African Journal of Basic & Applied Sciences 12 (4): 88-96, 2020
ISSN 2079-2034

DOI: 10.5829/idosi.ajbas.2020.88.96

Prevalence of Gastrointestinal Parasites of Donkeys in and Around Sululta District, Oromiaregional State, Central Ethiopia

[1]Lami Tamiru and [2]Birhanu Abera

[1]East Shoa Zone Livestock and Fishery Resource Office, Adama, Ethiopia
[2]Asella Regional Veterinary Laboratory, P.O. Box: 212, Asella, Ethiopia

Abstract: A cross sectional study was conducted to determine the prevalence of gastrointestinal (GIT) helminthes of donkeys in Sululta districts of central Oromia. A total of 325 faecal samples were collected from donkeys for coprological study. Coproscopy and ova-culture were protocols of the study. The overall prevalence of the GIT helminthes recorded was 98.46%. Results of coproscopy showed that the prevalence of was 97.23%, 36%, 23.38%, 6.76% and 2.77% for *Strongyles, Parascaris equorum*, *Fasciola* spp, *Gastrodiscus aegypticus* and *Anoplocephala* spp, respectively. Analysis of parasites infection by body condition of donkeys revealed no statistical significant difference (P>0.05) for all except *Strongyles* infection which is statistically significant (p<0.05). None of parasites infection statistically found significant among age group and sexes of donkeys (p>0.05). Unlike other parasites infections in the study, *Strongyles* infection and overall mean egg per gram were found statistically significant between body condition scores. The highest epg of strongyles was observed in poor compared to moderate and good body condition scores. Results of current study revealed that mixed infection was detected in highest frequency in moderate body condition score 148(80%), followed by good and poor body condition scores, 57(76%) and 42 (56%), respectively. Infections with double parasites predominantly *Strongyles* with others parasites was found with highest frequency (n=9) whereas to less extent triple parasites infections (n=3) were seen per donkey. Coproculture study revealed 100% prevalence of *Strongylus vulgaris* and *Strongylus westeri*, 56.25% *Triodontophorus*, *Cyathostomes* 81.25%, *Strongylus edentates* 75% and *Dictyocaulus arnifieldi* 81.25%. From the present study it can be concluded that the prevalence of GIT parasites in donkey was high and hampering health of donkeys. Therefore, well designed parasites control and prevention like strategic deworming using broad spectrum anti-helminthic drugs, rotational grazing program and improvement of housing and feeding management should be implemented.

Key words: Donkeys · GIT Parasites · Mean Egg Count · Prevalence · Risk Factors · Sululta

INTRODUCTION

The donkey (*Equusasinus*) is indigenous to the African continent and its wild progenitor is usually considered to be the Nubian wild ass. Archaeological evidence and molecular data suggests that donkeys may have been domesticated 5000 years ago in Africa. Ethiopia has more than 6 million donkeys, the second largest donkey population in the world next to China, 1.9 million horses and over 350, 000 mules [1] specifically kept for work.

Despite their huge numbers and significant contribution to the communities and national economy [2], the attention given to donkeys by governmental and non-governmental organizations to donkeys has been far below to what it deserves and very little research, donkey project, relating to donkeys helminthosis has been carried out. This might be partly due to the wrong perception that the donkey does not require a lot of care, that when donkeys do get sick they are quick to die and the donkey's low traditional status [3]. Among the multiple health and welfare problems affecting donkeys, parasite infestation take the lion share and have an economic impact on donkey as they cause loss through lowered fertility, reduced work capacity which directly reduce income of the owner and communityand increased treatment cost [4, 5].

Corresponding Author: Birhanu Abera, Asella Regional Veterinary Laboratory, P.O. Box: 212, Asella, Ethiopia.

