Study of gastro-intestinal parasitism in migratory sheep in SPSRNellore District of Andhra Pradesh, India.

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ABSTRACT

The present study was undertaken to investigate prevalence of gastro-intestinal parasites in migratory sheep in SPSRNellore district. Out of 1601 faecal examinations, 725 (45.28%) were positive which included single infections (25.36%) of ova of *Strongyle spp.*(12.55%), *Strongyloides spp.*(0.50%), *Trichuris spp.* (0.37%), oocysts of *Eimeria spp.*(7.81%), ova of *Amphistome spp.*(2.06%) and ova of *Moniezia* spp.(2.06%) along with mixed infections (19.93%) in which *Strongyle spp. + Eimeria spp.* was prominant (9.49%) followed by *Strongyle spp. + Moniezia spp*. (2.62%), *Strongyle spp. + Eimeria spp. + Amphistome spp.* (2.19%) and lowest (0.06%) with *Strongyloides spp. + Eimeria spp*. and *Amphistome spp. + Eimeria spp*. Five different species of *Eimeria* were identified after sporulation viz; *E.parva, E.ovina, E.faurei, E.pallida* and *E.intricata.*In the current study Females (46.60%) were more susceptible than males (41.61%). No significant difference between the prevalence of gastrointestinal parasites was observed between the lambs (45.40%), Adults (45.28%) and young sheep (44.57%) at 5% level of significance. Month wise highest prevalence was recorded in March 2024 (65%) followed by August 2024 (61.72%), July 2024 (43.18%), June 2024 (40.38%), May 2024 (35.21%) and in April 2024 prevalence was lowest (26.02%). The study emphasis migratory stress impact in Gastro-intestinal parasitism.

Keywords : Migratory sheep, Gastro-intestinal parasites, andhra pradesh, Eimeria, Faecal examination, Micrometry, Sex, Age, Migration stress.

INTRODUCTION

Sheep recorded with 17.6 million in the state of Andhra Pradesh and 74.26 million in India as per 20th livestock census (2019) which constitute approximately 18% of the total livestock population of the state and 13.86% of India. As grazing animal, sheep improve the ecology and quality of land (Devendra, 2005)[1].

Migration has been practised since ancient times by the people living in drought areas to find better fodder for their flocks and these migrating animals remain confined to the pastures in villages during the rainy season and migrate to the villages where irrigation facilities are plenty. However, migratory sheep become infected with a variety of parasites as a result of unsanitary environment, contaminated pastures, poor treatment, severe climate, and intimate contact with diseased animals(Kantwa *et al.*,2017)[2]. Among the parasitic diseases gastro-intestinal parasites contribute major threat to sheep which includes tapeworms, flukes and nematodes, along with coccidiosis (Sivajothi and Sudhakara reddy, 2018)[3]. Published reports on gastro-intestinal parasitism affecting migratory sheep are lacking particularly in migratory sheep in SPSRNellore District, Andhra Pradesh. Keeping the above information in view, the present study has been designed with the following objectives

1. To record the prevalence of gastro-intestinal parasites of migratory sheep in SPSRNellore district .
2. To identify the species of coccidia in migratory sheep.
3. To evaluate the prevalence with associated risk factors viz; age, sex, month.

MATERIALS AND METHODS

During the present investigations the faecal samples were processed from March 2024 to August 2024 (Migratory Period) in Sri Potti Sriramulu Nellore, Andhra Pradesh, India from four different flocks (4 groups) of sheep which migrated in four directions selected randomly by stratified sampling method to cover different areas and routes in district, to explore the occurrence of various gastrointestinal parasites and coccidiosis in sheep where migration occurs.

Collection of faecal samples : Immediately following defecation with the use of sterile disposable latex gloves collected freshly voided faecal samples from each animal. These samples were then individually placed in disposable plastic bags / containers and labelled properly with the particulars like age, sex, group/flock and date of collection. From Group-1of migratory sheep flock 63, 61, 61, 60, 60 and 59 samples were collected during March, April, May, June, July and August 2024 respectively which was 364 samples in total from Sheep Flock that migrated from Podalakur to Venkatachalam and returned back in August after migratory period. Similarly from all 4 Groups of migratory sheep 1601 fecal samples were collected and screened for 6 months.

Faecal samples microscopic examination done by

- Direct Smear Examination
- Sedimentation Technique
- Flotation Concentration Technique
- Sporulation studies on the faecal samples with *Eimeria species* oocysts.

Morphometric studies : The dimensions of sporulated oocysts of *Eimeria species* were determined using a calibrated ocular micrometer. Speciation of the Eimerian oocysts was conducted by comparing the oocyst dimensions with existing literature, with sporulation time and morphological features such as size, shape, micropyle characteristics, as detailed by Taylor *et al* (2016)[4] and Soulsby (1982)[5].

Statistical Analysis : The results obtained were subjected to statistical analysis as per the method described by Snedecor and Cochran (1994)[6] using chi-square test and ANOVA.

