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ORIGINAL ARTICLE

Prevalence of the Stomach Helminths in Equines

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SUMMARY

To determine the prevalence of stomach helminths in equines between March 2004 and February 2005, 100 equines' stomach belonging to 53 horses, 41 donkeys and 6 mules were examined following slaughtering. The feces have been examined which were collected from Ankara Horse Riding Clubs and Serum Production and Test Animals' Ranch to search stomach helminths, only according to feces inspection and also with the feces which have been collected from the rectums of equines whose organ examinations were done. The stomachs of equines have been inspected according to helminth infections and at the 88.6% of the horses, at the 85.3% of the donkeys and at the 83.3% of mules at least one helminth infection has been detected. After the diagnosis of the helminths which have been gathered in the research, *Habronema muscae, Habronema majus* and *Trichostrongylus axei* species have been detected. At the horses 28.3% *T. axei*, 54% *H. muscae*, 50.9% *H. majus*, 71.6% immature Habronema sp. have been detected. In the prevalence of the infection it has not seen any age effect but in the females *T.axei* has been found more prevalent ($p<0.05$) than the males. At the donkeys 46% *T. axei*, 56% *H. muscae*, 43.9% *H. majus*, 65% immature Habronema sp. have been detected. At the mules 83% *T. axei*, 66.6% *H. muscae*, 83% *H. majus*, 83% immature Habronema sp. have been detected. Because the mule number was few the correlation between the results and the age and sex have been evaluated with donkeys. In the donkey-mule group there have not been any differences between the old and young ones according to statistical view. And also it came out that *H. muscae* and *H. majus* are more prevalent in males. The stomach helminths which we see so prevalent in the organ controls but not in feces examinations shows us that these infections at alive animals are so hard to detect with the routine flotation techniques.

Key Words *Equines, Stomach, Helminth, Habronema, Trichostrongylus axei*

Tek Tırnaklılarda Mide Helmintlerinin Yaygınlığı

ÖZET

Tek tırnaklılarda mide helmintlerinin yayılışını tespit etmek amacıyla Mart 2004 ile Şubat 2005 arasında yapılan bu çalışmada 53 at, 41 eşek ve 6 katıra ait toplam 100 tek tırnaklı midesinin kesim sonrası muayenesi yapılmıştır. Organ muayenesi yapılan tek tırnaklıların rektumlarından toplanmış dışkıları yanında, mide helmintlerinin dışkı bakıları ile araştırılması yönünde, Ankara Atlı Spor Kulübü (50 at) ve Serum Üretim ve Deney Hayvanları Çiftliği'nden alınan dışkılar (50 at) incelenmiştir. Tek tırnaklılara ait midelerin helmint enfeksiyonları bakımından incelenmesi yapılmış ve atların %88.6'sında, eşeklerin %85.3'ünde ve katırların %83.3'ünde en az bir helmint enfeksiyonuna rastlanmıştır. Araştırmada toplanan helmintlerin tür düzeyinde *Habronema muscae*, *Habronema majus* ve *Trichostrongylus axei* oldukları tespit edilmiştir. Atlarda *T. axei* %28.3; *H. muscae* %54, *H. majus* %50.9; immature Habronema'lar %71.6 yayılış göstermiştir. Enfeksiyon yayılışında yaşın etkisi görülmemiş ancak dişilerde *T. axei* erkeklere göre daha yaygın ($p<0.05$) bulunmuştur. Eşeklerde *T. axei* %46, *H. muscae* %56, *H. majus* %43.9; immature Habronema'lar %65 yayılış göstermiştir. Katırlarda *T. axei* %83; *H. muscae* %66.6, *H. majus* %83; immature Habronema'lar %83 yayılış göstermiştir. İncelenen katır sayısı az olduğu için sonuçların yaş ve cinsiyetle olan ilişkilerinin istatistiksel değerlendirmesinde eşeklerle birlikte gruplandırılmıştır. Eşek-katır grubunda genç ve yaşlılar arasında istatistiki açıdan bir fark bulunamamakla birlikte *H. muscae* ve *H. majus*'un erkeklerde daha yaygın olduğu ($p>0.05$) ortaya çıkmıştır. Nekropsilerde oldukça yaygın olduğunu gördüğümüz mide helmintlerine dışkı bakılarında rastlamamış olmamız, canlı hayvanlarda bu enfeksiyonların, rutin flotasyon teknikleri ile tanısının ne kadar güç olduğunun bir göstergesidir.

