



Bamlaku Andarge¹, Chaltu Muhammed¹ and Gebawo Tibesso^{2*}

¹Livestock and Fisheries development office, Ethiopia
²Oromia Agricultural Research Institute, P.O.Box 229, Batu, Oromia, Ethiopia

Dates: Received: 02 August, 2017; Accepted: 18 September, 2017; **Published:** 19 September, 2017

***Corresponding author:** Gebawo Tibesso, Oromia Agricultural Research Institute, P.O.Box 229, Batu, Oromia, Ethiopia, Tel: +251912152764; E-mail: nadhi2521@yahoo.com

<https://www.peertechz.com>

Research Article

Prevalence of Major Intestinal Nematodes of Equines in Jimma Town, South Western Ethiopia

Abstract

A cross sectional study was conducted from October, 2015 up to March, 2016 in Jimma town, Oromia Regional State of South West Ethiopia, with the objective of determining the prevalence of intestinal nematode parasites of equines and the effect of putative risk factors on the rate of helminth parasite infections. A total of 400 Equines; donkeys (n=29), horses (n=317) and mules (n=54) were included in the study. Out of 400 faecal samples examined, three species of nematode eggs were identified during the study period. Coprological examination conducted using flotation technique revealed an overall point prevalence of 72.25%. The most common nematodes encountered in order of their predominance were, Strongyles (63.25%), *Parascaris equorum* (16.5%), *Oxyuris equi* (4.25%), and mixed infection was found to be (10.75%). The results of statistical analysis of different risk factors with risk of intestinal nematode infection indicates a significant difference ($P < 0.05$) between the species of equine and strongyle infection rate, body condition scores with Strongyle and *Parascaris equorum* infection rate. But species of the animal was not significantly associated with *Parascaris equorum* ($P < 0.05$). The infection rate of *Oxyuris equi* was not significantly associated with body condition score, age and species of equines ($P > 0.05$ for all variables). Statistical analysis of the result also showed no significant difference ($p > 0.05$) in the prevalence of intestinal nematodes with sex of the animal, although it was relatively higher in male than female individuals. Therefore, the present study showed that intestinal nematodes are an important health problem in the area affecting the wellbeing and productivity of the equines.

Introduction

Despite the increase in mechanization in the world, donkeys, horses and mules are still well deserving of the name “beats of burden”. They have a prominent position in agricultural system of many developing countries. This is shown by the wide spread use of equines in rural and urban areas of Africa [1,2]. The world equine population is about 122.4 million consisting of 43.4, 40 and 15 million horses, donkeys and mules respectively. Out of the global distribution 98% of donkeys, 97% of mules and 60% of horses are distributed in the developing countries. The equine population in Africa is 17.6 million, consisting of 11.6 million donkeys, 3.7 million horses and 2.3 million mules [3,4].

Ethiopia possesses nearly half of African equine population with 58%, 46% and 37% of all horses, mules and donkeys respectively [5]. Equines are important animals to the resource poor community in the rural and urban areas of Ethiopia providing traction power and transport service at low cost. In the farming system of Ethiopia, equines play a vital role in both economic as well as social functions. They are kept and

are often used for land tillage, cultivation, and threshing, as well as for pack purposes, riding, Social security, prestige and providing of manure for both energy and soil fertility [5].

Parasitic diseases, dominated by gastrointestinal parasites, are serious health hazards, contributing to poor body condition, reduced power output, poor reproductive performance, retarded growth and short lifespan of equines [6]. Large number of internal parasites has been reported to occur in six African countries including Ethiopia, Kenya, Zimbabwe, Burkinafaso, Chad and Morocco [7].

Many intestinal nematodes (round worms) occur in equines, which includes large strongyles (*Strongylus vulgaris*, *Strongylus equinus*, *Strongylus edentatus* and triodontophorous species), *Parascaris equorum*, *Oxyuris equi* and to the lesser extent other small strongyles (cyathostomins) [8]. Clinical illness occurs not only from the presence of the adult parasite in the intestine, but also from larval migration in the intestinal wall and other organs, notably the circulatory system, however they may also found in the intestine of most equines without signs necessarily being observed [9,10].