Donkeys harbor a large quantity of parasite that prevail in the GIT including round worms (families: *Stronglidae, Spiruridae, oxyuridae, Trichostronglidae* and *Ascaridae*) and tapeworm (family: *Anopiocephalidae*) which act up and damage the intestine depend on the age and natural defense of the individual equine [6]. Among these groups of helminthes, donkeys infected predominantly by *Strongyles* and *Parascaris equorum parasites,* to less prevalence by fasciola species, *Gastrodiscus aegypticus* and *Anoplocephala* species. Regarding wide distribution, pathogenic effect and economic impact, *Strongyles* and *P. sequorum*are far important than other parasites affect donkeys [5, 7]. There are many reports on prevalence of helminthes in donkeys in different parts of the country and most of them documented high prevalence ranging from 70%to100%. These all reports underlined parasitic infection is the major health problems of donkey [7, 8].

The Donkey Health and Welfare Project-Donkey Sanctuary (DHWP-DS) is providing strategic deworming in areas of project works (Ada, Lume, Adulala, Boset, Sendefa, Sebeta, Akaki, Dugda and Bora districts of central Oromia). Sululta is one of non intervention area by DHWP strategic deworming program and serve as control. However, there is no updated and sufficient data to compare status of donkeys under intervention and non -intervention. Thus, the project initiated this study to generate data on prevalence of GIT parasites that represent non –intervention of highland area.

The aim of this study was therefore:

- To determine the prevalence of GIT of donkeys in and around Sululta districts.
- To assess the relation between GIT parasites burden, sex, age and body condition score.

MATERIALS AND METHODS

Study Area: The study was conducted in and around Sululta district which is located in North Showa zone of Oromia regional state 21 km to the Northwest of Addis Ababa. The district is geographically situated at 9°26'N and 38°39'E. The area has an altitude of 2450 m above sea level. It has a temperature that ranges from 15-18°C. The main rainy season is from June to August. The human population of Sululta district is 247, 174 of which 120, 934 are male. With average family 6.27 persons in rural areas. The total coverage of district is 158700 hectares with the grazing area of 52548 hectares and forest and bushes and shrubs 14532 hectares. The livestock population of the district includes 218, 929 cattle, 189, 167 sheep, 86, 361 equine(53, 435 Donkey), 12, 678 poultry with total livestock population 414, 614. The feed source for donkeys and other grazing animals in percentage is 63% grazing, 35% crop residues and the remaining 2% improved forage. Animal production system is mainly mixed crop-livestock type of farming system [9].

Study Animals: The study animals are donkeys in and around Sululta district of Oromia Regional State, maintained under traditional small holder extensive management production system.

Study Design: A cross sectional study was conducted to predict the prevalence of the major GIT parasites involved in donkey during study period. Systemic random sampling procedures were employed to determine prevalence of GIT helminthes infections in donkeys. Previous studies conducted in Ethiopia have reported that the prevalence of helminthes infection in donkeys ranges from 70-100% [7, 8]. The age of each selected donkey was determined by dentation [10]. Body condition scores for each donkey was subjectively estimated based on guidelines published by Sevendesen [11]. The donkeys were supposed to be grouped into three age categories. Donkeys under 2 years of age were grouped as young, those in the range of 2 to 10 years were grouped as adult and those beyond 10 years were grouped as old donkeys. These age classes were based on age of first work, productive age and the life span of Ethiopian donkeys [11, 12]. The age, sex and body conditions of each donkey were recorded. Following recorded, fecal samples were taken directly from rectum using rectal gloves.

Each sample was labeled with animal identification, owners name, date and place of collection with indelible pen. Each sample was subjected to gross faecal examination for presence of parasites like *Anoplocephala* spp. and *Trichonema* spp. then samples were kept in refrigerator at 4°C to be examined within 48 hrs using qualitative and quantitative parasitological examination methods such as Sedimentation, Flotation, Baerman and McMaster egg counting methods following standard procedures out lined by MAFF [13], Urquhart *et al.* [14]. Faecal culture was done for those faecal samples with eggs per gram faeces of greater than 3000 epgthe larvae were identified based on shape and gut cells, relative size of sheath tail and shape of tail of larvae [13, 15].

Sampling Strategy: Selection of study areas was house hold based. Villages were randomly selected and from the selected village the house was also being randomized systematically.