Anahtar Kelimeler *Tek Tırnaklı, Mide, Helmint, Habronema, Trichostrongylus axei*

INTRODUCTION

Habronemosis, Draschiosis and Trichostrongylosis are commonly observed in equidae throughout the world. However, the distribution of effective types and species shows dissimilarity between regions (Guralp 1981).

Mature Habronema superficially harbor under mucus layer in pylorus (Pandey and Cabaret 1993) of stomach and cause this layer to become excessively thick and sticky through stimulating the mucus secretion depending on

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their locations. Hyperplasia and hypertrophy are the most common histopathological changes in mucus secreting glands. In the presence of high number of nematodes, chronicle catarrhal gastritis develops (Lapage 1968; Guralp 1981; Klei 1986; Kassai 1999; Rommel *et al.* 2000; Bowman 2003).

Draschia larvae migrate until submucosa in stomach and lastly, typical eosinophilic granulomas transforming into solid fibromas develop against this parasite. Draschia exist in groups within these fibromas and they are linked to stomach cavity by means of fistula. Close location of these nodules to pyloric exit increases their pathogenic effects (Lapage 1962, 1968; Guralp 1981; Klei 1986; Kassai 1999; Rommel *et al.* 2000; Bowman 2003).

Trichostrongylus axei generally settle fundus area in stomach (Pandey and Cabaret, 1993). In severe infections, parasites cause hyperemia, local lymphocytic catarrhal inflammation, erosion and ulcer. In chronicle cases, hyperplasia and mucus increase in stomach glands; furthermore, white plates and necrosis areas of 1.5 cm diameter occur (Levine 1968; Owen and Slocombe 1985; Klei 1986; Kassai 1999; Rommel *et al.* 2000; Bowman 2003).

Diagnosis of Habronematidosis through stool analysis is quite difficult even in severe infections because these parasites hardly lay eggs. The diagnosis of Trichostrongylosis through stool analysis can only be made with stool culture because their eggs have the typical properties of Strongylidae eggs (Guralp 1981; Klei 1986; Kassai 1999; Rommel *et al.* 2000).

MATERIALS and METHODS

This study was carried out to determine the species and distribution of helminths locating in stomach of equidae between April 2004 and April 2005. The study was performed based on necropsy considering the characteristics of possible helminths, and the scope of the study was expanded to certain extent with secondary stool inspection. The necropsy material used in the study mostly consisted of horse, donkey and mule collected from public and slaughtered for the purpose of nutrition of carnivore animals in Ankara Zoo; in addition, the same kind of samples collected from a horse subject to necropsy in Pathology Department of Veterinary Faculty of Ankara University were also included in the study. For the investigation of stomach helminths that can be detected with stool inspection, the stool samples collected from the horses in Serum Production and Experiment Animals Farm in Hygiene Institute Ministry of Healthy and Ankara Riding Center were evaluated.

For material procurement, a total of 99 equidae including 52 horses, 41 donkeys and 6 mules collected from different parts of Turkey for 1 year and brought to Ankara Zoo as well as 1 hose subject to necropsy in Pathology Department of Veterinary Faculty of Ankara University were investigated for stool taken from 100 stomachs and rectums, animal species, age, and gender.

Ages of equidae were determined by dentition and animals aged 0-7 years were considered “young”, while 8 and higher ages were taken as “old”, and thus two main age groups were determined. Accordingly, 22 out of 53 horses were young, 31 were old, 17 out of 41 donkeys were young, 24 were old, 2 out of 6 mules were young, and 4 were old. In addition, 26 out of 53 horses were female, 27 horses were male, 20 of 41 donkeys were female, 21 donkeys were male, 4 out of 6 mules were female, and 2 were male; furthermore, it was aimed to determine differences in stomach helminth infections by age and gender. Stomachs removed by placing a ligature in cardia and pylorus to prevent stomach contents to enter in esophagus and small intestine were taken to Helminthology Department Laboratory of Veterinary Faculty of Ankara University in a short time.