Infection occurs from ingestion of infective larvae or egg during grazing. Virtually all grazing horses infected with this parasite but many low to moderate infection are sub-clinical, although they may cause reduced weight gain and performance [11]. Young non-immune animals are most susceptible to clinical disease, which may include diarrhoea, colic and hypoproteinemia [12]. Diagnosis of most intestinal nematodes of equines is possible by demonstration of eggs of the parasites from faecal samples. These parasites are susceptible to common deworming agents like Ivermectin, Moxidectin mebendazole, pyperazine etc. Generally, infection with intestinal nematodes can result in reduction of productivity of equines because of weakness, colic diarrhea, pruritis and intestinal obstruction [6].

Although there are some researches carried out in certain parts of the country, on equine helmenthosis, it has not been done in the study area so far. Therefore, this study is targeted to fill the information gap in the area with the following objectives:

- To estimate the prevalence of intestinal nematodes of equines in Jimma town.
- To assess the potential risk factors of infection for intestinal nematodes in equines.

Significance statement: This study discover the type of parasite that affect equine that can be beneficial for government

organization and other institutions that are engaged on disease prevention and control.

Materials and Methods

Study Area

The study was conducted at Jimma town, South Western Ethiopia. Jimma town is located in Oromia regional state administration; 352 km Southwest of Addis Ababa. The town is located at latitude of about 7°13' - 8°56' N and longitude of about 35°52' - 37°37'E and at elevation ranging 880-3360 meter above sea level. The area receives a mean annual rainfall of about 1530 ml, which comes from the long and short rainy seasons. The annual minimum and maximum temperature is about 14.4 °C and 26.7 °C respectively [13] (Figure 1).

Study Population

A total of 400 equines from Jimma town were subjected to qualitative coprological examination to determine the prevalence of major intestinal nematode species of equines, Out of which, horses, mules and donkeys comprised 79.25% (317), 13.5% (54) and 7.25% (29) respectively. All age and sex groups of local origin equines were included in this study and equines less than 5 years of age were considered as young, while those more than 5 years old as adults conventionally. Even though determination of age range was done conventionally, estimation of ages of equines was by using history of the animal

