

## Prevalence and Risk Factors of Gastrointestinal Nematode Parasites of Horse and Donkeys in Hawassa Town, Ethiopia

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### Abstract

A cross sectional study was conducted on 384 horse and donkey in Hawassa town to determine the prevalence of gastro intestinal Nematode parasite and to identify infection association with species, sex, age and body condition of horse and donkey. Horse and donkey were examined for the presence of Nematode parasite. Floatation and McMaster Techniques were employed on feces to identify parasite eggs. Overall prevalence of horse and donkey was 72.7% (279/384) for gastro intestinal nematode parasite with the prevalence of 63.7% and 78.5 % in horses and donkeys respectively. The prevalence recorded for Strongyle parasite was 76% and 64.9% and for *Parascaris equorum* 26.2% and 4.6% in donkeys and horses respectively. Nematode parasite prevalence was influenced by species and age risk factors ( $p < 0.05$ ) whereas sex and body condition were not ( $p > 0.05$ ). The mean egg count indicated the existence of significant difference in the mean of egg count with different risk factors; detected high in donkeys, females, less than four years age group and poor body condition score ( $p < 0.05$ ). In conclusion, this study revealed that the occurrence of gastro intestinal nematode parasite in horse and donkey in Hawassa town is a common phenomenon. As a result, awareness to animal owners and proper deworming and prevention mechanisms should be implemented to reduce the economic burden of the disease in the country.

**Keywords:** Hawassa; Floatation; McMaster; Nematode; Prevalence

### Introduction

Despite their invaluable contributions, equines in Ethiopia are the most neglected animals, accorded low social status. Studies to elucidate the magnitude of equines health problem are lacking. Such information would be useful for designing strategies that would help improve equine health and welfare [1]. Equids are hosts to a great number of gastrointestinal parasite species, of which nematodes of the family *Strongylidae*, commonly called Strongyle nematodes or Strongyles, are the most important. These parasites are ubiquitous and live as adults in the large intestine of equids. Strongyle nematodes of equids (horse, donkey and zebra) are classified into the subfamilies *Strongylinae* and *Cyathostominae*, sometimes categorized as large and small Strongyles respectively. Among the helminthes, large Strongyles are most devastating parasites of equines [2]. This study was conducted to know the current prevalence of gastrointestinal nematode infection of horse and donkey in Hawassa town and its associated risk factors.

### Material and Methods

#### Study area

The study was conducted in Southern Nation's Nationalities and People's Regional state (SNNPRs) in Sidama zone, Hawassa town. The town is located in the Great Rift Valley, 270Km south of Addis Ababa. The population of donkey (*Equus asinus*), mule (*Equus hemionius*) and horse (*Equus caballis*) in Hawassa town is 13961, 369 and 5161 respectively [3].

#### Study type and study animal

A cross-sectional study was conducted on 233 donkeys and 151 horses. The study animals included systematically selected donkeys and horses of all age group which owned by the individual farmers for the purpose of cart pulling to generate income. The study animals were kept under extensive management system and they were not treated with anthelmintic during the study period.

### Sampling strategy

The sampling method employed to select the study animals was systematic random sampling where a sample of randomly selected donkeys and horses were sampled from market places, cart stations and construction sites. Sample size was determined by taking the expected prevalence of 50% and absolute precision of 5% with 95% confidence level were used and the total sample size was estimated at 384 [4].

### Study methodology

Fecal sample was collected directly from the rectum with strict sanitation and placed in air and water tight sample vials, and then transported to Hawassa University Parasitology laboratory. Information about the age, sex, species and body condition was recorded. The age of selected equine was determined by dentition [5] and body condition scores were estimated based on the guides published [6]. Fecal examination was carried out by floatation techniques. Quantitative fecal examination was performed by using McMaster technique [7] to determine the number of egg per gram of feces (EPG) and performed according to the procedure described by Urquhart et al., 1996. Level of infection was extrapolated from infection severity index [8] where horses are said to have mild, moderate and sever Nematode infestation if their fecal egg counts are less than 500, 500-1000 and more than 1000, respectively.

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## Data management and analysis

The data collected from the study area were entered in to Microsoft Excel spread sheet and the data were coded appropriately and analyzed using SPSS version 16 statistical software. Chi-square tests were applied to test the statistical association exists among the risk factor such as species, sex, age and body condition scoring with the presence of the infection.