Laboratory Studies

Stomachs taken to laboratory were opened and sifted through a system bearing sieves of 1250 µm pores in upper part and 60 µm pores in lower part. The contents left on sieve were taken in beaker containing 10% formaldehyde and kept at +4 °C. Stomach mucosa were scraped with a scalpel and collected in beaker, and because the mucus layer inhibits the observation and collection of parasites, the stool was investigated after mucus layer was diluted with the addition of 2% of sodium bicarbonate and kept at least for one night (Guralp 1981).

In the presence of parasite infection, the relevant samples of stomach wall were sent to Pathology Department of Veterinary Faculty of Ankara University for macroscopic and microscopic analyses.

Collection and Analysis of Parasites

Stomach contents collected and washed in beaker were investigated on a black ground under a light source, and the observed parasites were transferred in warm physiological salt water (PSW) by means of a needle. All the contents were examined and sampling was made only in the presence of high number of parasites. A certain amount was separated from the homogenized content concerning the density of infection in the sampling method (e.g. 1/5, 1/8 or 1/10) and this amount was gradually diluted and all the parasites were collected under stereo microscope. Afterwards, the number of total parasites was determined by proportioning the investigated amount to total content amount.

The collected parasites were determined by 70% alcohol at boiling temperature. Subsequently, parasites were transferred to private conservation solution (92% of 70% alcohol, 5% of glycerin and 3% of 10% formaldehyde), and stored until species determination (Becklund and Walker 1971).

During the process of species determination, parasites were made transparent and taken into lactophenol (2% of glycerin, 1% of phenol, 1% of lactic acid, 1% of distilled water) (Thienpoint *et al.* 1986), and thus species determination was made by using relevant literature by investigating 10 samples from females and males of each species (Oytun 1949; Lapage 1962; Soulsby 1965; Lapage 1968; Levine 1968; Lichtenfels 1975; Guralp 1981; Soulsby 1986).

Stool Inspection

Stool samples were collected from rectums of equidae examined for organs and controlled with flotation method of Fülleborn (Thienpoint *et al.* 1986), and the results of necropsy and stool inspection were compared.

Stool samples were collected from a total of 100 horses, 50 from Ankara Riding Center and 50 from Serum Production and Experiment Animals Farm for the analysis of stomach helminths. Stool samples were controlled for Habronema and Draschia eggs with flotation method of Fülleborn and the presence of *T. Axei* larvae was investigated by culturing stool samples.

Statistical Analysis

The differences between species, age and gender groups of

the detected parasites were statistically examined with Qui-Square test (SPSS 10.0 packet software).

Fig 1. Front end of *Habronema muscae* (x 630). A: One of two lateral lips separated in three parts B: Oral cavity.

Fig 2. Male back end of *Habronema muscae* (x157). A: Right Spiculum. B: Left Spiculum. C: Cuticular Papilla or relievos.

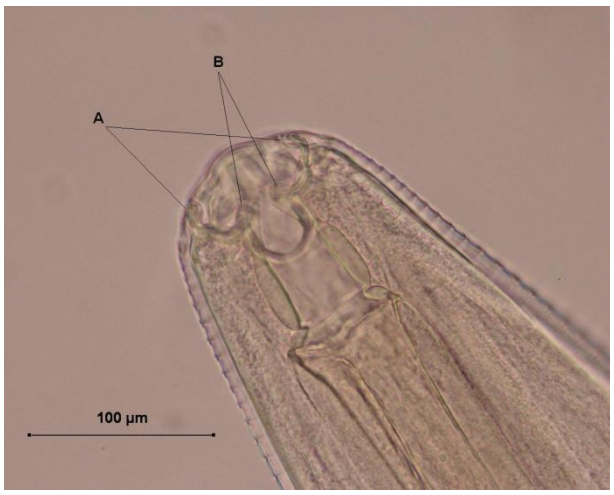

Fig 3. Front end of *Habronema majus* (x 630). A: Lips. B: Teeth.