Sample Collection and Examination: Fecal samples were collected per-rectum from fresh deposits using plastic gloves in clean plastic bags, labeled and kept in icebox and transported to Parasitology laboratory of DHWP. Fecal examination was carried out by using McMaster technique, sedimentation and floatation technique and for identification of some parasites species level. Fecal samples were cultured and the larvae were recovered using Bearman apparatus technique and then identified under lower power microscope (10X objective), based on the shape and number of gut cells, relative size and shape of larvae's tail [13, 15].

The floatation fluid used in this study was super saturated solution of sodium chloride (Nacl) salt prepared in the laboratory. The procedure given by Urquhart *et al.* [14] was followed for the above parasitological methods which are listed in annex. The Eggs was identified using ova identification keys [16].

Sample Size Determination: Previous studies conducted in Ethiopia have indicated that the prevalence of helmiths infection in donkeys ranges from 70-100% [7, 8, 17]. Sample size was calculated with expected prevalence of 70% and 95% confidence interval with the absolute precision of 5% as described in Thresfield [18]. Taking this in to consideration representative sample was calculated using the following formula given by Thrusfield [18].

$$N = \frac{1.96^2 P\exp\ (1 - P\exp)}{d^2}$$

where P *exp* = expected prevalence; $P_{ex} = 0.70$
D = desired absolute precision; d = 0.05
1.96 = constant from normal distribution at a given confidence level. The calculated sample size was 323. In the current study a total of 325 donkeys were sampled.

Data Analysis: All collected information obtained from coprological examinations were entered into excel spreadsheet and analyzed by ProcFreq and Proc GLM procedures of SAS 9.2 version software. Descriptive statistics and graphs were produced using data analysis tools in Microsoft Excel 2010. The P-value <0.05 was used to report significant differences.

RESULTS

Qualitative Faecal Examination: Of the total 325 donkeys, 322 (98.46%) were found to be infected with different parasites of donkeys. Result from current study indicated that the prevalence of *Strongyles* was 97.23%, *Parascarisequorum* 36%, *Fasciola* spp 23.38%, *Gastrodiscusaegy pticus* 6.76% and 2.77% *Anoplocephala* spp. (Table 1).

None of parasites infection statistically found significant among age group of donkeys. However, the highest strongyles infection was seen in old group 13(100), followed by adult 245(97.2) and young age group 58 (96.7). Whereas for Parascarisequorum infection, the highest prevalence was detected in adult 93(36.9) accompany by young 21(35) and old age group 3(23.08) as indicated in Table 2.

Analysis of parasites infection by body condition of donkeys revealed that no statistical significant difference (P>0.05) for *P. eqourum, Fasciola* spp. *G. aegypticus* and *Anoplocephala* spp. infections. However, *Strongyles* infection was found statistically significant among examined body conditions of donkeys (p<0.05) (Table 3).

Mixed Infection: Donkeys that were found positive for helminths parasites harboured one or more parasite. The donkeys were found with multiple parasite infection, where 239 (73.54%) out of the total donkeys were examined. Mixed infection investigated within age group was 44(73.33%), 182(72.22%) and 13(100%) in young, adult and old donkeys respectively. Among mixed infected noted, combination of strongyles and parascariseqourum was found higher 114 (35.07%) by preceding the combination occurrence of *Strongyle*s and *Fasciola* spp. 75(23.07%) than other helminths combination prevalence in different age groups. Triple infections with *Strongyles*, *Parascaris eqourum* and *Fasciola* 7 (2.15%), *Strongyles*, *P. eqourum* and *G. aegypticus* 5(1.54%), *Strongyles*, *P. eqourum* and *Anocephala* spp. 3(0.92%) were recorded (Table 4).

Results of current study revealed that mixed infection was detected in highest frequency in moderate body condition score 148(80%), followed by Good and Poor body condition scores, 57(76%) and 42 (56%), respectively Infections with double parasites predominantly strongyles with others parasites was found nine type (S and P, S and F, S and G, S and A, P and F, P and G, P and A, G and F, F and A) whereas triple parasites infections (S, P and F; S, P and A; S, P and G) were seen per donkey (Table 5).