## Results

### The overall prevalence of GIT nematode of donkey and horses

During the study period 384 fecal samples taken from 151 horses and 233 donkeys were thoroughly examined for the presence of different gastrointestinal nematode. From the examined animals, 96 horses and 183 donkeys were positive for different GIT nematode. 89(58.9%) of horses and 126 (54.1%) donkeys were infected with a single parasite, on the other hand 7(4.6%) horses and 57(24.5) donkeys were harbored two types of parasites. The overall prevalence of GIT nematode in horses and donkey in the study area was found to be 72.7% (Table 1) (Figure 1).

### Relative proportion of parasite

The highest relative percentage was recorded for Strongyles (75.26%, 210/279), followed by *Parascaris equorum* and Strongyle (22.58%, 63/279) and *Parascaris equorum* (2.15%, 6/279) (Table 2).

### The proportion of parasite with risk factors

The parasites encountered in the study area both in donkeys and horses were Strongyle and *Parascaris equorum* with overall prevalence of (76%, 64.9%) and (26.2%, 4.6%) in donkeys and horses respectively. The highest prevalence of Strongyle and *Parascaris equorum* was observed in donkeys, females, young and poor body condition score (Table 3).

### Analysis of risk Factors

Chi-square analysis of different risk factors showed that sex and body condition score was not significantly associated with the risk of infection with GIT nematodes ( $p>0.05$ ) whereas Species ( $X^2=10.33$ ,  $P=0.001$ ) and age ( $X^2=6.88$ ,  $P=0.043$ ) of the animal was associated with GIT nematode infection (Table 4).

### Result of quantitative fecal examination

The McMaster technique applied to determine the number of GIT nematode parasites egg per gram of feces (EPG) revealed minimum and maximum EPG value of 100-8100 and 100-3200 in donkeys and horses respectively. There was a high significant association between species, sex, age and body condition score with EPG of GIT nematodes in that highest EPG count was detected in donkeys, females, in age group less than four years and in poor body condition score (Table 5).

**Intensity of infection in donkey and horse:** Based on the result of EPG counts in the study area 53.6% donkeys were severely infected, 15.88% moderately, and 8.58% mildly whereas 11.2% horses were infected severely, 19.2% moderately and 32.4% mildly (Figure 2).

## Discussion

The coprological examination done for this study using floatation method revealed an overall gastrointestinal nematode parasite prevalence of 72.7% (78.5% in donkeys and 63.7% in horses). This finding is higher than work [9] reported with prevalence of 29.79%;

15.7% of horse and 37.48% of donkeys in South Darfur state. The current prevalence of gastrointestinal nematode infection of donkeys (78.54%) is higher than the work [10] reported with overall prevalence of 33% of *Parascaris* and Strongyle in donkeys in Central Shewa, Ethiopia and this is in agreement with previous study done [11] in Sudan. Horse harbor 63.6% of gastrointestinal nematode this is higher than the study reported [12] with overall prevalence of 52% of gastrointestinal nematode in horses in Kombolcha. This difference might be due to the difference in the study area or due to nutritional status of the animal in the respective study area which can influence the level of immunity to be infected by the parasite. Additionally it could be affected by deworming strategy equines and accessibility to veterinary clinic.

High level of prevalence (78.5%) was observed in donkeys compared to horses (63.6%). This is in agreement with previous reports [13-15]. This could be due to the relatively less attention given to these animals. Different prevalence was observed between female (78.6%) and male (71.9%), but there was no statistically significant difference ( $\chi^2=0.83$ ,  $P>0.05$ ). Age was also considered as a risk factor and higher prevalence (82.3%) observed in animals of below four years old while the lowest prevalence (66.9%) observed in greater than ten years old and the difference between the prevalence among the different age groups was statistically significant ( $\chi^2=6.8$ ,  $P<0.05$ ) this is in harmony with Regassa and Yimer [14], Sheferaw and Alemu [15]. Statistically there is no significance association with body condition and infection of GIT nematodes this is in agreement with Mezgebu et al. [13].

Strongyle type egg is highly prevalent in both species (76% in donkeys and 64.9% in horses) compared to *Parascaris* this agrees with study reported [16] predomination of Strongyle-type eggs with a prevalence of 50% in horse and 57.14% in donkey. 58.5% Strongyle type egg as predominant one also reported [17]. 66.67% of Strongyle type egg also reported [13].