RESULTS

Habronema muscae, *Habronema majus* and *Trichostrongylus axei* species were detected in the inspection of the collected helminthes (Fig 1-6).

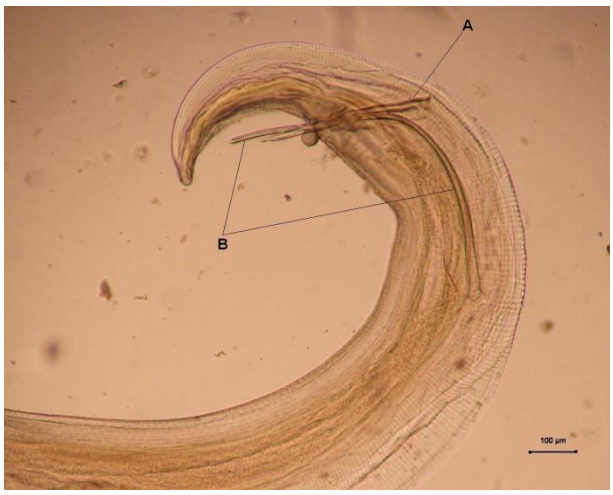

Fig 4. Male back end of *Habronema majus* (x 157). A: Right spiculum. B: left spiculum.

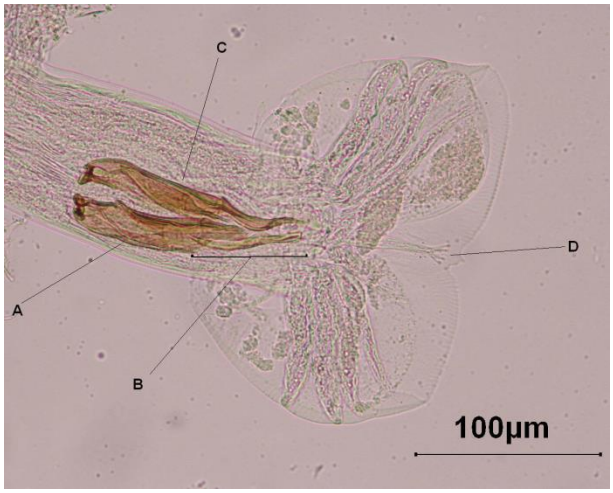

Fig 5. *Trichostrongylus axei*, male bursa copulatrix structure (x 630). A: Right Spiculum. B: Gubernaculum. C: Left spiculum. D: Dorsal rib.

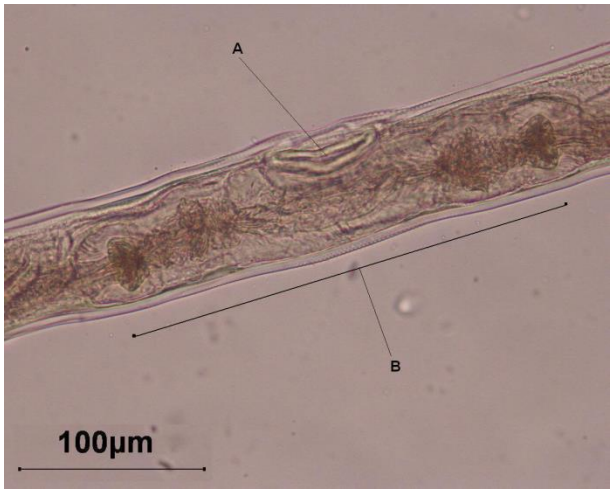

Fig 6. *Trichostrongylus axei* female (x 630). A: Vulva, B: Ovajector.

