Acta Scientific Veterinary Sciences (ISSN: 2582-3183)

Volume 4 Issue 5 May 2022

Research Article

# Prevalence and Pathological Investigation of Gastrointestinal Parasitic Infection among Goats Affected with Diarrhoea

**Ritesh Limbat, Mamta Kumari*, Anita Rathore, Poonam and Gunjan**

*Department of Pathology, Rajasthan University of Veterinary and Animal Science, Bikaner, India*

***Corresponding Author:** Mamta Kumari, Department of Pathology, Rajasthan University of Veterinary and Animal Science, Bikaner, India.

**DOI:** 10.31080/ASVS.2022.04.0377

**Received:** March 14, 2022

**Published:** April 08, 2022



## Abstract

One of the major causes of gastrointestinal pathologies in small ruminants is parasites. The present study was conducted to explore the prevalence of parasitic infection in Goats and the associated gross and histopathological changes. Faecal samples of diarrhoeic goats were analysed and were found positive for strongly *sp.* (35.29%), *Amphistomes sp.* (14.7%), *Trichuris sp.* (17.64%), *Monteria sp.* (5.88%), *Coccidia sp.* (14.70%) and mixed infections. Gross and histopathological examination of Goats died with a history of diarrhoea revealed presence of *Paraamphistomes* spp., *Haemonchus contortus*, and *Coccidia* spp. Pathological studies revealed that there was no difference in prevalence of diarrhoeic condition according to age and sex. The major changes were observed in abomasum, intestine and liver. Grossly, the organs were congested, haemorrhagic and oedematous and microscopically, congestion, oedema, haemorrhages and infiltration of leucocytes including few neutrophils and mainly macrophages were evident in the mucosa and submucosa. In case of coccidiosis, different developmental stages of coccidian oocysts were present in the intestinal epithelium, along with infiltration of leucocytes.

**Keywords:** Diarrhoeic Goats; Parasites; Helminthes; Haemonchus; Amphistomes; Coccidia; Strongyles; Gross Lesions; Histopathological Lesions

## Abbreviations

H and E: Haematoxylin and Eosin

## Introduction

India is agriculture based economy where major part of the population is dependent on agriculture along with rearing livestock. Goat is reared mainly by landless labours, and small and marginal farmers, because it requires less space and is easy to handle and manage [21]. It is also a major source of nutrition to rural farmers through providing milk and meat and so is an important source of income particularly for landless and small farmers. Sixty-five per cent of the global goat population is maintained in the developing countries of Asia and 29 per cent in Africa [22]. According to Basic Animal Husbandry Statistics 2019, Goat population of India is 148.88 million and of Rajasthan is 20.84 million [3]. About 97.19 million goats were slaughtered in India during 2018-19 for meat production and amongst these 6 million goats were slaughtered from Rajasthan [3]. Similarly, goat contributes significantly to nutrition of rural people through milk [5].

The major constraint in goat farming is the incidence of diseases. Disorders of gastrointestinal tract are often found in Goats. Amongst this diarrhoea, enteritis and bloat are commonly encountered in goat and many a time they result in death of the animal leading to economic loss to farmer. Incidence of mortality due to diarrhoea is common in winter (41.07%), followed by rainy (37.5%) and then in summer season (21.43%) [6]. Diarrhoea is a complex multifactorial disease condition involving the non-infectious and infectious agents. It may be caused by pathogens, toxic substances and nutritional causes. The most common disease of neonatal goat kids is enteritis which impairs their growth and leads to economic losses to the farmers.

Gastrointestinal parasites that can cause diarrhoea in goat are *Eimeria* spp., *Ostertagia* spp., *Trichostrongylus* spp., *Cooperia* spp., and *Nematodirus* spp. [23]. Helminth infections are common in small ruminants due to grazing on pastures contaminated with infective larval stage of nematodes [4]. The common helminth species causing infection are *Haemonchus* sps., *Trichostrongylus* sps., and *Oesophagostomum* sps. [12]. Amongst these *Haemonchus contortus* is the most pathogenic nematode. Its infection can be manifested as acute and chronic disease. In acute form anaemia, oedema, weakness, dark coloured faeces, and sudden death are observed while in chronic form generalized oedema, fluid in body cavities, thickened abomasal wall, ulcerative haemorrhages in abomasal mucosa, hepatomegaly, and loss of subcutaneous and visceral fat are observed [7,13].