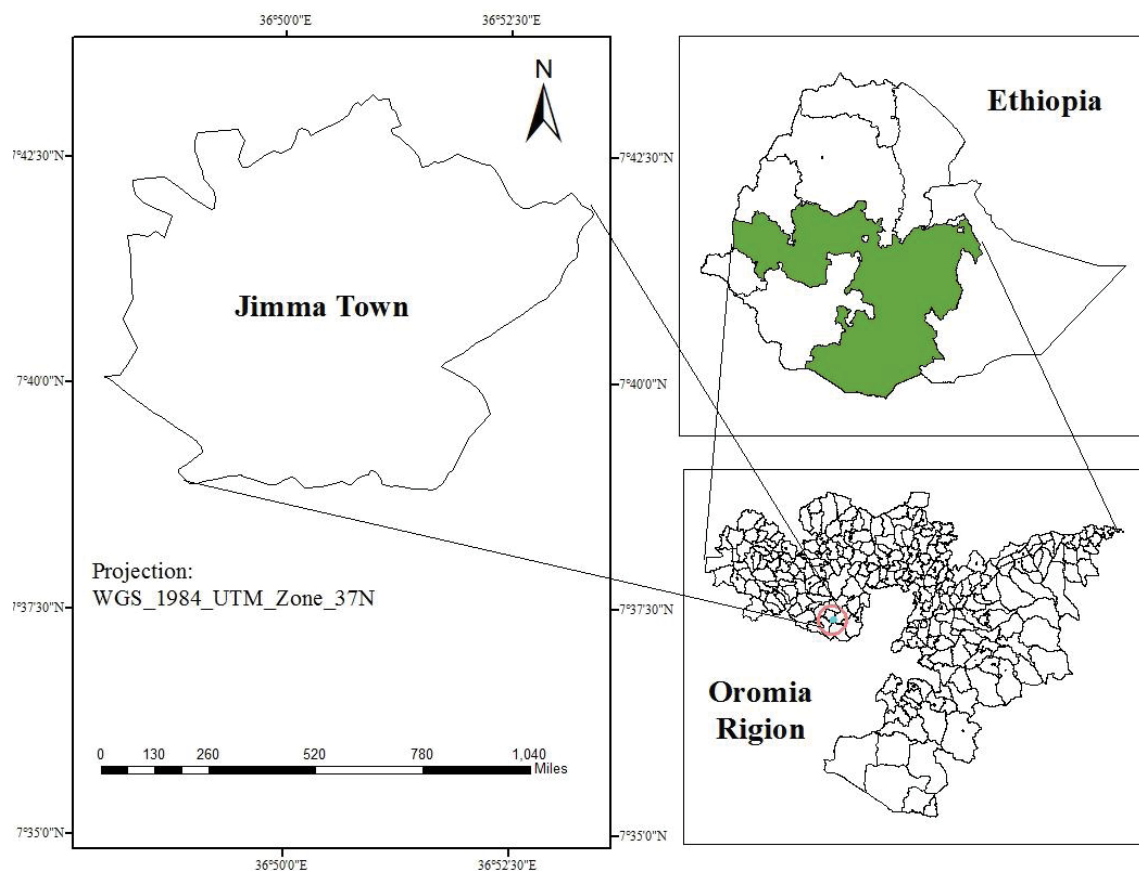


Figure 1: Map showing study area.

and guideline of age estimation by dentition as stated by David (2002). Linear body condition score grading were taken using pictorial guideline of IDPT trial (1985). Clinical examination using visual inspection and physical assessment were done on each equine.

Study design

A cross-sectional study was carried out to determine the Prevalence of Major Intestinal Nematodes of Equines in Jimma Town from October, 2015 up to March, 2016. Purposive sampling was employed to select kebeles and households keeping horse in Jimma town followed by simple random sampling to select study animals from the selected households. Kebeles and households were purposively selected based on accessibility, population of the study animals and willingness of the owners to be involved in the survey.

Coprological Examination

Faecal samples were collected directly from the rectum of each animal or during defecation with strict sanitation, in plastic bottles labeled with identification number and then brought to the laboratory. In the laboratory the samples were subjected to saturated sodium chloride flotation method of faecal examination technique to identify eggs of intestinal nematodes of equines such as strongyle species, *P. equorum* and *O. equi*. The flotation technique was conducted as the procedure given by William, 2001 [14].

- Approximately 3g of faeces was placed in a beaker.
- Then 50 ml of flotation fluid was poured into the beaker containing 3g of faeces and mixed thoroughly.
- The resulting faecal suspension was poured through a tea strainer into another beaker.
- Then the faecal suspension was poured into a test tube from the second container.
- The test tube was placed on the test tube rack.
- Then the test tube was gently filled with the suspension leaving a convex meniscus at the top of the tube and a cover slip was carefully placed on the top of the test tube.
- Then the tube was allowed to stand for 20 minutes.

Finally the cover slip was lit off carefully from the tube vertically, together with the drop of fluid adhering to it, and immediately placed on microscope slide and examined under the microscope.

Data Management and Analysis

The collected data from the field were stored in to a computer on a Microsoft excel spreadsheet and analyzed using SPSS version 20 software program. The prevalence was calculated as the number of animals having parasite, divided by the total number of animal examined. The association between the risk factors and the outcome variables was assessed using chi-square (χ^2) test. For all analysis, a P-value less than 0.05 were taken as significant.

Result

From a total of 400 faecal samples examined, 289 samples were positive for one or more eggs of the major intestinal nematodes of equines, indicating that the overall prevalence was 72.25% (Table 1). Three types of nematode eggs were identified during the study period, based on their morphology, as described by Soulsby [15]. The cumulative prevalence of Strongyle, *P. equorum* and *O. equi* in equine species was observed to be 63.25%, 16.5% and 4.25% respectively.

Prevalence of strongyles in horses, mules and donkeys was 63.72%, 51.85% and 79.31% respectively, and there was a significant differences ($p < 0.05$) between the species of equine with respect to susceptibility to the parasite. According to this study age and sex are not significantly associated with the occurrence of strongyle infection ($p > 0.05$) for both variables. Rate of infection with strongyles in poor, medium and average body condition scores of equine species was 86.90%, 61.15 and 37.50% respectively (Table 2) and there was a highly significant variation ($p = 0.001$) between body condition score and presence of the parasite egg in the faeces of equines.

The Prevalence of *P. equorum* in horses, mules and donkeys in the study area were found to be 17.98%, 12.96% and 6.89% respectively and there was no significant difference between species (Table 3). The difference in the prevalence of *P. equorum* between different age groups and sexes was not significant ($P > 0.05$). But the Prevalence of *Parascaris equorum* in different BCS of animals was found statistically significant ($P < 0.05$). This indicated that as the animal gets emaciated the immunity is not active enough to prevent the disease condition.

The prevalence of *Oxyuris equi* based on species, age, sex, and body condition score is indicated below in tables 4 and there was no significant variation ($p > 0.05$ for all variables) between the variables and occurrence of the disease.