Table 1 : Particulars of migratory sheep flocks in selected parts of SPSR Nellore district, Andhra Pradesh

Group	Distance covered	Days of journney	Migrated from	Migration place	Rain fall	
					Before migration	During migration
1	29 km	1	Podalakur	Venkatachalam	452 mm	658 mm
2	44 km	2	Rapur	Manubolu	440 mm	623 mm
3	50 km	2	Udayagiri	Atmakur	516 mm	485 mm
4	42 km	2	Jaladanki	Allur	552 mm	708 mm

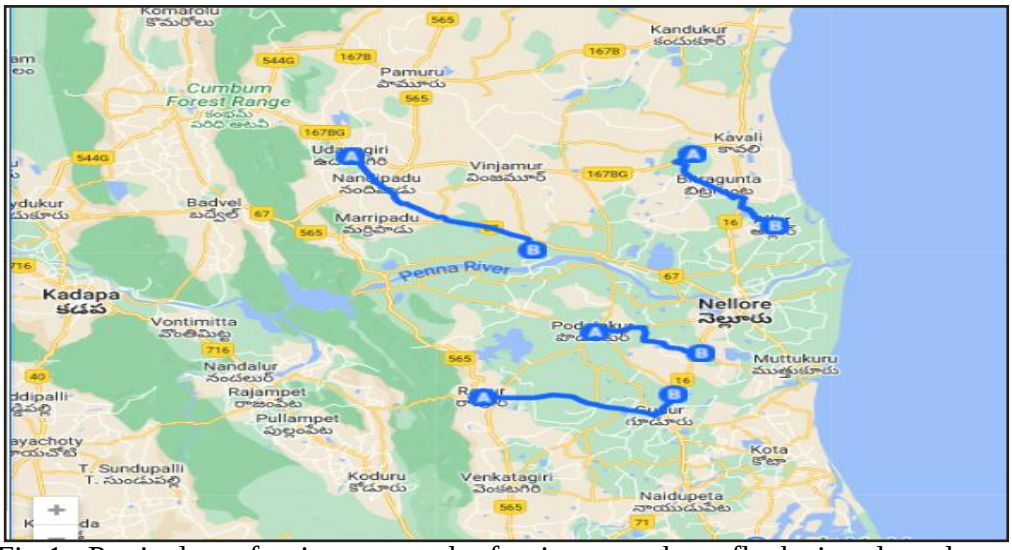


Fig 1 : Particulars of migratory path of migratory sheep flocks in selected parts of SPSR Nellore district, Andhra Pradesh under study.

RESULTS

Overall prevalence of Gastro-intestinal parasites : Out of 1601 samples obtained 725 revealed positive for parasite ova with prevalence rate of 45.28 percent. Out of 1601 samples, samples with single parasite ova were 406 (25.36%) and mixed infections were 319 (19.93%). Group 1,2,3 and 4 had the overall prevalence rate of 46.43, 38.93, 45.91, 50.37 and 45.28 percent respectively. The overall prevalence of *Strongyle* spp. was 30.23 % (484 out of 1601) with mono-infection with ova of *Strongyle spp.* 12.55% (201 out of 1601) and mixed infections with other parasites viz; *Strongyle spp.* + *Strongyloides spp.* 0.31% (N.5),

Strongyle spp. + *Trichuris spp.* 0.81%(N.13), *Strongyle spp.* + *Amphistome spp.* 1.87%(N.30), *Strongyle spp.* + *Moniezia spp.*2.62%(N.42), *Strongyle spp.* + *Eimeria spp.* 9.49%(N.152), *Strongyle spp.* + *Eimeria spp.* + *Amphistome spp.* 2.19%(N.35), *Strongyle spp.* + *Moniezia spp.* + *Eimeria spp.* 0.19%(N.3), *Strongyle spp.* + *Amphistome spp.* + *Strongyloides spp.* 0.19%(N.3) in four groups of migratory sheep.

Ova of *Strongyloides* spp. was observed as single infection with 0.50% (N. 8) and as mixed infections viz; *Strongyle spp.* + *Strongyloides spp.* was 0.31% (N. 5), *Strongyloides spp.* + *Amphistome spp.* was 0.25% (N. 4), *Strongyle spp.* + *Amphistome spp.* + *Strongyloides spp.* 0.19% (N. 3) and *Strongyloides spp.* + *Eimeria spp.* 0.06% (N. 1) with the overall prevalence 1.31 % (21 out of 1601) in migratory sheep.

The ova of *Trichuris* spp. was found as single infection 0.37% (N.6) and as mixed infections viz; *Strongyle spp.* + *Trichuris spp.* 0.81% (N.13), *Trichuris spp.* + *Eimeria spp.* 0.12% (N.2) with the overall prevalence of 1.31% (21/1601) in migratory sheep.

The ova of *Amphistome spp.* was observed as mono-infection as 2.06% (N.33) and as mixed infections viz; *Strongyle spp.* + *Eimeria spp.* + *Amphistome spp.* 2.19% (N. 35), *Strongyle spp.* + *Amphistome spp.* 1.87% (N.30), *Amphistome spp.* + *Moniezia spp.* 0.31% (N.5), *Strongyloides spp.* + *Amphistome spp.* 0.25% (N.4), *Strongyle spp.* + *Amphistome spp.* + *Strongyloides spp.* 0.19% (N. 3), *Amphistome spp.* + *Eimeria spp.* 0.06% (N.1) with an the overall prevalence of 6.93% (111 out of 1601).

The overall prevalence of *Moniezia* spp. was 6.62% (106 out of 1601) and ova of *Moniezia spp.* was found as single infection 2.06% (N.33) and as mixed infections viz; *Strongyle spp.* + *Moniezia spp.* 2.62% (N. 42), *Eimeria spp.* + *Moniezia spp.* 1.44% (N. 23), *Amphistome spp.* + *Moniezia spp* 0.31% (N.5), *Strongyle spp.* + *Moniezia spp.* + *Eimeria spp.* 0.19% (N.3) in migratory sheep.