Intestinal trichostrongylosis manifested as anorexia, persistent diarrhoea, and weight loss is often encountered in goats. Atrophy of intestinal villi results in impaired digestion and malabsorption, leading to protein loss [18]. Co- infection of Hemonchus *contortus* and *Trichostrongylus colubriformis* is often encountered in goats [26].

Coccidiosis is another important parasitic disease of goats with worldwide distribution. The economic losses are due to poor growth performance, high mortality and morbidity, and treatment costs [15]. The infection is mostly reported in winter season and in kids between 6-12 months [28]. *Eimeria arloingi* and *E. ninakohlyakimovae* infections are most frequently encountered [28]. Overcrowding and stress factors such as weaning, dietary changes; transportation, and cold or heat weather are the predisposing factors [15].

## Materials and Methods

The species breed, age and sex of all the 35 goat carcasses died with the history of diarrhoea were noted and a thorough post-mortem examination was conducted under aseptic condition. The external examination was conducted followed by the internal examination and presence of any parasite was noted, the parasites were collected and lesions in various organs were observed. Representative tissue pieces from organs showing lesions were collected in 10 percent buffered formalin for histopathological examination. The tissues after fixation were processed for paraffin wax embedding technique. The paraffin embedded sections were then stained by routine haematoxylin and eosin staining (H and E) method.

During post-mortem examination, all the parasites visible to the naked eye (*Haemonchus spp. in abomasum,* and *Amphistomes spp.*in rumen) were collected using a pair of forceps. All recovered parasites were preserved in 5% formalin with 5% glycerine. Formalin preserved nematodes are washed in water and dehydrated before clearing. Nematodes of medium to small size were cleared in lacto phenol. Very small nematodes were cleared and mounted in glycerine. All adult worms were identified directly under the microscope [24].

### Faecal examination

A total of 50 faecal samples of goat were collected from various areas of Southern Rajasthan (Dungarpur, Udaipur, Chittorgarh, Bhilwara and Rajsamand). These faecal samples were examined using different Floatation and sedimentation technique to find out the presence of parasitic eggs/oocysts/cysts to note the prevalence of parasites in goat.

## Results and Discussion

Out of 50 faecal samples, 42 (84.21%) sample were found positive for an overall prevalence for parasites infection in goat. Twelve samples were collected from animals more than 2 year, fourteen sample from 1-2 year and eight from 0 to 6 month of age group in goat.

Among various overall helminth infections (80.95%) reported in the present study, *Strongyles* (35.29%) were the most prevalent gastrointestinal helminth followed by *Trichuris sps.* (17.64%), *Coccidia sps.* (14.70%), *Amphistome sps.* (14.7%), Mixed infection (11.76%) and *Moniezia sps.* (5.88%) (Table 1 and Figure 1-6).

Although other workers (25 Swarnakar., *et al*. 2014; 14 Khajuria., *et al*. 2013, Abhishek., *et al*. 2013 1) also reported maximum prevalence of Strongyle infection among goats from different regions of India but the percentage was higher (69.7%, 50.01% and 79.08%) as compared to our study. The most common gastrointestinal parasites reported in goats from Mathura were Haemonchus, Moniezia and coccidia with an overall prevalence of 68.75%. In Egypt an overall higher prevalence of 89.33% of gastrointestinal parasitic infections among goats is reported [9]. The prevalence of infection by Coccidia spp., Moniezia spp., and Strongyle group was reported to be highest. The yearling age group was affected more as reported by other workers [9]. However, in buffaloes paramphistome infection is reported to be highest in Udaipur [25]. Prevalence of amphisotmosis in goats as reported by other workers is

found to be 14.67% (by rumen examination of slaughtered goats) and 17.1% (by faecal examination) [11]. Paramphistomum infestation in sheep is reported to be 0.041% by other workers [27]. As reported earlier, acute paramphistomosis is emerging parasitic disease in Europe [10].