Species of animal	Number of animal examined	Number of positive animal (%)
Horse	151	96 (63.7)
Donkey	233	183 (78.54)
Total	384	279 (72.7)

Table 1: The prevalence of gastrointestinal nematode parasites in donkeys and horse.

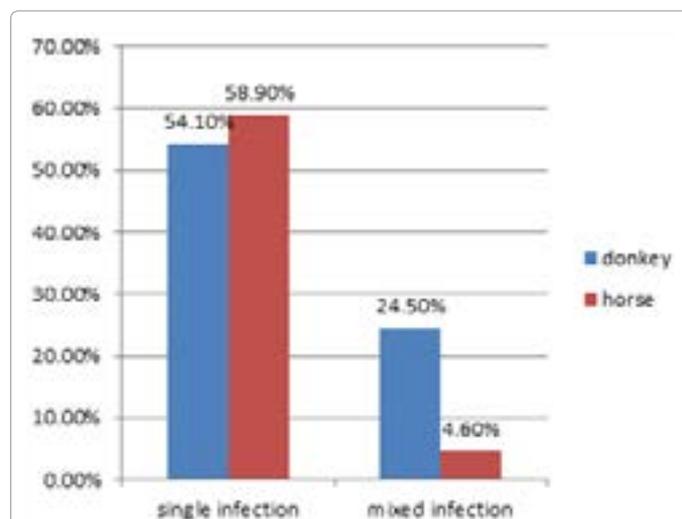


Figure 1: Prevalence of single and mixed infection with nematode parasites of donkey and horse.

Parasite encountered	Number of positive	Relative percentage
Strongyle	210	75.26%
<i>Parascaris equorum</i>	6	2.15%
Strongyle and <i>Parascaris equorum</i>	63	22.58%
Total	279	

**Table 2:** The relative proportion of gastrointestinal nematode parasite of donkey and horse.

Risk factor	No. Examined	Strongyles		<i>Parascaris equorum</i>	
		No. positive (%)	χ <sup>2</sup> (P-value)	No. positive (%)	χ <sup>2</sup> (P-value)
<b>Species</b>					
Donkey	233	177(76)		61(26.2)	
Horse	151	98(64.9)	5.5(0.019)	7(4.6)	29.18(0.000)
<b>Sex</b>					
Female	42	34(81)		5(11.9)	
Male	342	241(70.5)	2.023(0.155)	63(18.4)	1.09 (0.296)
<b>Age</b>					
<4 years	79	61(77.2)		29(36.9)	
4-10 years	172	124(72.1)		33(19.2)	
>10 year	133	90(67.7)	0.62(0.969)	6(4.5)	35.7(0.000)
<b>BCS</b>					
Poor	80	58(72.5)		20(25)	
Medium	222	159(71.6)		42(18.9)	
Good	82	58(70.7)	0.62(0.969)	6(7.3)	9.21(0.003)

**Table 3:** The prevalence of GIT nematode parasite with respective categories of the risk factors in the study area.

Risk factors	No. of animal Examined	No. of animals Positive	Prevalence (%)	χ <sup>2</sup> (p-value)
<b>Species</b>				
Horse	151	96	63.7	10.33(0.001)
Donkey	233	183	78.54	
<b>Sex</b>				
Female	42	33	78.6	0.83(0.362)
Male	342	246	71.9	
<b>Age</b>				
<4 years	79	65	82.3	6.88(0.043)
4-10 years	172	125	72.7	
>10 years	133	89	66.9	
<b>BCS</b>				
Poor	80	60	75	
Medium	222	162	73	0.64(0.726)
Good	82	57	69.5	
<b>Total</b>	384	279	72.7	

**Table 4:** Chi-square analysis of different risk factors for GIT nematode infection.

The percentage prevalence of Strongyle species was higher in donkeys, females, in young age and poor body condition but statistical significance was observed only on the species of animal whereas the occurrence of *Parascaris equorum* was statistically associated with species, age and body condition score. The prevalence of *Parascaris* was 4.6% in horses. This result is lower than the prevalence reported in Ethiopia [18] with prevalence of 11.7% and it is in close agreement with reported prevalence of 6.5% [12].