In the whole investigation of equidae, *T. Axei* was recorded in 39% of samples, *H. muscae* in 56%, *H. majus* in 50%, and immature Habronema infection in 70%. At least one helminth infection was detected in 88.6% of horses, 85.3% of donkeys and 83.3% of mules. Of the detected helminths species, *T. axei* was detected in 28.3% of horses, 46.3% of donkeys, 83.3% of mules, while *H. muscae* was seen in 54.7% of horses, 56% of donkeys, and 66.6% of mules, and *H. majus* was observed in 50.9% of horses, 43.9% of donkeys and 83.3% of mules. Furthermore, immature Habronemas was determined in 71.6% of horses, 65.8% of donkeys and 83.3% of mules (Fig 7).

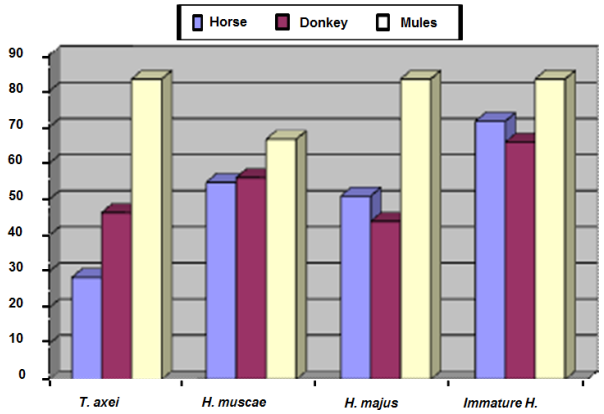

Fig 7. General stomach helminth infection in horses, donkeys and mules

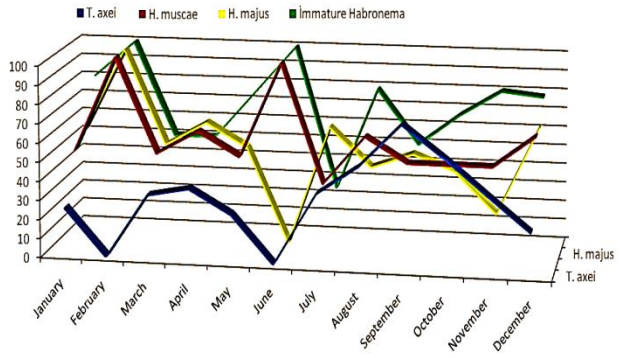

Fig 8. The monthly distribution of stomach helminths in horses, donkeys and mules

Considering the relation between parasites and age in animal groups, *T. axe*, *H. musca*, *H. majus and* immature Habronema were detected in 18.1%, 45.4%, 50% and 68.1% of young horses, respectively, while these rates increased to 35%, 61.2%, 51.6% and 70.9%, respectively. Different from other helminths, *T. axei* was reduced in donkeys, and the infection rate decreased from 47% to 45%. *H. muscae, H. majus* and immature Habronema were determined 52.9%, 41.1%, and 52% of young donekys, while these rates increased to 75%, 45.8% and 58.3% of old donkeys. On the other hand, *T. axei*, *H. muscae*, *H. majus* and immature Habronema were found in 100% of young mules, while these rates were reduced to 75%, 50%, 75% and 75% of old mules.

During one year of study period, the mean distributions of the equidae species slaughtered in Ankara Zoo by months and the stomach helminths found in these species are given in Table 1 and Fig 8. Due to the unevenness of the slaughter numbers, the slaughter number was reduced even to 1 in some months (June). When the parasite curves in Table 1 are investigated excluding June, Habronema is detected at 20%-100% rates nearly every month, while *T. axei* fluctuated between 0% and 75%.