Table 1: Overall prevalence of equine Intestinal nematodes in equine species basis.

Species of Animal	N	positive	% positive
Horse	317	234	73.81
Mule	54	32	59.25
Donkey	29	23	79.31
Over all	400	289	72.25

Table 2: Chi-square analysis of the association of different risk factors with Strongyle infection.

Risk factor		Number of animals	% positive	χ^2 -value	P-value
Species	Horse	317	63.72	6.26	0.04
	Mule	54	51.85		
	Donkey	29	79.31		
BCS	Poor	84	86.90	36.68	0.00
	Medium	260	61.15		
	Good	56	37.50		
Age	young	12	66.66	1.29	0.52
	Adult	388	61.25		
Sex	Male	241	61.41	0.88	0.23
	Female	159	66.03		

Discussion

Nematode parasites are serious health hazards of equines, contributing to poor body condition, reduced power output, poor reproductive performance, retarded growth and short lifespan of equines. This study showed that strongyle type nematodes were significantly higher than other detected nematodes. Accordingly it has revealed prevalence of strongyle species (63.25%) *Parascaris equorum* (16.5%) and *Oxyuris equi* (4.25%) infection in equines, which is relatively lower, as compared to some studies conducted at different geographical location, such as Belay (2011), who reported a prevalence of 100%, 39.77% and 22.88% respectively, in South and North Wollo zone. However it is in agreement with work done by Sinasi and Mustafa (2009) who reported prevalence of *P. equorum* (14.45%) and *O. equi* (4.82%) and Sotiraki, (1997) who reported the prevalence of strongyles 64%. The prevalence of strongyles was significantly higher ($P= 0.04$) than that of *P. equorum* and *O. Equi* and this may be due to the reason that strongyles are studied to genus level and contains many species occurring in equines.

Low infection rates of this study might be attributed to sensitivity of diagnostic technique or difference in agro ecological zones of the areas. This idea is supported by Chaudhry *et al.* [16], who presented the effect of diagnostic techniques and difference in the agro-ecological zones of the study area in the prevalence of nematode parasites of animals. Some other factors like management, climate and parasite control Program can also influence the prevalence of parasites of domestic animals. Use of broad spectrum anthelmintics like benzimidazoles and macrocyclic lactones has resulted in drastic reduction in worm populations of large strongyles

Table 3: Chi square analysis of the association of different risk factors with *Parascaris equorum* infection.

Risk factors		Sampled animals (No)	% positive	χ^2 -value	P-value
Species	Horse	317	17.98	2.93	0.23
	Mule	54	12.96		
	Donkey	29	6.89		
BCS	Poor	84	28.57	13.11	0.01
	Medium	260	14.61		
	Good	56	7.14		
Age	Young	12	16.66	1.65	0.43
	Adult	388	16.49		
Sex	Male	241	19.08	2.94	0.56
	Female	159	12.57		

Table 4: Chi square analysis of the association different risk factors with *Oxyuris equi* infection.

Risk factor		Sampled animals (No)	% positive	χ^2 -value	P-value
Species	Horse	317	5.04 1.85 0	2.54	0.28
	Mule	54			
	Donkey	29			
BCS	Poor	84	8.33 3.07 3.57	4.38	0.11
	Medium	260			
	Good	56			
Age	Young	12	0 4.25	0.54	0.76
	Adult	388			
Sex	Male	241	4.56 3.77	0.15	0.70
	Female	159			

[17,18]. One last possible cause of the lower prevalence of this study may be origin of the animals, because all the animals included in the study were from Jimma town, where relatively better awareness to animal diseases and better access to anthelmintics is present, unlike study of Belay, which is conducted on equines from different rural areas of Wollo zone. Higher infection rates are reported in animals examined by post mortem examination [19], and Studies based on necropsy findings have better chance to diagnose many latent infections that are missed at coprological examination [20,19].

The prevalence of strongyles was 63.72%, 51.85 % and 79.31% in horses, mules and donkeys respectively and there was a significant differences ($p<0.05$) between the species of equine with respect to susceptibility to the parasite. This result was in agreement with Saeed *et al.* [21], and Cirak and Gulegen [22], who reported 58.50% and 68% prevalence of strongyles in horses, in Lahore, and western Turkey respectively. According to this study there was no significant variation ($p>0.05$) between the two age groups (young and adult) in susceptibility to the parasite. This may be attributed to the less number of young animals included in the study. Prevalence of strongyle species among equines with poor, medium and good body condition scores was 86.90%, 61.15% and 37.50% respectively and the deference between body condition score and presence of the parasite egg in the faeces was highly significant ($p<0.001$). This significant association was evidenced from quantitative faecal egg analysis; animal with lower infection had relatively good body condition as Shiferaw [23].