## Age wise prevalence of parasitic infection in goat

A age wise prevalence was observed and three groups were classified 0 to 6 month, 1-2 year and above 2 year with 10, 17 and 15 number of animals examined. Highest prevalence of parasites infection was noted in age group of 1-2 year with (82.35%), followed by more than 2 year (80%) and 0 to 6 month was (80%) (Table 1).

| Age | Examine | Infected | Mixed infection | Strongyle | Amphistome | Trichuris | Moneizia | Coccidia |
|---|---|---|---|---|---|---|---|---|
| 0 to 6 months | 10 (80%) | 8 (80%) | 1 (12.5%) | 3 (37.5%) | 1 (12.5%) | 1 (12.5%) | 0 (0%) | 2 (25%) |
| 1 to 2 years | 17 (82.35%) | 14 (82.35%) | 1 (7.14%) | 5 (35.71%) | 2 (14.2%) | 3 (21.4%) | 1 (7.1%) | 2 (14.28%) |
| More than 2 years | 15 (80%) | 12 (80%) | 2 (16.66%) | 4 (33.33%) | 2 (16.6%) | 2 (16.6%) | 1 (8.33%) | 1 (8.33%) |
| Total | 42 | 34 (80.95%) | 4 (11.76%) | 12 (35.29%) | 5 (14.7%) | 6 (17.64%) | 2 (5.88%) | 5 (14.70%) |

**Table 1:** Percentage of parasitic eggs found on faecal examination of diarrhoeic goat (*Capra hircus*) from southern Rajasthan.