The oocysts of *Eimeria spp.* were found as single infection 7.81% (125 out of 1601) and as mixed infections viz; *Strongyle spp.* + *Eimeria spp.* 9.49% (N.152), *Strongyle spp.* + *Eimeria spp.* + *Amphistome spp.* 2.19% (N. 35), *Eimeria spp.* + *Moniezia spp.* 1.44% (N.23), *Strongyle spp.* + *Moniezia spp.* + *Eimeria spp.* 0.19% (N.3), *Trichuris spp.* + *Eimeria spp.* 0.12% (N.2), *Amphistome spp.* + *Eimeria spp.* 0.06% (N.1) and *Strongyloides spp.* + *Eimeria spp.* 0.06% (N.1) with overall prevlence of 21.36% (342 out of 1601) in migratory sheep

Group	1		2		3		4		Grand Total	Prevalence
	No.	%	No.	%	No.	%	No.	%	No.	%
Number Examined	**364**		**429**		**403**		**405**		**1601**	
Number Positive	169	46.43	167	38.93	185	45.91	204	50.37	**725**	45.28
Single infection	**110**	**30.22**	**86**	**20.05**	**81**	**20.10**	**129**	**31.85**	**406**	**25.36**
Ova of *Strongyle spp.*	57	15.66	43	10.02	40	9.93	61	15.06	**201**	12.55
Ova of *Strongyloides spp.*	3	0.82	0	0.00	1	0.25	4	0.99	**8**	0.50
Ova of *Trichuris spp.*	6	1.65	0	0.00	0	0.00	0	0.00	**6**	0.37
Ova of *Amphistome spp.*	8	2.20	9	2.10	9	2.23	7	1.73	**33**	2.06
Ova of *Moniezia spp.*	3	0.82	14	3.26	10	2.48	6	1.48	**33**	2.06

Oocysts of *Eimeria spp.*	33	9.07	20	4.66	21	5.21	51	12.59	**125**	7.81
Mixed infection	**59**	**16.21**	**81**	**18.88**	**104**	**25.81**	**75**	**18.52**	**319**	**19.93**
Strongyle spp. + Strongyloides spp.	5	1.37	0	0.00	0	0.00	0	0.00	**5**	0.31
Strongyle spp. + Trichuris spp.	3	0.82	9	2.10	1	0.25	0	0.00	**13**	0.81
Strongyle spp. + Amphistome spp.	4	1.10	3	0.70	12	2.98	11	2.72	**30**	1.87
Strongyle spp. + Moniezia spp.	13	3.57	10	2.33	13	3.23	6	1.48	**42**	2.62
Strongyle spp. + Eimeria spp.	20	5.49	52	12.12	45	11.17	35	8.64	**152**	9.49
Strongyloides spp. + Amphistome spp.	2	0.55	0	0.00	0	0.00	2	0.49	**4**	0.25
Strongyloides spp. + Eimeria spp.	1	0.27	0	0.00	0	0.00	0	0.00	**1**	0.06
Trichuris spp. + Eimeria spp.	1	0.27	1	0.23	0	0.00	0	0.00	**2**	0.12
Amphistome spp. + Moniezia spp.	0	0.00	0	0.00	0	0.00	5	1.23	**5**	0.31
Amphistome spp. + Eimeria spp.	0	0.00	0	0.00	1	0.25	0	0.00	**1**	0.06
Eimeria spp. + Moniezia spp.	7	1.92	2	0.47	10	2.48	4	0.99	**23**	1.44
Strongyle spp. + Eimeria spp. + Amphistome spp.	1	0.27	3	0.70	20	4.96	11	2.72	**35**	2.19
Strongyle spp. + Moniezia spp. + Eimeria spp.	2	0.55	0	0.00	1	0.25	0	0.00	**3**	0.19
Strongyle spp. + Amphistome spp. + Strongyloides spp.	0	0.00	1	0.23	1	0.25	1	0.25	**3**	0.19

Table 2 : Overall Prevalence of Gastro-Intestinal parasites in the migratory sheep flocks