The Prevalence of *P. equorum* in horses, mules and donkeys in the study area were found to be 17.98%, 12.96% and 6.89% respectively, and there was no significant difference between species. Similarly Shiferaw *et al.* [24], had reported 12.9%, 13.6% and 15.7% prevalence of *P. equorum* in horses, mules and donkeys of Wonchi, respectively. However, prevalence of the present study is lower, as compared to the study of Belay [25], who reported 36.02%, 28.3% and 43.8% in South and North Wollo zones, respectively. The lower finding of the present study might be due to the difference in the age of examined animals. Equines commonly develop marked resistance to *P. equorum* after six months of age [19].

The prevalence of *O. equi* was 5.04%, 1.85 % and 0% in horses, mules and donkeys respectively. This result is comparable with the result of Sotiraki [26], who reported the prevalence 4.1% and Sinasi and Mustafa [27], who reported 1.20%, in horses. The reason for the low rate of infection of *O. equi* might be a consequence of not using transparent tape for diagnosis purpose. *O. equi* eggs are rarely found on faecal examination of samples taken from the rectum but may be observed in materials from the perineum or in faecal materials taken from the ground [28]. There was no significant variation ($p> 0.05$) between the variables and occurrence of the disease.

Conclusions

The present study conducted on equines intestinal nematodes in Jimma town of Oromia regional state showed that intestinal nematodes are an important health problem in the area affecting the well-being and productivity of the

equines. However, the attention given to the disease so far has not been sufficient. Even though, equines are paramount important animals in farming system of the country, the existing livestock extension package program of the region and the country is saying nothing about the management and health aspect of equines.

Recommendations

Based on the above conclusion the following recommendations were forwarded:

- To get clear epidemiological picture of parasitic helminthes, comprehensive study should be launched in the area.
- Strategic treatment with appropriate, effective and broad spectrum anthelmintics should be practiced at the beginning and after the end of rainy seasons.
- The government should formulate an appropriate policy regarding equines' management and health aspects without delay, and this should be hold in the livestock extension package program.
- Additionally, the field veterinarians and stockowners should be aware of the importance and burden of helmenthosis in equines.

