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Prevalence and Comparison of ovine gastrointestinal helminthes parasites in domesticated and farmed, male and female sheep at University Town Peshawar, Pakistan

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Abstract
A comparative, epidemiological survey for the ovine gastrointestinal helminthes was carried out in different localities from farmed and domesticated environment at District Peshawar, Pakistan from November 2012 to April 2013. Fecal samples of 800 sheep were examined out of which 442 were found positive. Standard parasitological floatation techniques were used to identify the parasite eggs. Overall prevalence for domesticated male and female sheep was found to be 62% and 66.5% respectively. Same figures for farmed male and female were 50% and 40.5% respectively. Pure nematode infestation was most prevalent 49.6% followed by trematodes 3.6% and cestodes 2%. Sample study for domesticate male and female sheep were found to contain 15 helminthes species each among which nematodes were dominant in terms of abundance. Similar investigation for the farmed sheep both male and female revealed the presence of a total of 10 species of helminthes with high abundance for nematodes. Female domesticated sheep were found to have highest rate of infestation. The most prevalent parasite was found to be *Haemonchus contortus*. The findings can be used to sort out and minimize the risk factors for the gastrointestinal infections in both farmed and domesticated sheep of either gender.

Keywords: ovine, floatation techniques, helminthes, infestation, nematodes, *Haemonchus contortus*.

1. Introduction
Small ruminants are important source of income and employment for many people globally especially in rural areas of developing countries [1]. They are raised for the production of milk, meat, leather, hair, wool and manure [2]. About 30 to 35 million rural population of Pakistan is engaged in livestock farming [3]. The livestock subsector contributes 11.4% to National Gross Domestic Product [4]. Although Sheep breeding is an important income source but sometime due to diseases the ideal productivity can't be achieved, especially under the conventional management system of sheep rearing. Productivity is impaired by the gastrointestinal nematodes which reduce voluntary food intake and/or poor digestion and assimilation of nutrient. The significant effects of parasitic infections can be arrested protein metabolism and reduced absorption and retention of minerals [5] and [6]. In severe cases helmenthiasis causes production loss due to mortalities however the effect on production depends on the age, sex, ecology and species of livestock, breed, parasite species and the intensity of worm population. Other factors that cause diseases and ultimately pose great economic loss are weather conditions, physiological status of the animal and husbandry practice. For coherent control measures of the gastrointestinal nematodes infections a deep knowledge of the epidemiology of the parasite and their interaction with the sex and ecology of the host is essential [6]. This study was accomplished to sort out the epidemiological aspects of the gastrointestinal helminthes parasite relating the sex and habitat of the animal with the rate of prevalence.

Material and Methods
2.1 Period of Study
The present study was conducted farmed and domesticated environment at District Peshawar, Pakistan from November 2012 to April 2013.

2.2 Sample collection
Fecal samples were randomly collected from either sex of sheep in sterile polythene bags directly from the rectum of each animal and transferred immediately to laboratory for identification of parasite eggs. The samples were stored in refrigerator at 4 ℃ for examination on the same day. Information regarding animal type, sex and age of animal, date of sample collection and area from where the sample is collected were noted.

2.3 Fecal examination
The fecal samples were analyzed both qualitatively and quantitatively. Qualitative analysis was carried out by direct microscopic examination and flotation techniques as described by [7] and [8] while quantitative analysis will be done by McMaster egg counting technique described by [8]. Eggs of the different helminthes were identified on the basis of morphological appearance and size with the help of keys developed by [7] and [8]. Each sample will be first examined by direct method and then by concentration techniques. For eggs of certain nematodes that could not be exactly identified, copro-culture will be performed to obtain larval stages as described by [8].

2.4 Mc Master Method
2 grams accurately weighed fresh feces were suspended in 60 ml saturated sodium chloride solution and strained through a fine sieve and then stirred to obtain a homogenous distribution of eggs in the liquid. The counting cells were filled one by one with the help of a Pasteur pipette and let for few minutes. The eggs floated to the surface of the concentration solution and stuck to the cover-glass and were observed under low magnification.

3.1 Data analysis
The relative prevalence of different helminthes species or groups will be calculated by following formula as used by (1).

3. Results
A total of 800 samples were investigated 400 each for male and female sheep for the helminthes parasites. Out of all 224 positive samples were recorded for male sheep and 214 positive samples for female sheep. The overall prevalence for male sheep were calculated to be 56% in which farmed sheep were found to be with minimum prevalence of helminthes 50% against the farmed ones 62%. Some similar figures were found for the female sheep whose overall prevalence were found to be 5, of which farmed sheep were with less risk of infection 40.5% as against the domesticated where the prevalence is 66.5% as obvious in Table 1.

Table 1: Overall and group wise percentages of prevalence in different groups of sheep.

Sex	Positive samples (Farmed)	Prevalence	Positive samples (Domesticated)	prevalence	Overall prevalence
Male	100	50%	124	62%	56%
Female	81	40.5%	133	66.5%	53.5%

The presence and prevalence of each parasitic species were also recorded independently so that a clear picture of each parasitic species is obtained. A total of 15 species were recorded in different groups of sheep at different localities. The Table 2 below shows the prevalence of each parasite in male, female, farmed and domesticated group of sheep individually.