Quantitative Faecal Examination: In present study, analysis of the degree of infection on basis of epg count in different age group of donkeys revealed that severely affected 48.4% in adult, 9.7% in young and 2.2% in old age group whereas medium infection level was found

Table 1: Overall prevalence of different helminths in 325 study donkeys in Sululta districts

		Percent	Std. Err.	[95% Conf. Interval]	
Overall	Negative	1.53846	.0068376	.0063881	.0365845
	Positive	98.46154	.0068376	.9634155	.9936119
Strongyles	Negative	2.76923	.0091161	.0144204	.0525281
	Positive	97.23077	.0091161	.9474719	.9855796
Parascariseqourum	Negative	64.0	.0266667	.5860515	.6906292
	Positive	36.0	.0266667	.3093708	.4139485
Fasciola spp.	Negative	76.61538	.0235153	.7167722	.8092173
	Positive	23.38462	.0235153	.1907827	.2832278
Gastrodiscusaegy pticus	Negative	93. 23077	.0139565	.899133	.0448839
	Positive	6.76923	.0139565	.0448839	.100867
Anocephala spp.	Negative	97.23077	.0091161	.9474719	.9855796
	Positive	2.76923	.0091161	.0144204	.0525281

Table 2: Prevalence of parasites among different age groups

		Prevalence %				
Age in years	No. examined	*Strongyles*	*Parascaris*	*Fasciola* spp.	*Gastrodiscusaegy pticus*	*Anoplocephala* spp.
Young	60	58 (96.7)	21 (35)	13 (21.67)	3 (13.64)	0 (0)
Adult	245	245 (97)	93 (36.9)	59 (23.4)	19 (86.3)	8 (88.9)
Old	13	13 (100)	3 (23.08)	4 (30.77)	0 (0)	1 (11.1)
χ^2		0.4412	1.06	0.49	1.48	3.03
P-value		0.8020	0.59	0.59	0.04	0.22

Table 3: Prevalence of parasites by body condition of donkeys

		Prevalence %					
BSC	No examined	Total	*Strongyles*	*Parascaris equorum*	*Fasciola* spp.	*Gastrodiscusaegy pticus*	*Anoplocephala* spp.
Poor	75	75 (100)	75 (23.7)	21 (175)	18 (24)	5 (27.7)	1 (11)
Moderate	175	173 (98.8)	172 (54.4)	72 (61.5)	41 (23.4)	11 (50)	6 (66.67)
Good	75	72 (96)	69 (23.7)	24 (20.5)	17 (22.7)	6 (27.2)	2 (22.2)
χ^2		4.3527	10.5	4.61	0.038	0.24	0.86
p-value		0.113	0.0053	.0996	0.98	0.88	0.65

Table 4: Prevalence of mixed infection within age group

Young (%)	Name of mixed helminthes	Adult (%)	Old (%)	Total (%)
44 (73.33)	Positive	182 (72.22)	13 (100)	239 (73.54)
20 (17.54)	S and P	91 (79.82)	3 (2.63)	114 35.07)
13 (17.54)	S and F	58 (77.3)	4 (5.33)	75 (23.07)
1 (20)	S and G	4 (80)	0 (0)	5 (1.54)
0 (0)	S and A	7 (87.5)	1 (12.5)	8 (2.46)
8 (100)	P and F	0 (0)	0 (0)	8 (2.46)
1 (20)	P and G	4 (80)	0 (0)	5(1.54)
0 (0)	P and A	3 (75)	1 (25)	4 (1.23)
0 (0)	G and F	0 (0)	3 (100)	3 (0.92)
0 (0)	F and A	2 (100)	0 (0)	2 (0.61)
0	S, P and F	7 (100)	0	7 (2.15)
0(0)	S, P and A	2(66.7)	1(33.3)	3(0.92)
1(20)	S, P and G	4(80)	0(0)	5(1.54)
60	Total	252	13	325

S=*Strongyles*, P = *Parascaris equorum,* F = *Fasciola* spp., G = *Gastrodiscusaegy pticus*, A = *Anoplocephala* spp. Numbers in the brackets are percentages