Table 1. The monthly numeric distributions and infection rates of the slaughtered animal

		Helminth Species in slaughtered animals (%)			
Months	n	*T. axei*	*H. muscae*	*H. majus*	Immature Habronema
January	16	4 (25)	8 (50)	9 (56.2)	13 (81.2)
February	3	0(0)	3 (100)	3 (100)	3 (100)
March	6	2 (33.3)	3 (50)	3 (50)	3 (50)
April	8	3 (37.5)	5 (62.5)	5 (62.5)	4 (50)
May	4	1 (25)	2 (50)	2 (50)	3 (75)
June	1	0 (0)	1 (100)	0 (0)	1 (100)
July	8	3 (37.5)	3 (37.5)	5 (62.5)	2 (25)
August	19	10 (52.6)	12 (63.1)	8 (42.1)	15 (78.9)
September	4	3 (75)	2 (50)	2 (50)	2 (50)
October	12	7 (58.3)	6 (50)	5 (41.6)	8 (66.6)
November	10	4 (40)	5 (50)	2 (20)	8 (80)
December	9	2 (22.2)	6 (66.6)	6 (66.6)	7 (77.7)

n: Number of total slaughtered animals

DISCUSSION and CONCLUSION

H. muscae, *H. majus* and *D. megastoma* of Spiruridae family are commonly seen parasites in stomachs of equidae species throughout the world.

In the studies performed in different parts of world, *H. muscae* was reported in 1.1-95.8% of horses (Foster and Pedro Ortiz 1937; Pandey *et al.* 1981; Lyons *et al.* 1983, 1984; Reinemeyer *et al.* 1984; İslam 1986; Tolliver *et al.* 1987; Krecek *et al.* 1989; Antiporda and Eduardo 1993; Bucknell *et al.* 1995; Höglund *et al.* 1997) and 65-90% of donkeys (Ahmed 1984; Vercruysse *et al.* 1986; Pandey *et al.* 1993). In the first study (Alibasoglu and Yalciner 1965) implemented on this parasite in Turkey, the infection rate was recorded as 0.8% (*Habronema spp*), and it changed between 40% - 100% in the studies performed in the later years (Tinar *et al.* 1994; Burgu *et al.* 1995a; Gonenc 1997). In the present study, *H. muscae* was detected in 54% of horses, 56% of donkeys and 66.6% of mules. This indicates that the distribution of the parasite among equidae species in Turkey is quite serious.

H. majus, another helminth of Spiruridae family parasiting in equidae species, generally exists at the same time with *H. muscae*; however, their infections rates are not similar at all times. In the studies implemented in different parts of world, this parasite was detected in 2-85,4% of horses (Foster and Ortiz 1937; Pandey *et al.* 1981; Lyons *et al.* 1983, 1984; Tolliver *et al.* 1987; Reinemeyer *et al.* 1984; İslam 1986; Krecek *et al.* 1989; Antiporda and Eduardo 1990; Bucknell *et al.* 1995) and 85,4-93% of donkeys (Vercruysse *et al.* 1986; Pandey *et al.* 1993). In a study performed in Ankara vicinity, *H. majus* was detected in 80% of horses (Burgu *et al.* 1995a), while other studies in Turkey reports its presence in species level (Alibasoglu ve Yalciner 1965; Maskar 1983). There is only a limited number of studies regarding its distribution among donkeys. Maskar (1983) detected Habronema species in 1 of 5 donkeys in his study, while Burgu et al. (1995b) and Gonenc (1997) encountered this parasite in 90% and 52%

of donkeys in their studies, respectively. There is no clear data about the distribution of this parasite among mules in the world, and only Maskar (1983) reported to detect Habronema spp. in 1 out of 34 mules in his postmortem investigation. In the present study, *H. majus* was detected in 50.9% of horses, 43.9% of donkeys and 83% of mules.

The incidence of *H. majus* is quite high, but less frequent compared to *H. muscae* both in Turkey and World.

Studies implemented in different parts of the world reported *Draschia megastoma* in 3-66 % of horses (Foster and Pedro Ortiz 1937; Lyons *et al.* 1984; 1987; Reinemeyer *et al.* 1984; İslam 1986; Tolliver *et al.* 1987; Krecek *et al.* 1989; Antiporda and Eduardo 1990; Bucknell *et al.* 1995) and 0.69-47% of donkeys (Ahmed 1984; Vercruysse *et al.* 1986; Pandey *et al.* 1993). In Turkey, Maskar (1983) stated that *D. megastoma* was observed in 9.6%of horses and 5.8% of mules, but it was not recorded in donkeys. In the same study, Maskar reported a gastritis case caused by *D. megastoma* and *H. majus* in the stomach of a riding horse referring to Ali Sadi Uysalef and Cevat Şahin. Okursoy et al. (1998) detected *D. megastoma* in one of 12 horses subject to necropsy in Bursa vicinity. Other studies not record *D. megastoma* in any groups of equidae. In the present study, this parasite was not observed in any of the examined horses, donkeys and mules.

