39)	53 (12.92)	152 (37.07)	92 (22.43)	67 (16.34)	31 (7.56)	13 (3.17)	2 (0.48)

In Sheep the month wise prevalence of helminth infection reported highest in September Month (86.95%), followed by August month (84.21%), May month (82.14%), June month (80.76%), October month (80.48%), November month (76.31%), July Month (73.07%), December month (69.69%) and January month (67.85%). Rainy season has highest prevalence but the variability in month are not in accordance due to climatic conditions variability in different regions of the country. The variability for month wise prevalence of helminth infection in small ruminants was found to be highly significant ($p<0.01$), where p=0.00

Table 6: Month wise Prevalence of helminth infection in Sheep

Month	Examined	Infected	Mixed	*Strongyles*	*Amphistome*	*Trichuris*	*Fasciola*	*Moniezia*	*Strongyloides*
May	56	46 (82.14)	3 (6.52)	19 (41.30)	10 (21.73)	7 (15.21)	3 (6.52)	2 (4.34)	1 (2.17
June	52	42 (80.76)	10 (23.80)	15 (35.71)	9 (21.42)	5 (11.90)	2 (4.76)	1 (2.38)	0
July	52	38 (73.07)	13 (34.21)	12 (31.57)	7 (18.42)	4 (10.52)	2 (5.26)	0	1 (2.63)
August	95	80 (84.21)	15 (18.75)	29 (36.25	18 (22.5)	11 (13.75)	5 (6.25)	2 (2.5)	0
September	115	100 (86.95)	7 (7.0)	43 (43.0)	22 (22.0)	17 (17.0)	8 (8.0)	3 (3.0)	0
October	41	33 (80.48)	4 (12.12)	16 (48.48)	6 (18.18)	4 (12.12)	2 (6.06)	1 (3.03)	0
November	38	29 (76.31)	5 (15.15)	13 (44.82)	6 (20.68)	3 (10.34)	2 (6.89)	0	0
December	33	23 (69.69)	3 (13.04)	11 (47.82)	4 (17.39)	3 (13.04)	1 (4.34)	1 (4.34)	0
January	28	19 (67.85)	6 (31.57)	9 (47.36)	2 (10.52)	2 (10.52)	0	0	0
Total	510	410 (80.39)	66 (16.09)	167 (40.73)	84 (20.48)	56 (13.65)	25 (6.09)	10 (2.43)	2 (0.48)

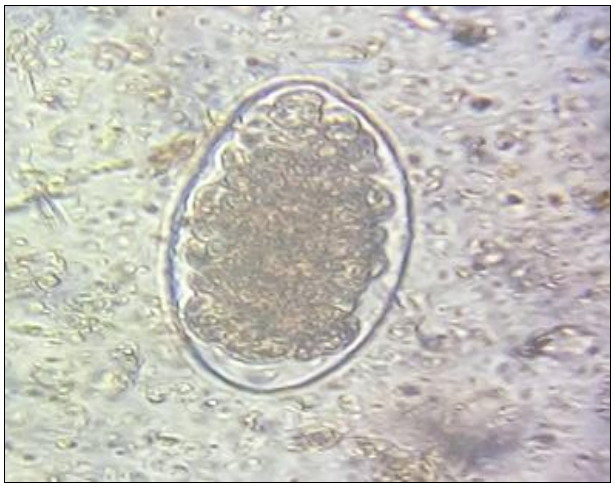

Fig 1: Photomicrograph of ova of *Strongyle* sp.

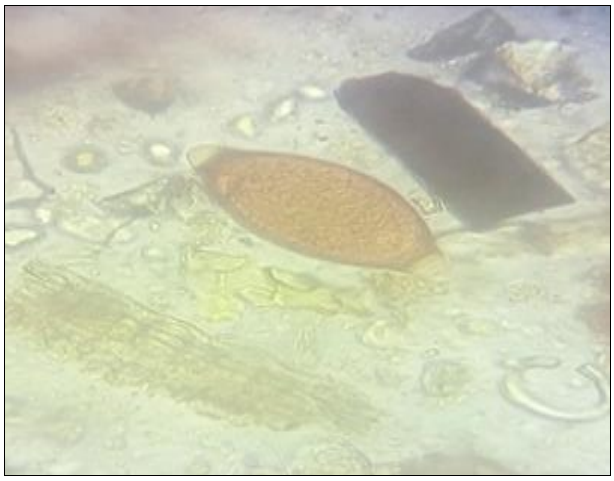

Fig 2: Photomicrograph of ova of *Trichuris* sp.