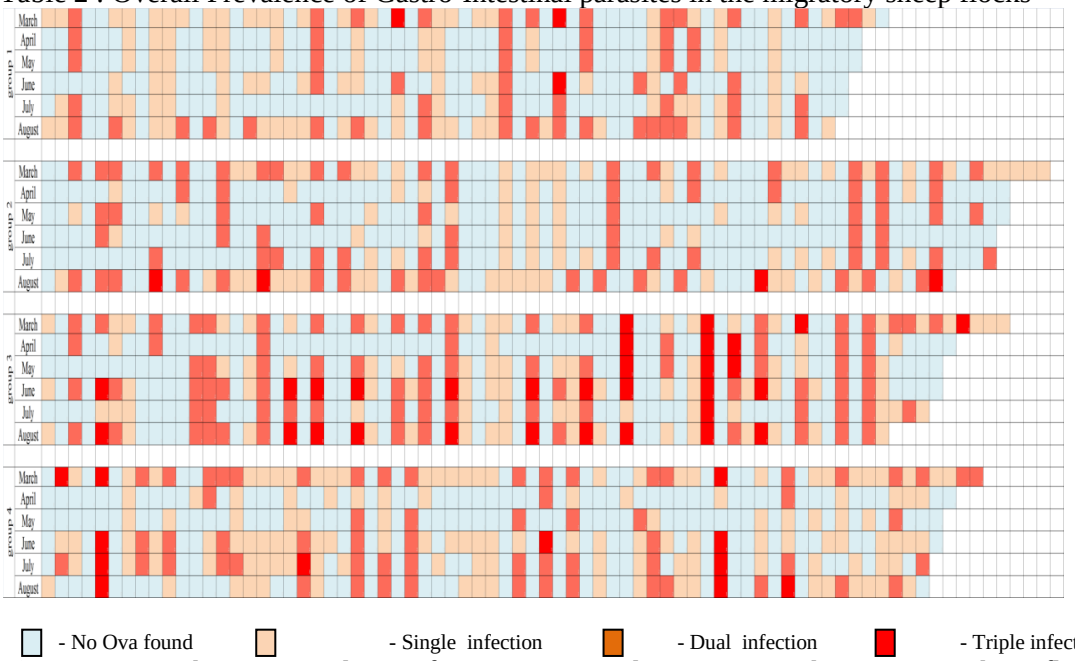
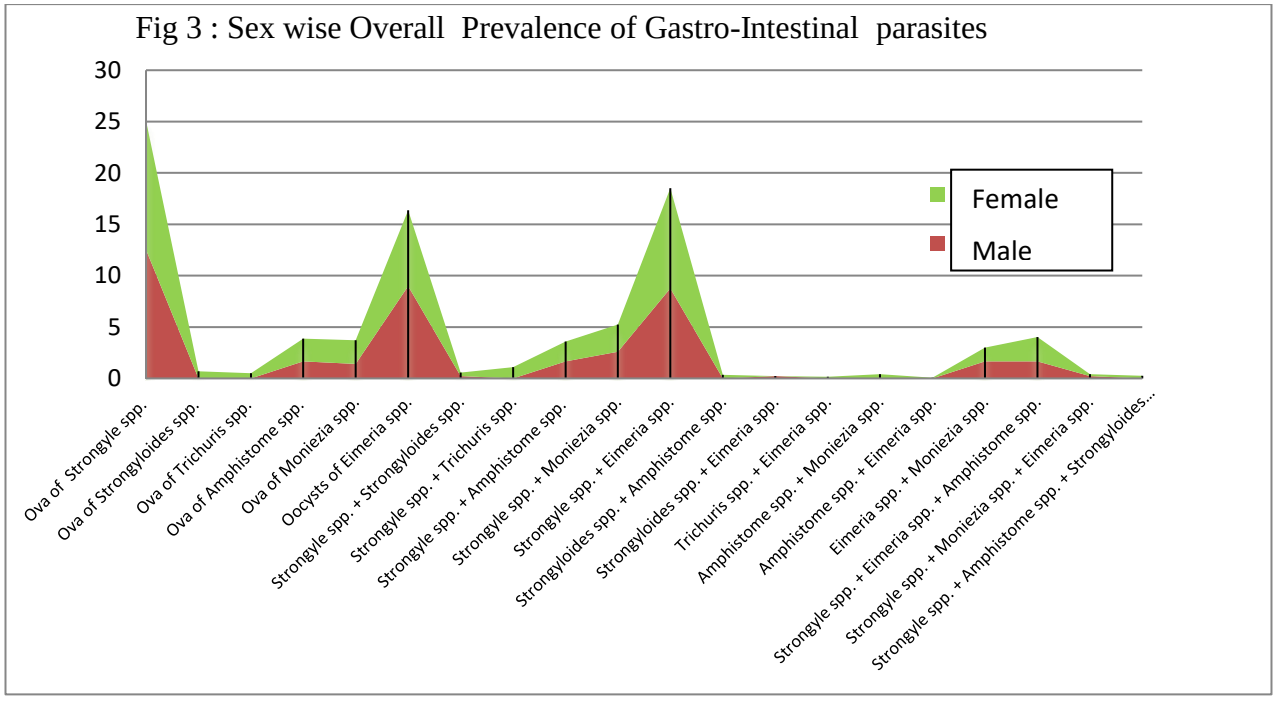


Figure 2 : Month wise Prevalence of Gastro-Intestinal parasites in the migratory sheep flocks (Heat Map)

Sex wise prevalence of Gastro-intestinal parasites : The overall prevalence was more in female (46.60%) than in male sheep (41.61%). The overall prevalence of *Strongyle* spp., *Strongyloides* spp., *Amphistome sp.* and *Moniezia* spp. infection in male population were 27.66% (N.117), 0.47% (N.2), 4.96% (N.21) and 5.91% (N.25) respectively was lower compared to females which were 31.15% (N.367), 1.61% (N.19), 7.64% (N.90) and 6.88% (N.81) respectively. *Trichuris* spp. was prevalent in female sheep 1.78% (N.21) whereas *Eimeria* spp. showed similar prevalence in males 21.51% (N.91) and females 21.31% (N.251).



Age wise prevalence of Gastro-intestinal parasites : No significant difference between the overall prevalence of gastro-intestinal parasites was observed between the lambs (45.40%), young sheep (44.57%) and Adults (45.35%) at 5% level of significance. The prevalence of *Strongyle* spp. (31.72%) and *Strongyloides* spp. (1.70%) was more in adults whereas *Eimeria* spp. was more prevalent in lambs (24.28%), *Trichuris* spp. (2.29%) , *Amphistome* spp. (9.71%) and *Moniezia* spp. (14.86%) prevalence was more in young sheep **.**