References

- Pearson RA, Nengomasha E, kreck RC (1999) The challenges of using donkeys for work in Africa, London 190-198. [Link: https://goo.gl/nXF4rw](https://goo.gl/nXF4rw) S
- Bowman's DD (2003) Parasitology for veterinarians. 8th ed. New York: Saunders 155-184. [Link: https://goo.gl/FCrjjh](https://goo.gl/FCrjjh)
- Fielding D (1991) The number and distribution of equines in the world, UK 62-66. [Link: https://goo.gl/krf6Dr](https://goo.gl/krf6Dr)
- Taylor MA, Coop RL, Waller RL (2007) Veterinary parasitology. 3rd ed. United Kingdom: Black well publishing. 272-286. [Link: https://goo.gl/HJ9sdw](https://goo.gl/HJ9sdw)
- Elisabeth D, Sevendesen MBE (1997) Professional donkey hand book, London: anleyroad. 61-67.
- Foreyt JW (2004) Veterinary parasitology reference manual, 1st ed. London: black well, 117-119.
- Pandey VS, Khallaayoune K, Ouhelli H, Dakask A (1994) Parasites of Donkeys in Africa. Proceedings of the second colloquium on working equines .Institute Agronomique Veterinaire Hassan II, Rabat, Morocco, 35-44. [Link: https://goo.gl/euCWMy](https://goo.gl/euCWMy)
- Radostitis OM, Blood OC, Gay CC (2007) A text book of the disease of cattle, sheep, goats, pigs and horse: Veterinary medicine 10th ed. UK: Baillere, Jindall, 1570-1584. [Link: https://goo.gl/z82JDL](https://goo.gl/z82JDL)
- Wintzer JH (1996) Equine diseases. 2nd ed. Verlap Paul. 141-145. [Link: https://goo.gl/P4P7X8](https://goo.gl/P4P7X8)
- Donald HB (2001) Equine parasitology: The control of gastrointestinal nematode h parasites in horses with Emphasis on Reducing Environmental Contamination. Mid America Agricultural Research, Verona, WI. 17-21.
- Smith BP (2009) Large animal internal medicine. 4th ed. USA: Elsevier. 1623 -1627. [Link: https://goo.gl/m4kYfw](https://goo.gl/m4kYfw)
- Zajac MA, Conboy AG (2006) Veterinary clinical parasitology. 7th ed. London: black well. W67-72. [Link: https://goo.gl/czEoFD](https://goo.gl/czEoFD)
- BoA (2015) Oromia regional state, Bureau of agriculture, Annual report, Jimma.
- William JF (2001) Veterinary parasitology: A reference manual. 5th ed. Blackwell. 214-222. [Link: https://goo.gl/CHCmTD](https://goo.gl/CHCmTD)
- Soulsby EJJ (1982) Helminths, Arthropods and Protozoa of Domesticated Animals: 7th ed. London: Baillere Tindall 239. [Link: https://goo.gl/U3KDem](https://goo.gl/U3KDem)
- Chaudhry, Sohail AHE, Iqbal Z (1991) Studies on the prevalence and taxonomy of the members of genus Strongylus and their effect on blood picture in equines in Faisalabad Pakistan: Pakistan Veterinary Journal 11: P179 – 181. [Link: https://goo.gl/AR9zqd](https://goo.gl/AR9zqd)
- Konigova, Varady AM, Corba J (2003) Comparison of in vitro methods and faecal egg count reduction test for the detection of benzimidazoles resistance in small strongyles of Horses. Veterinary Research Communications 27: 281-288. [Link: https://goo.gl/F75GEg](https://goo.gl/F75GEg)
- Love S (2003) Treatment and prevention of intestinal Parasite- associated disease. Veterinary Clinics of Equine. 19: 791-806.
- Boxell, Gibson, Hobbs RP, Thompson RCA (2004) Occurrence of gastrointestinal parasites in horses, in metropolitan Perth, Western Australia. Australian Veterinary journal 82: 91 – 95. [Link: https://goo.gl/tTAJoH](https://goo.gl/tTAJoH)
- Chapman, French MR DD, Klei TR (2002) Gastrointestinal Helminths of equines in Louisiana: a comparison of species currently prevalent with those present 20 years ago. Journal of Parasitology 88: 1130 - 1134. [Link: https://goo.gl/ohkdnX](https://goo.gl/ohkdnX)
- Saeed K, Qadir Z, Ashraf K, Ahmad N (2010) Role of intrinsic and extrinsic epidemiological factors of strongylosis in horses. The Journal of Animal & Plant Sciences 20: 2010: 277-280. [Link: https://goo.gl/AR9zqd](https://goo.gl/AR9zqd)
- Cirak VY, Gulegen E (2005) The prevalence of strongyle infections and persistent efficacy of pyrantel embonate, Ivermectin and Moxidectin in Turkish horses. Turkish Journal of Veterinary and Animal science 29: P29 175-181. [Link: https://goo.gl/dKb87T](https://goo.gl/dKb87T)
- Shiferaw Y, Alemayehu M, Smith GD, Terefe F, Shelima B, et al. (2011) Helminth parasites of donkey in Western and East shoa zones, central Ethiopia. Ethiopian Veterinary Journal P 4-9.
- Shiferaw Y, Gebreab F, Wesene A (2001) Survey on helmenthosis of equines in Wonchi. Journal of Ethiopian Veterinary Association 5.
- Belay M (2011) Preliminary study on helmenthosis of equines in south and north Wollo zones, Kombolcha regional veterinary laboratory, Kombolcha.
- Sotiraki ST, Badouvas AG, Himonas CAA (1997) Survey on the prevalence of internal parasites of equines in Macedonia and Thessalia-Greece. Journal of equine veterinary science 17: 550-552. [Link: https://goo.gl/xkYT6A](https://goo.gl/xkYT6A)
- Sinasi U, Mustafa A (2009) A survey on helminth infections of equines in the central black Sea region, Turkey: Turkish Journal of Veterinary and Animal science 33: 373-378. [Link: https://goo.gl/8prNur](https://goo.gl/8prNur)
- Urquhart MG, Armour J, Duncan LJ, Dunn ML, Jennings WF (1996) Veterinary parasitology. 4th ed. black well 3-137. [Link: https://goo.gl/qTWeaz](https://goo.gl/qTWeaz)