Table 5: Prevalence of mixed infection within body condition score

Name of mixed helminthes	Poor (%)	Moderate (%)	Good (%)	Total (%)
Positive	42(56)	140(80)	57(76)	239(73.54)
S and P	21(18.42)	71(62.28)	22(19.3)	114(35.07)
S and F	18(24)	41(54.67)	16(21.3)	75(23.07)
S and G	0(0)	3(60)	2(40)	5(1.54)
S and A	2(25)	6(75)	0(0)	8(2.46)
P and F	0(0)	2(25)	6(75)	8(2.46)
P and G	0(0)	3(60)	2(40)	5(1.54)
P and A	0(0)	3(75)	1(25)	4(1.23)
G and F	0(0)	3(100)	0(0)	3(0.92)
F and A	1(50)	0(0)	1(50)	2(0.61)
S, P and F	0(0)	2(28.57)	5(71.43)	7(2.15)
S, P and A	0(0)	3(100)	0(0)	3(0.92)
S, P and G	0(0)	3(60)	2(40)	5(1.54)
Total	75	175	75	325

S = *Strongyles*, P = *Parascaris*, F = *Fasciola* spp., G =*G. aegypticus*, A = *Anoplocephala* spp. Numbers in the brackets are percentages

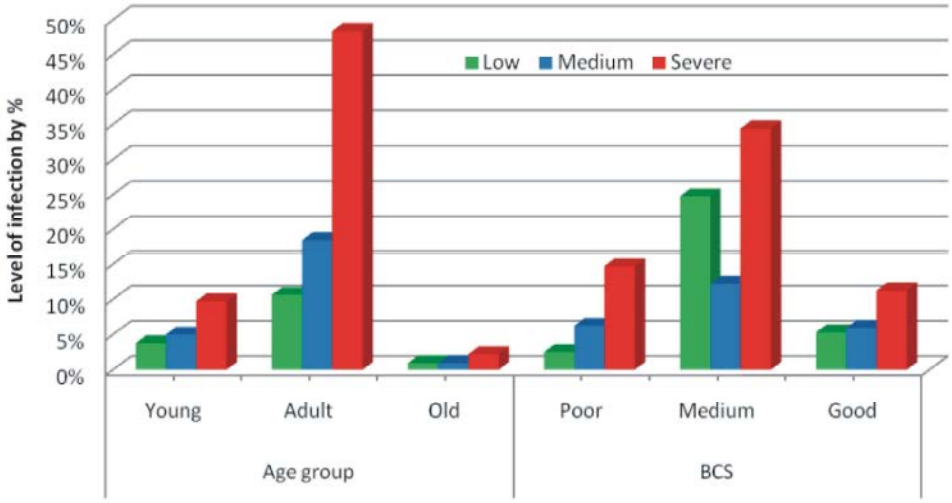

Fig. 1: Level of infection of parasites in different age groups (Young, Adult and Old) and body condition (Poor, Medium and Good) scores

18.44 in adult, 5% in young and 0.94%. Analysis of level of infection with body condition indicated that about 14.7%, 34.38% and 11.25% were severely affected from poor, medium and good BSC, respectively (Figure 1).

There was no statistically significance difference between age groups for overall mean egg per gram of feces and specific parasites epg ($p>0.05$). However, the highest overall epg was recorded in adult age group (1456±936) as compared to young (1223±3900) and old (1154±664) (Table 6).

The overall mean egg per gram was found statistically significant between body condition scores. Likewise, there was statistically significance difference ($P< 0.05$) between body condition scores for mean egg per gram of feces of strongyles infection. The highest epg of strongyles was observed in poor body condition with 1401.3±981.2 mean and standard deviation. There was no statistically significance variation among body condition scores in mean epg of *P. eqourum, Fasciola* spp, *G. aegypticus* and *Anoplocephala* spp. (Table 7).

Mean epg count indicated no statistical significance between sexes of donkeys. However, the highest strongylesepg was noted in females as compared to males (Figure1).

Larval Culture: Examination of the pooled ova culture showed that seven types of helminth parasitic larvae notable *S. vulgaris, S. westeri, S. edentatus, T. axei, Dictocaulosarnefield, Cyathostomes, Triodontophorus* spp. Of these *S. vulgaris* and *S. westeri* were found with highest percentage (100%) (Figure 3).