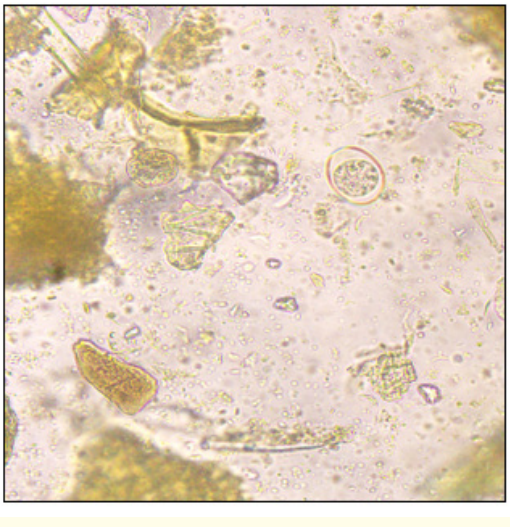

**Figure 1:** Photomicrograph of faecal sample showing Coccidia ova (400X).

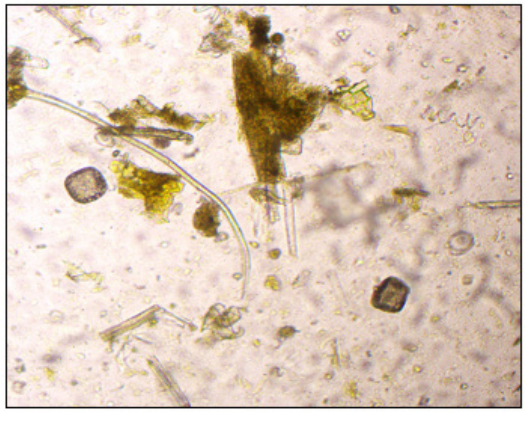

**Figure 2:** Photomicrograph of faecal sample showing Moniezia ova (400X).

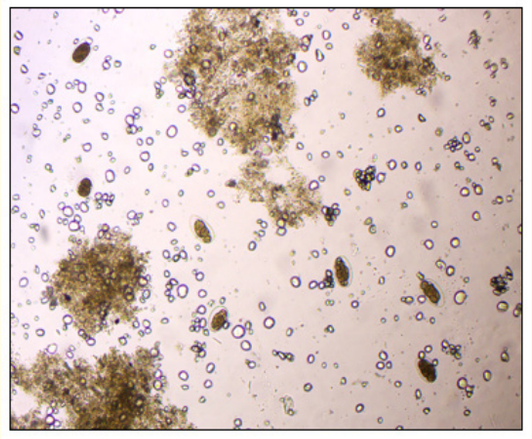

**Figure 3:** Photomicrograph of faecal sample showing Strongyle ova (400X).

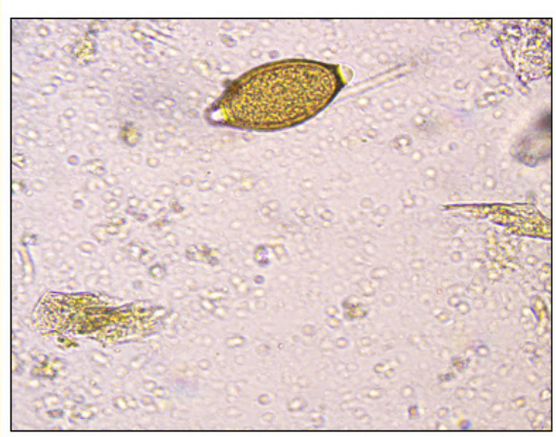

**Figure 4:** Photomicrograph of faecal sample showing Trichuris ova (400X).

**Figure 5:** Posterior end (copulary bursa) of Male Haemonchus worm found in abomasum of goat (100X).

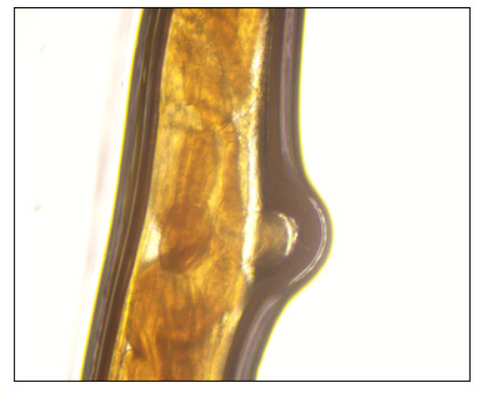

**Figure 6:** Vulvar flap of female Haemonchus worm found in abomasum of goat (100X).

**Figure 7:** Mature stages of Amphistome spp. found attached to the mucosa of rumen.

**Figure 8:** Haemonchus worms collected from abomasum of goat.

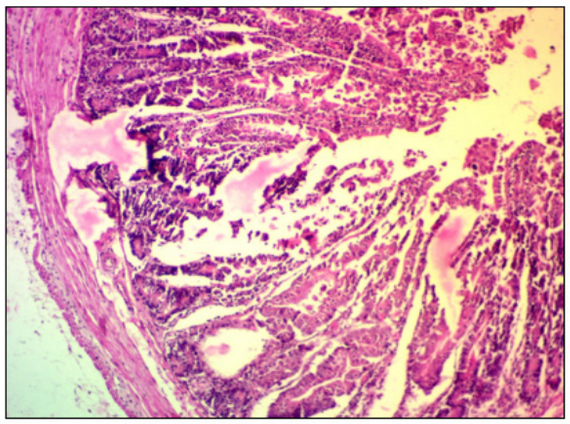

**Figure 9:** Necrosis of mucosa, sub-mucosa and muscularis along with infiltration of mononuclear cells in Intestine (H and E, 100X).

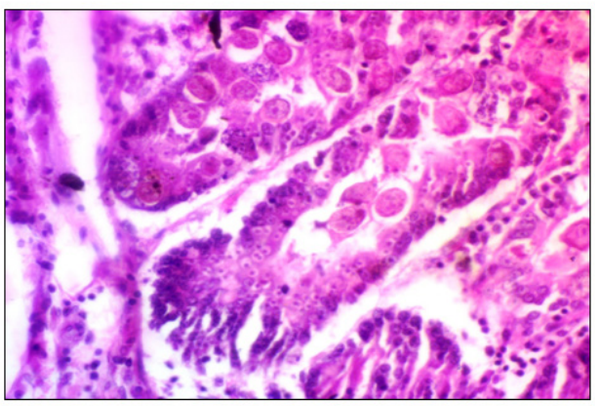

**Figure 10:** Oocyst of Coccidia spp. Present in Glandular epithelium of Intestine (H and E, 400X).

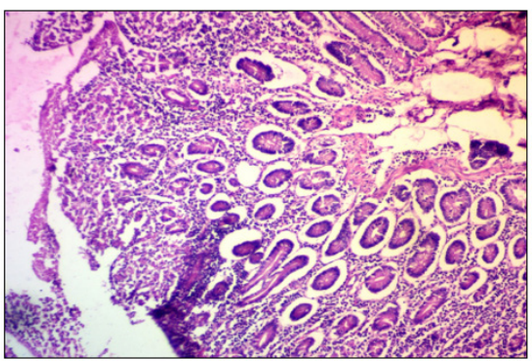

**Figure 11:** Necrosis and Shortening of villi, infiltration of inflammatory cells and loss of adherence of glandular epithelial cells from basement membrane in Intestine (100X).