Considering the distribution of *T. axei* in the world, which is the only stomach helminth in equidae species other than Spiruridae family, it was detected in 3-80,9% of horses in different regions (Pandey *et al.* 1981; Lyons *et al.* 1983; 1987; Reinemeyer *et al.* 1984; Tolliver *et al.* 1987; Krecek *et al.* 1989; Bucknell *et al.* 1995), while this parasite was not determined in the studies implemented in Panama Canal, Australia, Zambia, Philippines and Sweden (Foster and Pedro Ortiz 1937; Mfitilzode and Hutchinson 1989; İslam 1986; Antiporda and Eduardo 1993; Höglund *et al.* 1997). *T. axei* was detected in 93.8% of donkeys in in Morocco (Pandey *et al.* 1993). Parasite was not determined in the studies performed in Egypt, Northwest Africa, South Africa and Chad (Graber 1970; Ahmed 1984; Vercruysse *et al.* 1986; Matthee *et al.* 2000). In the studies implemented in Turkey, Oytun (1945) reported the presence of *T.axei* without any rate, while Merdivenci (1970) reported its existence in horses in Sakarya as well as horses and donkeys in Kırıkkale without indicating its distribution rates. In addition, in the studies performed in Ankara vicinity, Burgu et al. (1995a,b) reported to detect *T. axei* in 40% of horses and 50% of donkeys, while Gonenc (1997) detected this parasite in 28% of donkeys. In the present study, *T.axei* was determined in 28.3% of horses, 46.3% of donkeys and 83.3% of mules.

Some studies reported that the age was not effective on infections caused by stomach helminths (Lyons *et al.* 1983; Dunsmore and Lindsay 1985; Mfitilzode and Hutchinson 1989) on the other hand, Bucknell et al. (1995) indicated that immature Habronemas was more prevalent among horses aged less than two years, while *T. axei* was more common among horses aged over 2 years; in addition, Gonenc (1997) stated that *H. muscae* and *T. axei* were more prevalent among donkeys aged over 3 years, and *H. majus* was approximately the same. In the present study, infection rate and mean numbers of helminths per animal concerning horses and donkeys among equidae species were reported to be higher in old animals than young animals, but these differences were statistically not significant (except for *T. axei* infection) ($p>0.05$).

The gender was seen ineffective in the distribution of stomach helminths (Lyons *et al.* 1983; Mfitilzode and Hutchinson 1989; Bucknell *et al.* 1995), but Gonenc (1997) reported that *H. muscae* was more prevalent among females and *T. axei* was more common among males. In the present study, all species of helminths observed in all equidae species were found more prevalent among males (except for *T. axei* in horses). *T. axei* was more common among females in horses ($p<0.05$), while *H. muscae* ($p<0.01$) and *H. majus* ($p<0.05$) were more prevalent among males in donkey and mules.

In the studies lasting one and more years, generally the relation between infections and seasons was investigated. Of these studies performed in different parts of world, some studies reported Habronema infections were found maximum in June, July (Lyons *et al.* 1983; Pandey and Eysker 1988) and autumn (Bucknell *et al.* 1995), while some other studies (Dunsmore and Lindsay 1985) reported that these infections were seen in every month of the year.

Of the limited studies performed in Turkey, only Gonenc (1997) interpreted the infections found in donkeys from seasonal aspects. The researcher reported no seasonal effect on these infections, but the mature Habronema species were seen in every month, while *H.* muscae was found maximum in April and June and *H. majus* was highest in May.