Table 6: Comparison of mean EPG in donkeys of different age groups

		Mean± SD epg					
Age	No. examined	*Strongyles*	*Parascarise eqourum*	*Fasciola* species	*Gastrodiscus aegypticus*	*Anoplocephala* species	Overall
Young	60	985±751.23	121.7±2.5	88.4±229	28.3±133.	0±0	1223±390
Adult	252	11689±08	140.92±82	88.92±26	45.61±87	11.97±4.8	14569±36
Old	13	992.3±671.4	84.61±91	61.51±04	00±	15.45±5.5	11546±64

Table 7: Comparison of mean EPG in donkeys of different body condition

		Mean± SD epg					
BSC	No. examined	*Strongyles*	*Parascaris eqourum*	*Fasciola* species	*Gastrodiscus aegypticus*	*Anoplocephala* species	Overall
Poor	75	1401.3±981.2[a]	105±211.7	70.67±142	34.67±163	14.67±92.5	1626.7±1014.8[a]
Moderate	175	1121±7823[b]	138.8±217	98.9±216	34.9±162.5	9.1±57	1403±866[a]
Good	75	866.7±802.8[c]	156±406.4	78±187	60±210.5	6.7±57.7	1168±844.2[b]
Total	325	1127.38±874	135.08±271	87.69±222	40.61±175	9.84±66.9	1400.62±908.55

* a b c Superscripts within a column with different letters are significantly different at p<0.05

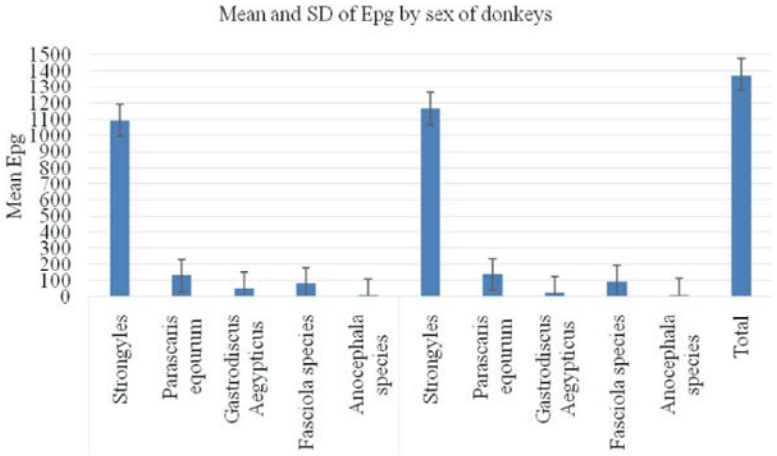

Fig. 2: Comparison of mean EPG by sex of donkeys

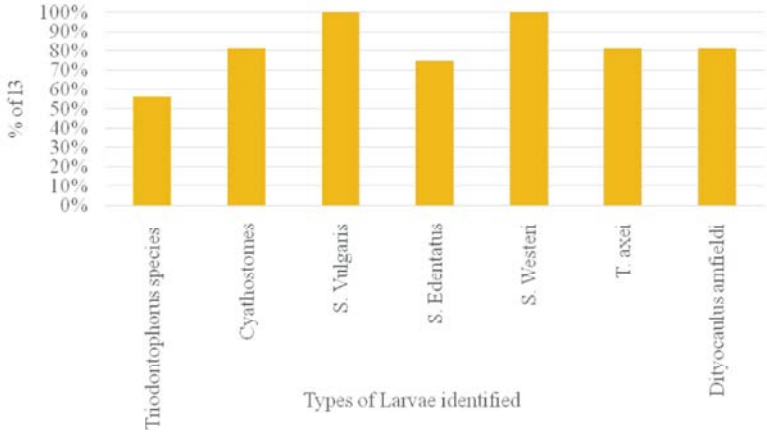

Fig. 3: Percentage of parasites indentified on ova culture

DISCUSSION

Coproscopic Study: The overall prevalence of gastrointestinal (GIT) parasites of donkey in the study area was found to be 98.46% (320/325). This findings is in agreement with previous studies made [4, 7, 8, 12, 17, 19-21] who reported prevalence of 100%, 100%, 100%, 100%, 100%, 96.3% and 100% in donkeys of Bishoftu,

central midlands and lowlands of of Ethiopia, Dugda Bora districts, Wonchi, highlands of Wollo provinces, western highlands of Oromiya and Goba districts and Sululta and Gefersa districts of central Oromia and disagrees with the result of 65.1% by Nuraddis *et al*. [22]. Similar prevalence between the current and previous reports suggests the lack of intervention with anthelmintics in Sululta.

