Short Communication

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2019.20.003441

# Identification of Abomasum Nematodes Fauna of Ruminants in Kerman Industrial Slaughterhouse, Iran

**Badrosadat Kordi, Mohammad Mirzaei and Maryam Nooshadokht***

*Pathobiology Department, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran*

***Corresponding author:** Maryam Nooshadokht, Pathobiology Department, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran

## ARTICLE INFO

**Received:** July 29, 2019

**Published:** August 07, 2019

**Citation:** Badrosadat Kordi, Mohammad Mirzaei, Maryam Nooshadokht. Identification of Abomasum Nematodes Fauna of Ruminants in Kerman Industrial Slaughterhouse, Iran. Biomed J Sci & Tech Res 20(3)-2019. BJSTR. MS.ID.003441.

**Keywords:** Abomasum; Abomasum Nematodes; Ruminants

## Abstract

**Introduction:** Parasitic diseases play an important role in reducing livestock productions. Particularly, nematode diseases have a determining role in reducing domestic animal products (milk, meat, wool). On the other hand, the most challenging digestive nematodes live in the abomasum. Therefore, the identification of parasitic diseases, especially nematode diseases, is of particular importance. The aim of this study was to investigate and identify the ruminants' abomasum nematode fauna of infection in the Kerman industrial slaughterhouse in Iran.

**Materials and Methods:** Totally, 208 abomasa (52 abomasa of four farm animals per season) were collected and their contents were analyzed by two methods of isolation with and without staining.

**Results:** Of the 208 animals in the study, 156 (75%) cases had *Marshallagia* and *Parabronema* nematodes. *Camelostrongylus* nematode was found in 52 (25%) instances. The prevalence of *Haemonchus* and *Ostertagia* nematodes was found to differ significantly with season (P-value<0.05). Additionally, livestock was infected in all ages, except for 39 (75%) cases that aged 2-3 years. Therefore, the lowest infection rate was observed at the age of 2-3 years old. Data analysis also showed that the relationship between age of livestock and infection was significant (P-value<0.05).

**Conclusion:** According to the results, we conclude that the infection of the abomasum to parasitic nematodes in Kerman is high. *Hemoncus contort*us is one of the most important blood-sucking nematodes in the abomasum, with high prevalence in Kerman, a small number of which is pathogenic. Therefore, it is essential for livestock breeders to be aware of the need to treat and prevent infection with abomasum nematodes.

## Introduction

Like many other countries, ruminates are among major resources of protein for humans and significant in the animal husbandry industry in Iran. The livestock population in Kerman Province, Iran, makes up 5% of the total farm animal population of the country. Parasites and worms of the digestive tract are a major factor decreasing the production of ruminant worldwide [1,2]. Ruminants are the main hosts for parasitic and worm infections, often manifesting themselves in chronic and subclinical forms. Factors affecting parasitic infections include climatic conditions, livestock nutrition, and vegetation [3]. Infection with parasitic worms of the digestive tract may cause complications such as lack of appetite, reduced growth and production, decreased livestock products, stopped skeleton formation and, as a result, reduced absorption of nutrients, leading to reduced livestock weight and decreased production of meat and livestock products.

Moreover, the absorption of minerals and some enzymes is decreased. Also, the weight of calves born of livestock infected with nematodes of the digestive tract and abomasum is lower than that of healthy livestock, and they are more prone to different diseases. If infection is severe, it leads to heavy loss in the livestock [4,5]. Abomasum is a major organ for nematodes. The most important genera of this family include *Haemonchus contortus, Trichostrongylus*, *Ostertagia ostertagi, Nematodirus*, *Marshallagia marshalli*, *Parabronema skrjabini* and *Cooperia oncophora* [6].

Studies have indicated a considerable difference in the type of ruminant worm infection in different organs. It is necessary for worm infection control and prevention programs be developed in different regions based on the data collected from the same region [7]. The present study aimed to determine the level and type of abomasum worm infection in Ruminant slaughtered in the industrial slaughterhouse in Kerman, Iran.

## Methods

### The Studied Geographical Region

Kerman Province is located in Southeastern Iran with a hot, semi-arid, and desert climate. The livestock population in Kerman province makes up about 5% of the total livestock population of the country.