## Pathological lesions associated with parasitic infection

On post mortem examination severe to moderate haemorrhages and thickened wall were observed in intestine which on microscopic examination revealed congestion of vessels, haemorrhages, necrosis of intestinal epithelium, and different developmental stages of coccidian oocyst in intestine along with infiltration of leucocytes (Figure 10). Pathologic findings including haemorrhages, thickened intestinal wall, proliferation of intestinal villi, presence of different stage of coccidial life cycle in epithelial cells were in agreement with the findings of [8,15-17,19].

Gross lesions observed in cases in which haemonchus was observed grossly, were haemorrhages on mucosa of abomasum and thread like worms adhered to the mucosa (Figure 8). Histopathological examination revealed necrosis of mucosa of abomasum, haemorrhages and infiltration of particularly mononuclear cells [7,12,20].

Pathological changes in cases where amphistome was found in rumen (Figure 7) were similar to the findings of other workers who also reported congestion haemorrhages and atrophy of glands of intestine and severe infiltration of mononuclear cells and eosinophils [27]. Similar histopathological changes in infected animals in the form of mononuclear cell infiltration in the sub mucosa of the ruminal papillae, necrosis and degeneration in the gland of the duodenum were noted by other workers [2].

Pathological studies revealed that there was no difference in prevalence of diarrhoeic condition according to age and sex. The major changes were observed in abomasum, intestine and liver. Abomasum was congested, haemorrhagic and oedematous and had *Haemonchus* adult worm attached to its mucosa in two cases. Microscopically, congestion, oedema, haemorrhages and infiltration of leucocytes including few neutrophils and mainly macrophages were evident in the mucosa and submucosa. Intestine was also congested, haemorrhagic with thickened wall in few cases. Microscopically, congested vessels in the lamina propria, haemorrhages in the mucosa, goblet cell hyperplasia, necrosis, shortening of the villi, and necrosis of the epithelium was noted. The sub-mucosal glands were showing degenerative and necrotic changes. Gross lesions observed in liver were congestion, haemorrhages, oedema, and necrotic foci. In some cases hepatomegaly, enlarged gall bladder, abscess, and cysts were noticed. Microscopically, congestion in veins and sinusoids, and telangiectasis were noticed. In the hepatocytes, degenerative changes like cloudy swelling and fatty changes were also noticed. Centrilobular and coagulative necrosis was noticed. In many cases fibroblast proliferation was observed in the portal triad area particularly around the blood vessels.

## Conclusions

- Faecal examination of diarrhoeic goat revealed 84.21% prevalence of parasitic infection which included Strongyles sps. (35.29%), Trichuris sps. (17.64%), Coccidia sps. (14.70%), Amphistome sps. (14.7%), Moneizia sps. (5.88%) and mixed infection (11.76%).
- *Amphistomes sps., Haemonchus sps* and *coccidiosis* was seen in P.M. findings.
- Poor managemental conditions of the investigated area may be responsible for occurrence of parasitic conditions in goats so better Managemental practices should be adopted.

## Acknowledgements

Authors are thankful to the Department of Veterinary Parasitology, College of Veterinary and Animal Science, Navania for providing facilities for parasitic examination of faeces.

## Conflict of Interest

There were no conflicts among the authors for the present study.