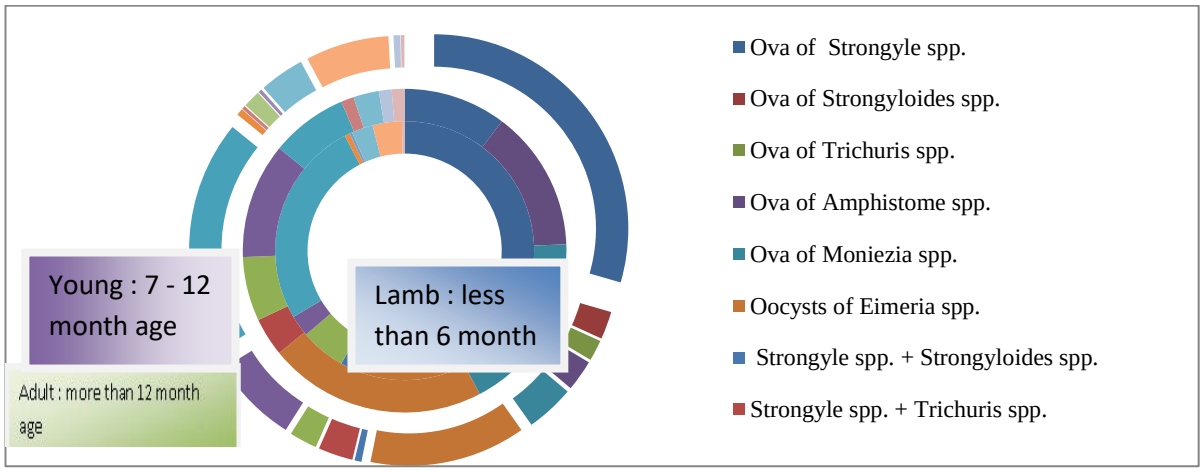


Fig 4 : Age wise Overall Prevalence of Gastro-Intestinal parasites

	Upto 6 months (Lambs)		7 - 12 months (Young)		More than 12 months (Adult)		Total	Prevalence
	NO.	%	NO.	%	NO.	%	NO.	%
Number Examined	**663**		**175**		**763**		**1601**	
Number Positive	301	45.40	78	44.57	346	45.35	**725**	45.28
Single infection								
Ova of *Strongyle spp.*	91	13.73	8	4.57	102	13.37	**201**	12.55

Ova of *Strongyloides spp.*	0	0.00	0	0.00	8	1.05	**8**	0.50
Ova of *Trichuris spp.*	0	0.00	0	0.00	6	0.79	**6**	0.37
Ova of *Amphistome spp.*	13	1.96	11	6.29	9	1.18	**33**	2.06
Ova of *Moniezia spp.*	5	0.75	14	8.00	14	1.83	**33**	2.06
Oocysts of *Eimeria spp.*	63	9.50	17	9.71	45	5.90	**125**	7.81
Mixed infection								
Strongyle spp. + Strongyloides spp.	3	0.45	0	0.00	2	0.26	**5**	0.31
Strongyle spp. + Trichuris spp.	0	0.00	3	1.71	10	1.31	**13**	0.81
Strongyle spp. + Amphistome spp.	17	2.56	5	2.86	8	1.05	**30**	1.87
Strongyle spp. + Moniezia spp.	8	1.21	9	5.14	25	3.28	**42**	2.62
Strongyle spp. + Eimeria spp.	78	11.76	6	3.43	68	8.91	**152**	9.49
Strongyloides spp. + Amphistome spp.	2	0.30	0	0.00	2	0.26	**4**	0.25
Strongyloides spp. + Eimeria spp.	1	0.15	0	0.00	0	0.00	**1**	0.06
Trichuris spp. + Eimeria spp.	0	0.00	1	0.57	1	0.13	**2**	0.12
Amphistome spp. + Moniezia spp.	0	0.00	0	0.00	5	0.66	**5**	0.31
Amphistome spp. + Eimeria spp.	0	0.00	0	0.00	1	0.13	**1**	0.06
Eimeria spp. + Moniezia spp.	8	1.21	2	1.14	13	1.70	**23**	1.44
Strongyle spp. + Eimeria spp. + Amphistome spp.	11	1.66	0	0.00	24	3.15	**35**	2.19
Strongyle spp. + Moniezia spp. + Eimeria spp.	0	0.00	1	0.57	2	0.26	**3**	0.19
Strongyle spp. + Amphistome spp. + Strongyloides spp.	1	0.15	1	0.57	1	0.13	**3**	0.19

Table 3 : Age wise Overall Prevalence of Gastro-Intestinal parasites

Month wise prevalence of Gastro-intestinal parasites : The present study period was carried in migratory sheep in Nellore for six months (March to August 2024) to assess the prevalence of gastro-intestinal parasites. Highest prevalence was recorded in March 2024 65% (182 out of 280) followed by August 2024 as 61.72% (158 out of 256), July 2024 as 43.18% (114 out of 264), June 2024 as 40.38% (107 out of 265), May 2024 as 35.21% (94 out of 267) and in April 2024 prevalence was lowest at 26.02% (70 out of 269).