Considering the overall equidae groups in this one-year study, no statistical evaluation was made because the number of slaughtered animals decreased to 4, 3 and even 1 in some months. The investigation of slaughter numbers and infection rates by months revealed that mature and immature Habronemas were always seen except for June and especially matures *H. muscae* and *H.majus* shows similarity in general. The curve of Immature Habronemas followed near 100% and never decreased to zero. This could attributed to the high vector population due to huge amounts of excrement formed in the slaughtering area and the presence of a stream in the near vicinity because animals were sometimes waited in slaughtering region for months after they were brought from their areas.

The seasonal activity of *T. axei*, another stomach helminth, was found similar in rainy months in the studies performed in Turkey and world (Pandey and Eysker 1988; Bucknell *et al.* 1995; Gonenc 1997). The infection rate was determined to increase in rainy weather, and decrease in dry weather. In the present study, (excluding the June when only one animal was slaughtered) the infection rate was reduced to 0 level but started to increase in March and April, followed a certain level until August, and started to increase again after August and reached its highest level in September (75%). Following this point, it gradually decreased and reached to 0 in February. The seasonal course observed in the present study supported the finding that the trend increased in rainy weather.

As far as known, no comparison was made among equidae groups in terms of stomach helminths in the studies performed in Turkey and world. In the present study, sample materials were collected from three animal groups, and the detailed results are given in findings section. However, statistical comparison of helminths infections among groups was not possible as the number of mules was only 6. Therefore, donkeys and mules were investigated together against horses, and the results indicated that *T. axei* infection was more prevalent in donkeys-mules group than horses ($p<0.05$) and donkeys-mules group was 2.75 times more prone to infection risk than horses (Odd=2.75). Different percentages were determined for other stomach helminths in these two

animal groups, but the differences were statistically insignificant (p>0.05).

For the diagnosis of Habronemosis with stool inspection, stools collected from Ankara Riding Center and Serum Production and Experiment Animals Farm as well as the stools of animals subject to organ examination were investigated, and accordingly no egg was detected in stools even of those animals which were known to have Habronema species in the stomach. In the previous studies performed in Turkey with stool inspection (Sevim 1968; Gulbahce 1990; Oge 1992; Ozer ve Kuçukerden 1992; Demir *et al.* 1993) and the comparative studies of necropsy and stool inspection (Gonenc 1997), no egg of Habronema or Draschia was detected.

There is only limited number of studies that establish the presence of *T. axei* in equidae species only by stool inspection (Poynter 1954, 1969; Herd ve ark. 1981; Heil 1983). In the studies performed in Turkey (Gulbahce 1990; Oge 1992), *T. axei* larva was not detected in cultures of stool samples. In the present study, individual cultures of stools collected from Ankara Riding Center and Serum Production and Experiment Animals Farm were made to examine the presence of *T. axei* with stool inspection and accordingly, *T. axei* larva was not detected in any stool sample. The length of *T. axei* parasiting in ruminant abomasum other than equidae stomach was reported as 3-7 mm in classical references (Oytun 1949; Soulsby 1965; Lapage 1968; Levine 1968; Guralp 1981), but it did not exceed 4.32 mm in the present study and the study of Gonenc (1997). This parasite that can reach 7 mm remained at 4 mm, which indicated that equidae species might not be a very suitable host for *T. axei.* It was considered that the negative effect or effects that reduce the parasite length by half could be reflected upon production capability and thus complicate the detection of *T. axei* larvae. In the present study, these larvae were not determined even in the stool samples collected from Serum Production and Experiment Animals Farm where the horses are mainly grazed in meadow and collectively grown, which supported this idea.

Stomach helminths in Equidae species are reported to demonstrate different distribution patterns among geographic regions, Equidae species, studies and the years of studies, and in the present study, *H. muscae, H. majus* and *T. axei* species were found to account for 39 – 56% of epidemics and infections in Turkey according the stomach inspections.

D. megastoma, recorded as the most pathogen species, was not detected in the study. Eggs and larvae of stomach helminths widely observed after slaughter were not detected in routine stool inspections, which supported the literature in that it is not possible to diagnose these infections in living creatures except for very special conditions.

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