## Bibliography

1. Abhishek G., *et al*. "Prevalence of gastrointestinal parasites in small ruminants in and around Jabalpur". *Indian Journal of Veterinary Parasitology* 27 (2013): 59-63.
2. Al- Gaabary MH., *et al*. "Studies on Paramphistomiasis in Ruminants". *Journal of Veterinary Medical Science Congress* (2009): 116-136.
3. Basic animal husbandry statistics. Department of Animal Husbandry and Dairying. Ministry of fisheries, Animal Husbandry and Dairying goat of India. New Delhi (2019).
4. Chandrawathani P., *et al*. "A survey of parasitic infection on small ruminant farms in Kinta and Hilir Perak districts, Perak, Malaysia". *Tropical Biomedicine* 26.1 (2009): 11-15.
5. Devendra C. "Goats challenges for increased productivity and improved livelihoods". *Outlook AGR* 28 (1999): 215-226.
6. Dohare AK., *et al*. "Influence of age, sex and season on morbidity and mortality pattern in goats under village conditions of Madhya Pradesh". *Veterinary World* 6.6 (2013): 329-331.
7. Dutta B., *et al*. "Occurrence and pathology of *Haemonchus contortus* infection in goats". *Journal of Entomology and Zoology Study* 5.3 (2017): 1284-1287.
8. Hashemnia M., *et al*. "Experimental caprine coccidiosis caused by *Eimeria arloingi*: morphopathologic and electron microscopic studies". *Veterinary research communications* 36 (2012a): 47-55
9. Hassan NMF., *et al*. "Prevalence assessment of gastrointestinal parasitic infections among goats in Giza Governorate". *Egypt Bulletin of National Research Centre* 43 (2019): 12.
10. Huson KM., *et al*. Paraamphistome of Ruminants: "An Emerging Parasitic Disease in Europe 33.11 (2017): 836-844.
11. Jaiswal A., *et al*. "Prevalence of Caprine amphistomosis in Mathura District of Uttar Pradesh (India)". *International Journal of Livestock Research* 8.11 (2018): 1.
12. Jesse F., *et al*. "A Veterinary Clinical Case of Severe Chronic *Haemonchus contortus* Infection in a Goat". *Advance in Animal and Veterinary Science* 7.6 (2019): 503.
13. Jesse FFA., *et al*. "Hemotropic Mycoplasma ovis infection in goats with concurrent gastrointestinal parasitism in Malaysia". *Journal of Advance Veterinary Animal Research* 2.4 (2015): 464-468.
14. Khajuria JK., *et al*. "Seasonal prevalence of gastrointestinal helminths in sheep and goats of middle agro-climatic zone of Jammu province". *Journal of Parasitic Diseases* 37.1 (2013): 21-25.
15. Kheirandish R., *et al*. "Prevalence and pathology of coccidiosis in goats in south-eastern Iran". *Journal of Parasitic Diseases* 38.1 (2014): 27-31.
16. Khodakaram T and Hashemnia M. "An overview of intestinal coccidiosis in sheep and goats". *Revue de Medicine Veterinaire* 167 (2017): 1-2.
17. Khodakaram TA and Mansourian M. "Pathologic lesions of naturally occurring coccidiosis in sheep and goats". *Comparative Clinical Pathology* 17 (2008): 87-91.
18. Mark T Fox. "Gastrointestinal Parasites of Sheep and Goats (2021)". *MSD Veterinary Manual Accessed* (2021).
19. McGavin MD and Zachary JF. "Pathologic basis of veterinary disease, 5th edition". Elsevier Mosby, London (2011).
20. Pathak AK., *et al*. "The influence of condensed tannins containing leaf meal mixture on histopathological changes in *Haemonchous contortus* infected sheep". *Indian Journal of Veterinary Pathology* 38 (2014): 231 -234.

21. Patil SJ., *et al*. "Factors affecting the age at first kidding in local, angora and their crossbred goats". *Asian Journal of Animal Sciences* 3.2 (2008): 193-195.

22. Singh SK., *et al*. "Role of goats in sustainable rural live hoods in India". In Goats - undervalued Assets in Asia, Proceeding of the Aphcailri regional workshop on goat production systems and Markets (2006).

23. Sochoenian S. "Diarrhoea (scours) in small ruminants". *Mary Land Small Ruminants* (2007).

24. Soulsby EJL. "Helminths, Arthropoda and Protozoa of domesticated animals". 7th Edition, Bailliere tindal and cassell LTD. London. *Veterinarki Archive* 80.2 (1982): 323-328.

25. Swarnakar G., *et al*. "Prevalence of *amphistome* parasites (Trematoda: Digenea) in Udaipur of Southern Rajasthan, India". *International Journal of Current Microbiology and Applied Science* 3.4 (2014): 32-37.

26. Tan TK., *et al*. "Co-infection of *Haemonchus contortus* and *Trichostrongylus* spp. among livestock in Malaysia as revealed by amplification and sequencing of the internal transcribed spacer II DNA region". *BMC Veterinary Research* 10 (2014): 38.

27. Tehrani A., *et al*. "Prevalence and pathological study of Paramphistomum infection in the small intestine of slaughtered ovine". *Journal of Parasitic Diseases* 39.1 (2015): 100-106.

28. Verma R., *et al*. "Molecular epidemiology and point mutations in ITS1 and 18S rDNA genes of Eimeria ninakohlyakimovae and E. christenseni isolated from Indian goats". *Veterinary Parasitology: Regional Studies and Reports* 9 (2017): 51-62.