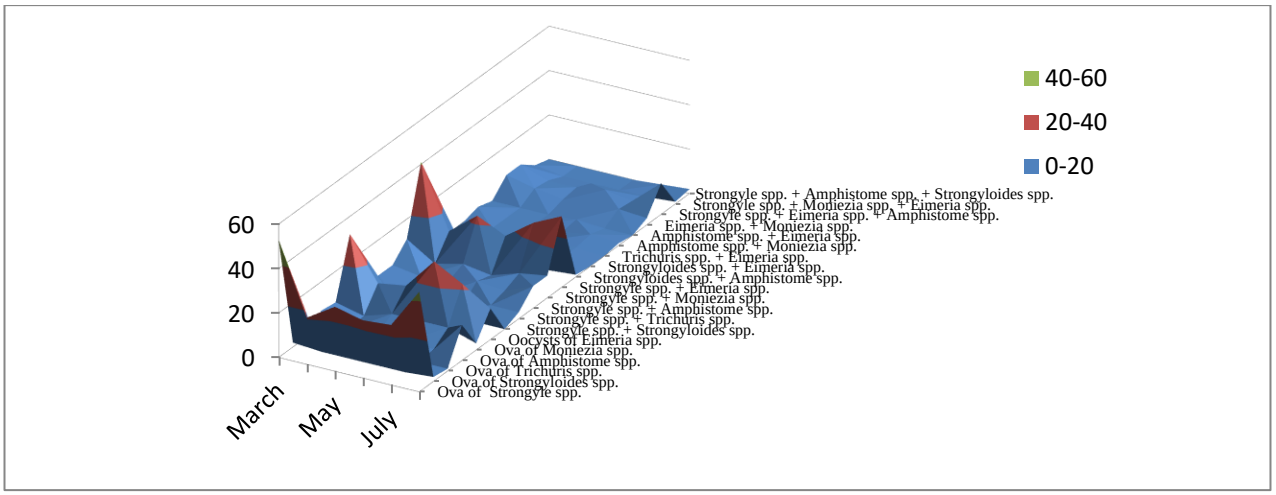
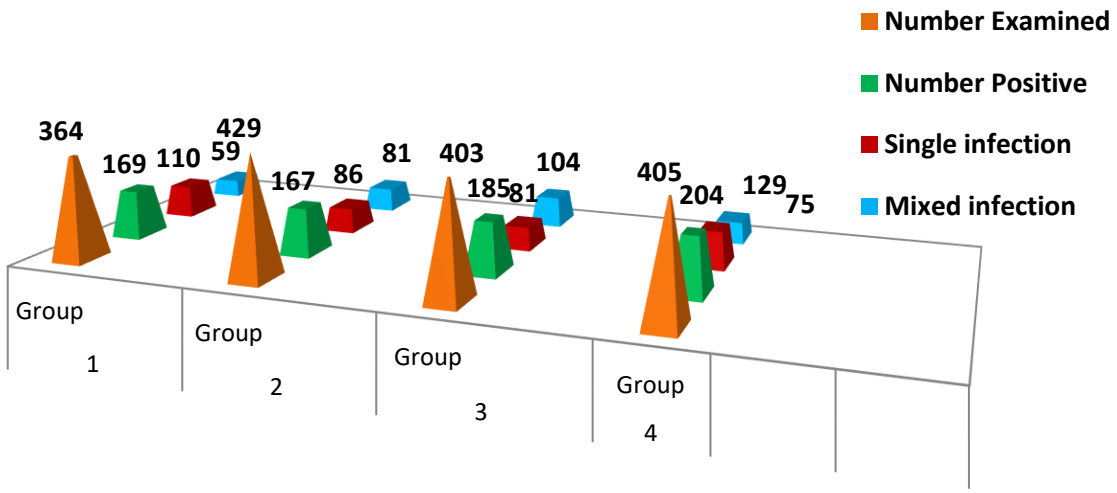


Fig. 5 : Month wise Prevalence of single and mixed infections of Gastro-Intestinal parasites in the migratory sheep flocks

Group wise prevalence of Gastro-intestinal parasites : Highest overall prevalence was observed in Group 4 with 50.37%, followed by Group 1 with 46.43%, Group 3 with 45.91% and least in Group 2 with overall prevalence of 38.93%. Infection with *Strongyle spp.* was highest in Group 3 with 33.00% (133 out of 403 samples) and lowest in Group 2 with prevalence of 28.21% (121 out of 429 samples).

Fig.6 : Groupwise Prevalence of Gastro-Intestinal parasites



Morphometry of sporulated *Eimeria spp.* for identification : After sporulation, 5 species of *Eimeria* spp. were identified viz; *Eimeria parva*, *Eimeria ovina*, *Eimeria faurei*, *Eimeria pallida* and *Eimeria intricata* and the identification of *Eimeria* oocysts in this study relied on a thorough analysis of morphological features, sporulation duration, and micrometry observations.

S. No.	*Eimeria* species	Shape	Polar cap	Micropyle	Oocyst		Sporulation time (hours)
					Average Length (µm)	Average Width (µm)	
1	*Eimeria pallida*	ellipsoidal	absent	absent	14.63±0.38	12.76±0.46	24 -48
2	*Eimeria intricata*	ellipsoidal	present	present	47.82±0.78	33.21±0.84	48 – 72
3	*Eimeria ovina*	ovoid	present	present	25.56±0.47	19.73±0.86	24 - 48
4	*Eimeria faurei*	ovoidal	absent	present	31.21±0.48	25.36±0.63	48 – 72
5	*Eimeria parva*	spherical	absent	absent	18.94±0.43	18.21±0.34	24 - 48

Table 4 : Morphological and micrometric characteristics of the sporulated oocysts of *Eimeria* species (Mean±SE)