### Sampling

The abomasa of the slaughtered livestock were collected between August 2017 and May 2018 from the industrial slaughterhouse of Kerman city, Kerman, Iran. In each season, 13 abomasa of each of cow, sheep, goat, and camel were collected. The sex of the animal and the season of slaughter were recorded. The luminal of the abomasa were ligatured, labeled, and coded. Excised abomasa were transferred to a dedicated parasitology laboratory in the Veterinary School of Bahonar University of Kerman.

### Parasitology Test

Each abomasum was opened and emptied, its surface was washed and scraped in a tub so that nematodes would fall into the tub. The contents of the tub were then poured onto a 100-mesh sieve. Afterwards, the contents were transferred to a 3L container 10 parts of which was previously filled with water. In the next step, the contents were mixed and poured into a Petri dish using a ladle and viewed under a loop with black background under strong light. Using this method, the worms were viewed under the loop without staining. In another method, the contents of the ladle were poured into a plate, and a few drops of lughole's iodine were added. The worms absorbed the dye and were viewed as red in color. Then, iodine was added so that extra dye would exit the worm. The worms were transferred to 70% alcohol for storage. Unstained worms were lucidified for identification using lactophenol. The identified nematodes were placed on a slide and a few drops of lactophenol were poured on them. The number of separated worms in a ladle was multiplied by 100 to calculate the number of worms in the abomasum [8]. All the separated nematodes were identified based on their appearance (anterior outgrowths, shape, size of spicule, etc.) and a valid identification key.

### Statistical Analysis

Results of statistical analysis are expressed in percentage. The prevalence of nematode infection in the abomasum and the relationship with variables (sex, age, season, and infection) were separately analyzed using Chi-squared test in SPSS 19 at the significance level of $p<0.05$.

## Results

Of the 208 abomasa taken from the studied slaughtered ruminant, 169 (81.25%) abomasa were infected with the nematodes of *Marshallagia, Parabronema*, *Camelostrongylus, Haemonchus*, and *Ostertagia* (Figure 1). Of the identified parasites, the most prevalent nematodes were *Marshallagia* and *Parabronema*, and the least prevalent ones were *Camelostrongylus* (Table 1). Based on the results of Fisher's exact test, the variables of the type of livestock, season, and age of livestock affected infection (p-value<0.05). All livestock were infected, except for 39 cows (75%) aged 2-3 years, whereas no significant relationship was found between sex and parasitic infection (Table 2).

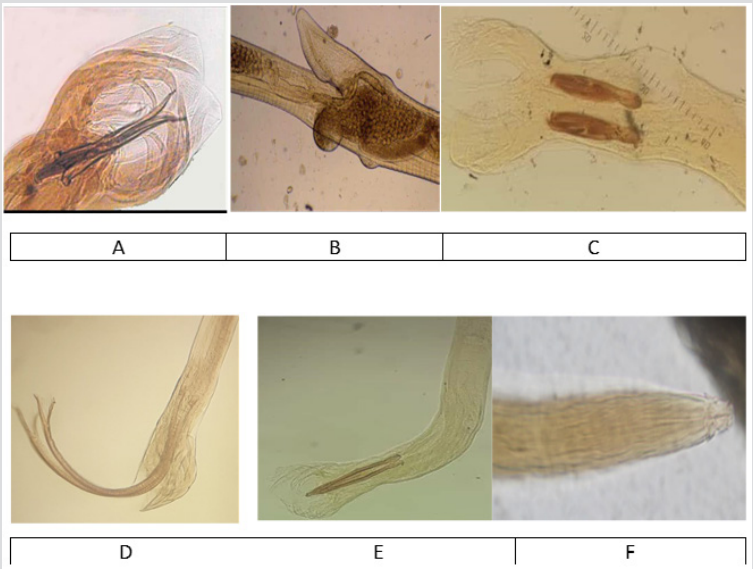


**Figure 1:** Microscopic photographs of abomasum nematodes: A: Male Haemonchus, B: Female Haemonchus, C: Ostertagia, D: Camelostrongylus, E: Marshallagia, F: Parabronema.