Statistically significant variations in mean eggs per gram of feces were observed in all the considered risk factors ( $P < 0.05$ ), in the current study higher level of mean egg count was observed in female animals compared to male. The result agrees with previous work [19]. This difference in the mean egg count between female and male animals

could be due to the fact that resistance to infection is decreased at the time of parturition and during early lactation. This periparturient relaxation of resistance results in the females [2].

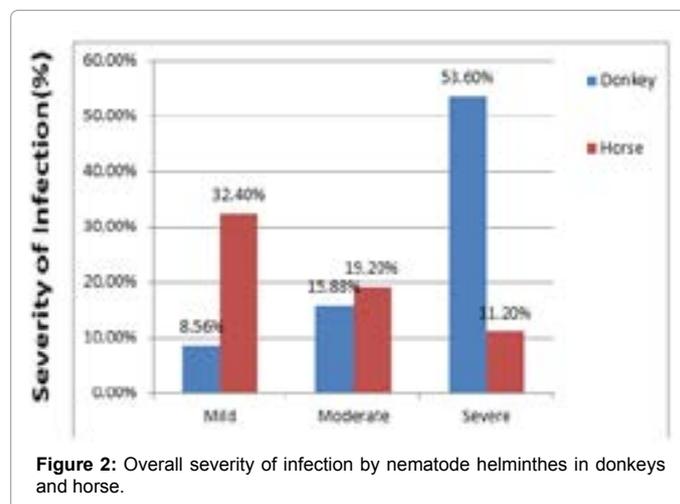
With regard to age, generally the highest egg count was observed in animals of less than four years of age followed by the egg count observed in animals of four to ten years of age, while the lowest egg count observed in animals of greater than ten years. As age increases egg per gram feces decreases this is in agreement with previous work [14,15]. This might be associated with apparent inability of the host to develop acquired immunity so that young animals have severe infection with gastrointestinal nematode parasite. Higher infection rates and more severe infections indicate a lack of immunity in younger population [2].

Concerning severity of infection in donkeys reported in this study, (53.6%) for severe infection both moderate and mild infection had the lower incidence with 15.9% and 8.6%, respectively.

It is lower than the values obtained with previous work [14] in donkeys 86.31%, 46.82%, and 46.82% for severe, mild and moderate infection respectively. In Sudan there is a contradictory report with 58.6%, 21.9%, and 19.5% for mild, moderate and severe infections respectively [11]. This may be attributed to management system and deworming strategy of donkeys.

Risk factors	No. of animal infected	Mean EPG	95% CI for Mean	Range	SD	F	P
<b>Species</b>							
Donkey	183	2101	1855-2347	100-8100	1688		
Horse	96	624	503-745	100-3200	5595	68.8	0.000
<b>Sex</b>							
Female	33	2261	1566-2954	200-7200	1957		
Male	246	1503	1315-1691	100-8100	1499	6.86	0.009
<b>Age</b>							
<4 years	65	2068	1631-2506	100-6800	1766		
4-10 years	125	1559	1293-1825	100-8100	1501		
>10	89	1294	986-1601	100-7300	1460	4.7	0.010
<b>BCS</b>							
Poor	60	2019	1506-231	100-7900	1984		
Medium	162	1526	1304-1748	100-7300	1432		
Good	57	1335	960-171	100-8100	1413	3.15	0.044

**Table 5:** Analysis of mean EPG of GIT nematodes in donkeys and horse with different risk factors using one-way ANOVA.



**Figure 2:** Overall severity of infection by nematode helminthes in donkeys and horse.

## Conclusion and Recommendation

GIT nematode infection was highly prevalent in donkeys and young age group where as sex and body condition was not significantly associated with prevalence of GIT nematode. Strongyle and *Parascaris equorum* was the nematode parasites affecting donkeys and horses in Hawassa town and Strongyle had the highest relative prevalence, than *Parascaris* in the study area. All donkeys in the study area working for long duration and provided with small amount of crop residue at the morning and in the evening they are allowed to graze around Tikur Wuha and these may suppress their immunity and expose them to parasitic infection.

Public awareness creation to equine owners on proper deworming, sufficient feed supply and minimizing extensive open grazing of donkeys and horses is important. Balancing of the work load and duration should be managed.

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