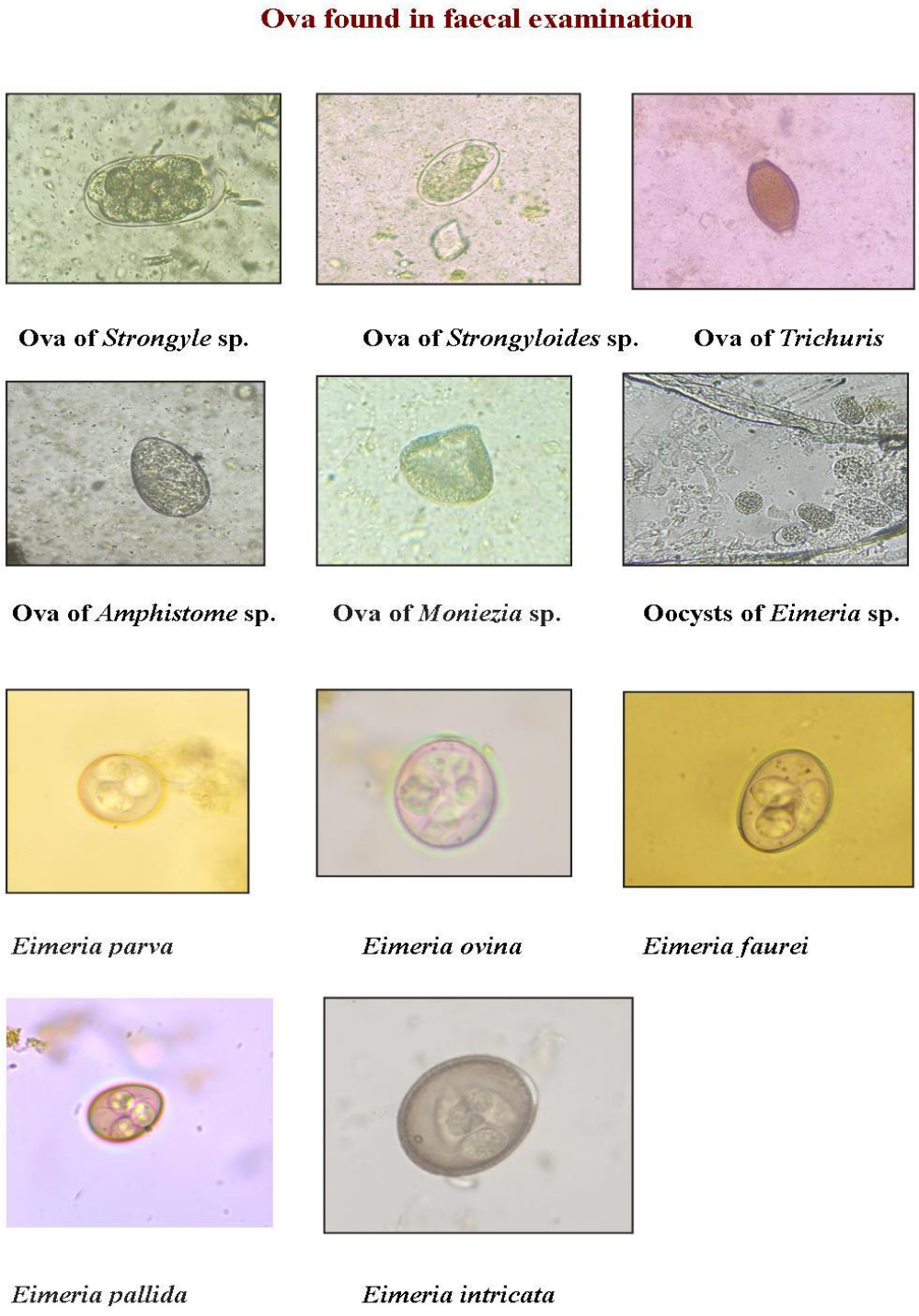


Fig.7 : Ova/oocysts of Gastro-Intestinal parasites found in the migratory sheep flocks by faecal microscopic examination

DISCUSSION

Out of 1601 samples obtained 725 tested positive for the minimum of one parasite ova, yielding an overall prevalence rate of 45.28 percent. In India, the higher rate of Gastro-intestinal parasitic infection was recorded in Himachal Pradesh by Jithendran (1998)[7] in migratory sheep and goats as 94% whereas in Punjab, Singh *et al.* (2005)[8] observed 78%, Sivajothi and Reddy (2018)[3] indicated 91.27% of gastro-intestinal parasites in sheep, Priyanka *et al.* (2020)[9] in Haryana as 83.24%, Ananda and Pradeep (2021)[10] in Karnataka as 69.35%. Similarly in abroad higher rate of incidence was recorded in Nigeria Jatau *et al.* (2011)[11] as 74.76%, in Bangladesh Sangma *et al.* (2012)[12] found 81.1%, Raza *et al*. (2014)[13] reported an overall 78% prevalence of gastro-intestinal helminths in Pakistan. The lower prevalence of parasitic infections was noticed by various researchers from India and abroad. In India, Kuchai *et al.* (2011)[14] found the prevalence of gastro-intestinal parasites of sheep in the Ladakh region of Jammu and Kashmir State as 43.45 percent, Rajkumar *et al.*(2014)[15] recorded overall prevalence of gastro-intestinal parasites as 42.9% in sheep in a farm of Tamil Nadu, Malathi *et al.* (2021)[16] in Srikakulam district of Andhra Pradesh reported 29.4%. Similarly in abroad lower rate of incidence was recorded by Kantzoura *et al*. (2012)[17] in Thessaly, Greece as 7.9% and the variations in the differences in the prevalence could be due to management, deworming, migration stress and low immunity to parasitic infections.