**Table 1:** Frequency of ruminants' abomasum nematodes.

| Type of slaughtered animals | Number of slaughtered animals | Abomasum Nematodes | | | | | |
|---|---|---|---|---|---|---|---|
| | | Marshallagia No, % | Parabronema No, % | Haemonchus No, % | Ostertagia No, % | Camelostrongylus No, % | Total No, % |
| Sheep | 52, 100% | 52, 100 % | 52, %100 | 39, 75% | 39, 75% | 0 | 52, 100% |
| Cattle | 52, 100% | 0 | 0 | 13, 25% | 0 | 0 | 13, 25% |
| Goats | 52, 100% | 52, 100% | 52, 100% | 52, 100% | 26, 50% | 0 | 52, 100% |
| Camels | 52, 100% | 52, 100% | 52, 100% | 26, 50% | 0 | 52, 100% | 52, 100% |
| Total | 208, 100% | 156, 75% | 156, 75% | 130, 62.5% | 65, 31.3% | 52, 25% | 169, 81,25% |

**Table 2:** Risk factors association with occurrence of ruminants' abomasum nematodes.

| Risk factors | | No (%) positive | P value |
|---|---|---|---|
| Sex | Female | 67 (79.8) | 0.65 |
| | Male | 102 (82.3) | |
| Type of animals | Sheep | 52 (0) | <0.001 |
| | Cattle | 13 (25) | |
| | Goats | 52 (0) | |
| | Camels | 52 (0) | |
| Age (years old) | <1 | 27 (100) | <0.001 |
| | 2-Jan | 77 (100) | |
| | 3-Feb | 13 (25) | |
| | < 3 | 52 (100) | |
| Season | Spring | 39 (75) | <0.001 |
| | Summer | 52 (100) | |
| | Fall | 39 (75) | |
| | Winter | 39 (75) | |

## Discussion

Based on the rising trend in population and the increasing demand for food, especially protein, livestock products are in demand more than ever. Accordingly, it is necessary to fight parasitic infections. Parasitic, and especially worm, infections are a major cause of reduction in livestock products (meat, milk, and wool). Also, parasites predispose livestock to infectious and non-infectious diseases [9,10]. Therefore, the identification of infectious diseases and fighting parasites is of paramount importance. To maintain the livestock capital and further exploit the available resources, it is essential to identify the infections specific to each region. Consequently, paraclinical tests and autopsies are of special significance in the identification of parasitic diseases, especially worm parasites [11]. Based on the result, of 208 livestock studied here, the nematodes of *Marshallagia, Parabronema, Haemonchus, Ostertagia* and *Camelostrongylus* were observed in the abomasum of 169 livestock (81.25%).

In the present study, all sheep, goats, camels (100%), and 30 cows (75%) were infected with the nematodes of abomasum. In a study by Chalechale et al. on the slaughterhouse examination of the worm infection of the digestive tract in sheep in Kermanshah, Iran, the prevalence of nematodes of the digestive tract was reported as 82 % in the slaughtered sheep [8]. In the study by Borji in Mashhad, Iran, and Bekele in Ethiopia, the prevalence of abomasum nematodes was reported at approximately 75% in slaughtered camels [12,13]. Moreover, in numerous studies on cows in Europe, the prevalence of abomasum parasite has been reported at 80-90% [14,15]. The high prevalence of nematodes in this and similar studies may be due to the direct evolution and higher resistance of eggs in the environment. In addition, since antiparasitic medications, either preventive or therapeutic, are often used by stockbreeders in an inaccurate and insufficient manner, the potential risk of drug resistance has been reported for some medications [16,17].

In a study by Mashayekhi et al. on the abomasum nematodes in cows slaughtered in Tabriz, Iran, the prevalence of these nematodes was reported to be 44% [18]. Furthermore, Murphy et al. reported the prevalence of abomasum nematodes in cows slaughtered in Ireland to be 50%. In the present study, *Marshallagia* and *Parabronema* nematodes had the highest prevalence compared to other parasitic worms in the abomasum of cows with the frequency of 75% [19]. All the sheep and goats studied here were infected with these two nematodes. *Marshallagia* is the most prevalent nematode in the abomasum of small ruminant in Iran, and the infection of sheep and goats has been reported to be 86% and 87.3%, respectively [8]. This result is consistent with that reported by Gharekhani et al. [20], reporting the highest level of abomasum parasitic infection to be associated with *Parabronema skrjabini*. In a study by Kheirandish

et al. on the frequency of *Parabronema skrjabininematode* in small ruminant in Kerman, Iran, the prevalence of this nematode was reported to be 70% [21].