Table 2: Prevalence of each individual parasite in different groups of sheep.

		Prevalence % (Farmed sheep)		Prevalence % (Domesticated sheep)	
S. No	Parasite species	Male (n=200)	Female (n=200)	Male (n=200)	Female (n=200)
1	*Trichuris spp*	9	..	5	6.5
2	*Trichostrongylus spp*	12.5	..	..	..
3	*Moniezia expensa*	4.5	2	1	0.5
4	*Haemonchus contortus*	13.5	11.5	14	16.5
5	*Ostertagia circumcincta*	..	7.5	4	2.5
6	*Dicrocoelium dendriticum*	..	…	1	..
7	*Strongiloides papillosus*	..	2	7	7
8	*Fasciola hepatica*	..	3	2	3
9	*Chabertia ovina*	5.5	1.5	7	6.5
10	*Oesophagostomum columbianum*	..	10.5	3	5.5
11	*Toxocara vitulorum*	..	2.5	2	2.5
12	*Cotylophorum cotylophorum*	..	..	2	3.5
13	*Marshallagia marshalli.*	..	..	1	4
14	*Gaigeria pachysoelis.*	..	..	1	..
15	*Cooperia spp*	..	..	2	1

The prevalence of parasites belonging to different classes of helminthes was sorted out individually for nematodes, trematodes and cestodes. The relative prevalence of the parasites of each class and in different localities is given here in the Tables number 3, 4 and 5 below.

Table 3: Prevalence of Nematode parasites in male and female sheep.

S. No	Parasite	Overall Prevalence % Female sheep N=400	Overall Prevalence % Male sheep N=400
1	*Trichuris spp*	3.25	7
2	*Trichostrongylus spp*	5.75	11.25
3	*Haemonchus contortus*	14	13.75

4	*Ostertagia circumcincta*	5	2.75
5	*Strongiloides papillosus*	4.5	3.5
6	*Chabertia ovina*	4	6.25
7	*Oesophagostomum columbianum*	8	1.5
8	*Toxocara vitulorum*	2.5	1
9	*Marshallagia marshalli.*	2	0.5
10	*Gaigeria pachysoelis.*	..	0.5
11	*Cooperia spp*	0.5	1

Table 4: Prevalence of Trematode parasites in male and female sheep.

S. No	Parasite	Overall Prevalence % Female sheep N=400	Overall Prevalence % Male sheep N=400
1	*Fasciola hepatica*	3	1
2	*Dicrocoelium dendriticum*	..	0.5
3	*Cotylophorum cotylophorum*	1.75	1

Table 5: Prevalence of Cestode parasites in male and female sheep.

S. No	Parasite	Overall Prevalence % Female sheep N=400	Overall Prevalence % Male sheep N=400
1	*Moniezia expensa*	1.25	2.75

In order to have a much clear picture of the occurrence and prevalence of all the parasitic groups in male and female sheep and in different localities the prevalence are being calculated individually for each group. Table 6 below shows complete information of different classes of parasites in different sexes and under different rearing and management systems.

Table 6: Comparison of different groups of parasites in different groups of sheep.

Animal group/parasite	Nematodes	Trematodes	Cestodes	Sum of occurrence
Male farmed (n=200)	91 (45.5%)	0 (0%)	9 (4.5%)	100 (50%)
Male domesticated (n=200)	116 (58.0%)	10 (5%)	2 (1%)	128 (60%)
Female farmed (n=200)	71 (35.5%)	6 (3%)	4 (2%)	81 (40.5%)
Female domesticated (n=200)	119 (59.5%)	13 (6.5%)	1 (0.5%)	133 (66.5%)
Total samples investigated =800	Total=397	Total=29	Total=16	Total positive samples=442

Footnote: The Figures in parentheses shows the prevalence in percentages.

4. Discussion

The present study reveals that sheep reared in domesticated environment are found to have greater risk of parasitic infections/ infestations. Domesticated management systems therefore probably would not be proper and care must to be taken. The prevalence figures in the above given tables support this hypothesis. Peoples therefore should be aware and trained to minimize the risk. The parasite *Haemonchus contortus* was found to be the most prevalent, same finding was reported by (1) for the sheep flocks in Cholistan desert of Pakistan reflecting the hardy and cosmopolitan nature of the parasite. Some similar findings were reported in India by (9), in Cameroon by (10) and in Jatoi, Pakistan by (11).

The higher prevalence can be attributed to the fact that the *H. contortus* has relatively short generation interval and lays up to 10,000 eggs per day for several months. Furthermore, resistance to anthelmintics develops faster than other species (12) and (9). The abundance of nematodes infestation over trematodes and cestodes in the present work is in agreement with the works of (13-15, 1).

The relative higher prevalence in domesticated sheep in our study is probably because of the poorly drained land which provide ideal medium for the transmission of endoparasites as also stated by (16). We conclude that overstocking, malnutrition and in turn weak immunity of the sheep may also be the contributing factors for the high rate of prevalence. Control measures are urgent than ever the study sites to reduce parasitic burdens.

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