In the present study, males with overall prevalence rate of 41.61% was lower than in females with 46.60%. The prevalence in females was more for *Strongyle spp., Strongyloides spp., Trichuris spp., Amphistome spp. and Moniezia spp.* with 31.15%, 1.61%, 1.78%, 7.64% and 6.88% respectively than in males which was 27.66%, 0.47%, 0.00%, 4.96% and 5.91% respectively and these findings are in agreement with Kuchai *et al.* (2011) [14] who observed the prevalence of Gastro-intestinal parasitism of sheep in the Ladakh region was higher in females (53.67%) than in males (46.32%). Jena *et al.* (2018) [18] observed that females (66.24%) were more susceptible than males (56.6%) and revealed that trematodes, cestodes and nematodes had higher prevalence in females (33.76%; 23.23% and 43.23%), while males had lower prevalence (26.56%; 19.62% and 32.29%) respectively. Similarly in abroad in Bangladesh Sangma *et al.* (2012) [19] reported higher prevalence in female (83.3%) than in male (79.3%) sheep.

The prevalence of *Eimeria spp.* was similar in both genders (male 21.51%; female 21.31%) and these findings are in agreement with Rajkumar *et al.*(2014) [15] who stated that there is no significant difference in males and females of sheep with regard to gastro-intestinal parasitism in Tamil Nadu.

In the current study no significant difference observed in the overall prevalence of gastro-intestinal parasites between the lambs (45.40%), adults (45.28%) and young sheep (44.57%) at 5% level of significance. Kuchai *et al.* (2011) [14] recorded in Jammu and Kashmir lower prevalence of 48.52% in adults and 51.47% with lambs. Mir *et al.* (2013) [20] in Jammu and Kashmir recorded that the prevalence was 52.99% in young ones and in adults with 37.85%. Jena *et al.* (2018) [18] recorded that prevalence was higher

in lambs below 3 month age group (66.14%) followed by 4 to 9 months (60.86%) and more than 9 month age (53.5%). The present findings of age wise prevalence revealed no significance statistically and the variation could be due to immunolgical status and sharing of grazing area by all age groups and no segregation due to migration.

In the current investigation, month wise highest prevalence was recorded in March 2024 (65%) followed by August 2024 as (61.72%), July 2024 as (43.18%), June 2024 as (40.38%), May 2024 as (35.21%) and in April 2024 prevalence was lowest at (26.02%). In Himachal Pradesh, Jithendran (1998) [7] revealed high level of infection in migratory sheep between July to September (monsoon and post-monsoon seasons) followed by march to april (spring) and november to february (dry winter). Pal *et al*. (2020) [21] manifested 44.26, 37.74, 31.92 and 17.31 percent of nematode infection during autumn, summer, spring and winter seasons respectively. Regarding prevalence of gastro-intestinal parasites in different months of migratory period in migratory sheep could be associated with the little or no rain during those periods and drying of the faecal pellets may leads to variations in the prevalence pattern in the exposed migratory routes of the sheep.

In the present investigations, oocysts of *Eimeria spp.* were identified with prevalence as 21.36%(342 out of 1601). In Karnataka, Dhanalakshmi *et al*. (2001) [22] identified oocysts of *Eimeria spp.* with 1.5%, Sivajothi and Reddy (2018) [3] revealed 15.40% of *Eimeria* spp. in Andhra Pradesh. In abroad Gadahi *et al*. (2009) [23] reported oocysts of *Eimeria spp.* 27.77% in Islamabad, in Papua New Guinea Koinari *et al.* (2013) [24] recorded *Eimeria spp.* as 17.3%, Alubadi and Alfatlawi (2024) [25] revealed 22.9%. The variations with the present findings could be due to exposure of young non immune sheep to massive challenges with the sporulated oocysts in migratory tracts of sheep under variable geographical conditions along with the nutritional and peri-parturient increase of oocyst count with shedding.

The present study revealed five species of *Eimeria*, namely *Eimeria parva*, *Eimeria ovina, Eimeria faurei*, *Eimeria pallida, Eimeria intricata*. In Bihar, Pandit *et al*. (1987) [26] identified *Eimeria ninakohlyakimove*, *Eimeria ashata*, *Eimeria arloingi*, *Eimeria parva*, *Eimeria faurei*, *Eimeria granulosa*, *Eimeria crandallis* and *Eimeria intricata*.In Andhra Pradesh, Kumar and Hafeez (1999) [27] reported subclinical coccidiosis in sheep in Tirupati, AP and identified *Eimeria ovina*, *Eimeria parva*, *Eimeria ninakohlyakimovae*, *Eimeria faurei*, *Eimeria granulosa*, *Eimeria intricata* and *Eimeria pallida*.

Conclusions

To conclude the present investigations on the gastro-intestinal parasitism on the migratory sheep, showed that migration stress decreases immunity causing increased gastro-intestinal parasates and also the necessity for addressing the importance of the forecasting or intensity or gravity of parasitic burden and creation of awareness during migration of the flock with an aim to increase the productivity from sheep.

Further the presence of gastro-intestinal parasites in spite of deworming warrants scope for further investigations in deworming drug efficacy, drug resistance and alternative control measures for augmenting productivity.

Compliance with ethical standards

Permission IAEC of College of Veterinary science, Tirupati approved the project proposal no 281/go/ReBi/2000/CPCSEA/CVSc/TPTY/ 054/Veterinary Parasitology/2024 dated 07.05.2024.

Acknowledgments

I acknowledge the kind support of The SRI VENKATESWARA VETERINARY UNIVERSITY, TIRUPATI – 517 502 (A.P) INDIA and The Director, Animal Husbandry, the Government of Andhra Pradesh

Disclosure of conflict of interest

The authors declare that they have no known competing financial interests or personal relationships influenced by this work.

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