However, in a study by Kumsa et al. in Ethiopia [22] and Bashir Ahmad Lone et al. in Kashmir [23], infection with *Haemonchus* has been reported as the most prevalent parasite of the digestive tract. Various levels and the diversity of infection depend on the year (occurrence of droughts or abundant precipitation) or even the geographical location of study. In addition, sampling, sample size, and in some cases, the laboratory method chosen by the researcher may lead to different results. Furthermore, the race and age of the livestock, being domestic or non-domestic, pasture, extensive use of parasitic infection preventive medication, and the stockbreeders' level of awareness of disease transmission and prevention may be confounding variables in estimating the prevalence of disease [24,25]. In the present study, the prevalence of *Marshallagia* and *Parabronema* was equal in different seasons, observed in the abomasum of 39 livestock in all seasons. Moreover, 13 livestock were found to be infected with *Camelostrongylus* nematode in all seasons, and thus no significant difference was found in the prevalence of *Marshallagia, Parabronema*, and *Camelostrongylus*. Similarly, results reported by Borji et al. in Mashhad examining the prevalence of worms in the digestive tract of camels are consistent with this finding [12].

In the present study, no significant relationship was found between the prevalence of *Haemonchus* and *Ostertagia* on the one hand, and season on the other, consistent with the results reported by Bashir Ahmad Lone et al. in which the highest level of infection with parasites of the digestive tract occurred in summer, while the lowest level was seen in winter [23]. As climate can vary across years and regions, it would be problematic to compare different parts of the world and years [26]. All the livestock were infected in all ages except for 39 livestock (75%) aged 2-3 years. Similarly, Bashir Ahmad Lone et al. [23] reported the highest level of infection in younger ages (0-2 years) and the lowest level of infection in older ages (over 3 years). Results of the present study greatly assist the epidemiological understanding and potential planning of pasture and cycle management, leading to solutions for the prevention of nematodes in ruminant in the studied region.

## Conclusion

In this study, the highest level of infection in terms of number belonged to *Marshallagia* and *Parabronema*, and the lowest belonged to *Camelostrongylus*. It seems that despite the use of antiparasitic medications, infection with these nematodes persists, and the existence of drug resistance is probable, especially in case of Marshallagia. Therefore, it is recommended to strategically and scientifically fight these abomasum nematodes.

## Acknowledgement

Authors would like to thank Dr M. H. Radfar, Shahid Bahonar University of Kerman (SBUK), for effective counsel. This article has been extracted from the first author's MSc thesis at SBUK.

## Authors Contribution

All authors have equally contributed to execution of this research and approved the final version of the manuscript.

## Compliance with Ethical Standards

All ethical standards committed to by the journal are considered and met.