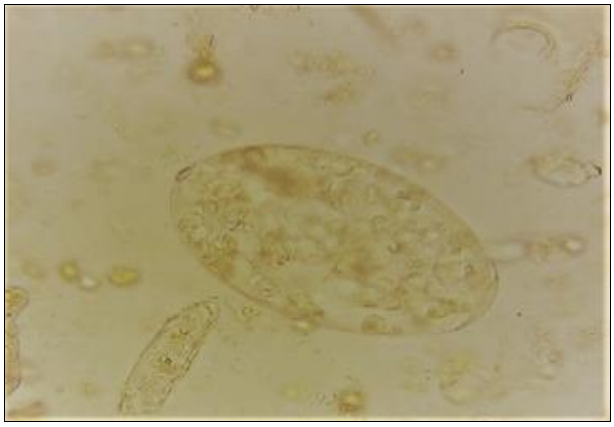

Fig 3: Photomicrograph of ova of *Paramphistomum* sp.

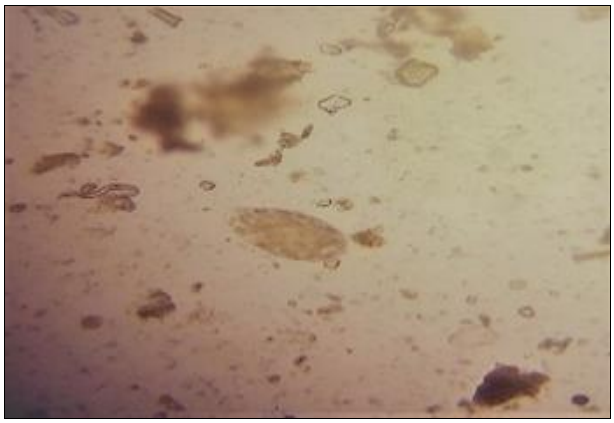

Fig 4: Photomicrograph of ova of *Fasciola* sp.

Fig 5: Photomicrograph of larvae of *Strongyloides* sp.

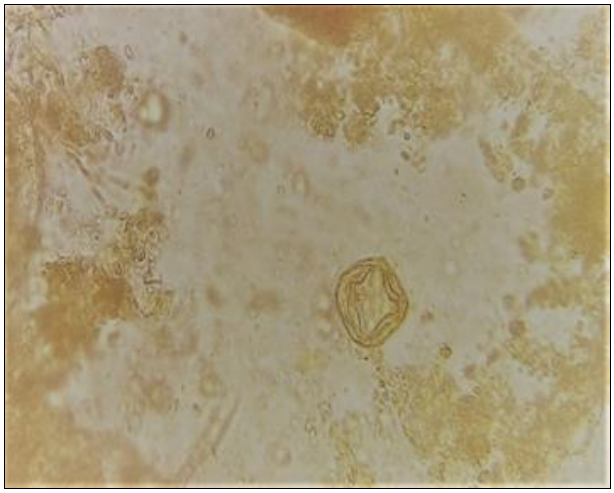

Fig 6: Photomicrograph of ova of *Moniezia* sp.

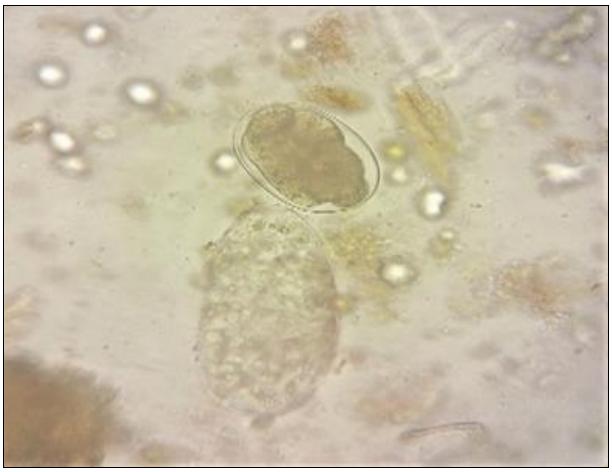

Fig 7: Photomicrograph of mixed infection with ova of *Strongyle* sp. and *Amphistome* sp.

Conclusion

The present study revealed that the infection status by the various species of helminth parasites was very high. The prevalence of helminth parasite of sheep at Udaipur district, Rajasthan shows high susceptiblity to helminth infection. The overall higher incidence of *Stronglye* infection in the areas surveyed could be attributed to lower immunity of hosts and the life cycle is direct. All the livestock in the area under investigation largely depend on grazing. Sex wise, Tehsil and Village wise, and Month wise Prevalence of helminth infection in sheep is highly significantly ($p<0.01$). The study also revealed that maximum helminth infection was observed in females as compared to males. Therefore geographical and climatic conditions of this region favours for helminth infection. It is observed that the variation in animal husbandry practices and pasture management of sheep in these two different tehsils where large number of uneducated population thrives affects Prevalence rates. Further study should be carried out to determine the economic losses due to helminthiasis of sheep and to develop effective control measures against it. It is, therefore, suggested that two annual anthelminthic treatments would help to minimise the infection and optimum growth and productivity of small ruminants in the region.

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