## References

1. Erfanzadeh R, Kahnuj S (2013) Study on the effect of different livestock grazing densities on soil seed bank characteristics in dry rangeland of Kerman province. Iranian Journal of Range and Desert Research 20(2): 333-344.
2. Krausman PR, Leopold BD (1986) Habitat components for desert bighorn sheep in the Harquahala Mountains, Arizona. The Journal of wildlife management 50(3): 504-508.
3. Cunha TJ, McDowell LR (2012) Nutrition of grazing ruminants in warm climates. Academic Press.
4. Moradpour N, Borji H, Razmi G, Maleki M, Kazemi H (2013) Pathophysiology of Marshallagia marshalli in experimentally infected lambs Parasitology 140(4): 1762-1767.
5. Roberts L, Schmidt G (2000) Phylum Apicomplexa: gregarines, coccicidia, and related organisms Gerald D Schmidt & Larry S Roberts' Foundations of Parasitology, 6th (edn.). LS Roberts and J Janovy (Eds.), New York: McGraw-Hill Companies.
6. Perry BD (2002) Investing in animal health research to alleviate poverty. ILRI (aka ILCA and ILRAD).
7. Skerman K, Shahlapoor A, Eslami A, Eliazian M (1970) Observation on the incidence, epidemiology, control and economic importance of gastro-intestinal parasites of Sheep and Goats in Iran. Arch Inst Razi 22: 187-196.
8. Chalechale A, Karimi I (2010) Slaughter-based survey of gastrointestinal helminthes parasite infection in sheep in Kermanshah district. Journal of Veterinary Medicine 4: 17-22.
9. Mahdavi Maymand Z, Mirtajodin M (2010) The collection and identification of the some plant species of Kerman province Journal of Herbal Drugs. An International Journal on Medicinal Herbs 1(2): 1-24.
10. Sharififar F, Koohpayeh A, Motaghi MM, Amirkhosravi A, Puormohseni Nasab E, et al. (2010) Study the ethnobotany of medicinal plants in Sirjan, Kerman province, Iran. Journal of Herbal Drugs (An International Journal on Medicinal Herbs) 1: 19-28.
11. Sutherland I, Scott I (2010) Gastrointestinal nematodes of sheep and cattle: biology and control. John Wiley & Sons.
12. Borji H, Razmi G, Movassaghi AR, Naghibi AG, Maleki M (2010) A study on gastrointestinal helminths of camels in Mashhad abattoir, Iran. Iranian Journal of Veterinary Research 11: 174-179.
13. Bekele T (2002) Epidemiological studies on gastrointestinal helminths of dromedary (Camelus dromedarius) in semi-arid lands of eastern Ethiopia. Veterinary parasitology 105(2): 139-152.
14. Agneessens J, Claerebout E, Dorny P, Borgsteede FH, Vercruysse J (2000) Nematode parasitism in adult dairy cows in Belgium. Veterinary parasitology 90(1-2): 83-92.

15. Borgsteede FH, Tibben J, Cornelissen JB, Agneessens J, Gaasenbeek CP (2000) Nematode parasites of adult dairy cattle in the Netherlands. Veterinary parasitology 89(4): 287-296.

16. Veale P (2002) Resistance to macrocyclic lactones in nematodes of goats. Australian veterinary journal 80(5): 303-304.

17. Zajac AM, Gipson TA (2000) Multiple anthelmintic resistance in a goat herd. Veterinary Parasitology 87(1-2): 163-172.

18. Mashayekhi M, Gharedaghi Y, Farazmand MR (2013) Study of Abomasal Nematodes in Adult Cattles in Abattoir of Tabriz Iran Bull Env Pharmacol Life Sci 2(11): 107-109.

19. Murphy T, Fahy K, McAuliffe A, Forbes A, Clegg T, et al. (2006) A study of helminth parasites in culled cows from Ireland. Preventive veterinary medicine 76(1-2): 1-10.

20. Gharekhani J, Gerami Sadeghian A, Yousefi M (2015) Parasitic helminth infections in native sheep (Mehraban) in Hamedan, Iran. Journal of Advanced Veterinary and Animal Research 2(2): 115-119.

21. Kheirandish R, Radfar M, Azizi S, Masnavipoor A (2018) Slaughterhouse Prevalence of Parabronema Skrjabini Associated with Pathologic Lesions in Small Ruminant. Journal of Comparative Pathobiology Iran 14(4): 2325-2332.

22. Kumsa B, Wossene A (2006) Abomasal nematodes of small ruminants of Ogaden region, eastern Ethiopia: prevalence, worm burden and species composition. Revue de médecine vétérinaire 12: 27-32.

23. Lone BA, Chishti M, Ahmad F, Tak H (2012) A survey of gastrointestinal helminth parasites of slaughtered sheep and goats in Ganderbal, Kashmir. Global Veterinaria 8(4): 338-341.

24. Armour J (1980) The epidemiology of helminth disease in farm animals. Veterinary Parasitology 6(1-3): 7-46.

25. Cowan P, Heath D, Stankiewicz M (2002) Effects of season, age, and sex on infection with endoparasites of brushtail possums, Trichosurus vulpecula, from a forest/farmland site, lower North Island, New Zealand New Zealand. Journal of Zoology 29(2): 161-169.

26. Richter SH (2002) Gastrointestinal helminths in sheep (Ovis aries) in Iceland; their prevalence, abundance and geographic distribution. Icel Agric Sci 15: 111-128.

**ISSN: 2574-1241**

DOI: 10.26717/BJSTR.2019.20.003441

**Maryam Nooshadokht.** Biomed J Sci & Tech Res



**Submission Link**: https://biomedres.us/submit-manuscript.php