Relative Proportion of Each Parasite: Among the identified gastrointestinal parasites, the highest relative percentage was recorded for Strongyles (97.23%, 316/325) which is in agreement with previous report by Ayele *et al*. [7], Getachew *et al*. [8], Yoseph *et al*. [12] and Zerihun *et al*. [21] which reported 100%, 100%, 100% and 99.5% respectively in the different parts of Ethiopia. The prevalence and mean epg of strongyles never showed statistically significant variation in donkey of different age groups similar to report by Ayele *et al.* [7].

Prevalence of *Parascaris eqourum* recorded in the current study is (36%, 117/325) which is in agreement with previous reports of Ayele *et al*. [7], Mulate [19], Zerihun [21] and Zerihun [23] who have reported 50%, 43%, 42% and 53% in Dugda Bora districts, highlands of Wollo providence, Bishoftu and Sululta and Gefersa districts respectively. However, the prevalence is higher than the previous report made by Fikiru *et al.* [4] which is (17.3%) and Yosef *et al.* [12] which is (15.7%). The prevalence and mean epg of parascarisequorum showed no statistically significant ($p>0.05$), which is parellel with the work of Getachew *et al.* [8] and Ayele *et al*. [7] who reported absence of stastically significant differences in the prevalence of parascarisequorum among donkeys of different age groups.

The prevalence of Fasciolaspp recorded in the current study is (23.38%, 76/325), which is higher than the previous report done by Ayele *et al*. [7] who reported 1.5% in Dugda Bora district and Zerihun *et al.* [21] which is 9.8% in Sululta and Sendefa districts. This higher prevalence suggests that Fasciola is common in highlands where donkeys share grazing area with ruminants that are considered as primary hosts of liver fluke and the ecological conditions which allow multiplication and spread of intermediate snail host in study district.

Hammami and Ayadi [24] have reported that permanent dampness, suitable luminosity, basic pH of soil and water and temperature contribute to the multiplicity of snails. The infections were recorded in April (from snail infection of Nov. - Dec.) and July (from snail infection of March-April). A study conducted by Hardy *et al.* [25] in Egypt indicated that donkeys are the potential reservoir of Fasciolosis and they recommended that donkeys should be considered within the preventive and control measures of Zoonotic Fasciolosis.

The prevalence of (6.76%, 22/325) for *Gastrodiscus aegypticus* recorded in the current study is in harmony with previous work done by Ayele *et al.* [7] and Zerihun *et al.* [21] in Dugda Bora and Sululta and Sendefa districts respectively. Low Anoplocephala (2.76%, 9/325) recorded in this study as compared to the finding in the Dugda Bora by Ayele *et al.* [7] who might be due to seasonality of orbited mites intermediate hosts. Similar results have been reported in the survey of helminthosis conducted in the central high lands of Ethiopia by Yoseph *et al*. [12]. However, this finding is in discordance with the work of Zerihun *et al.* [21].

Severity of infection as obtained from the number of eggs per gram of faeces was determined less than or equal to 500 eggs/gram of faeces regarded as mild infection; 500-1000 eggs /gram of faeces as moderate infection; and above 1000 eggs/ gram of faeces as severe infection [14]. This index was applied to assess the extent of severity in donkeys. Accordingly, working donkeys in the current study were severly infected with helminthes. There was no significant difference between age group.

Donkeys that were found positive for helminths parasites harboured one or more parasite. The donkeys were found with multiple parasite infection, where 239 (73.54%) out of the total donkeys were examined. Mixed infection investigated within age group was 44(73.33%), 182(72.22%) and 13(100%) in young, adult and old donkeys, respectively. Among mixed infected noted, combination of strongyles and parascariseqourum was found higher 114 (35.07%) by preceding the combination occurrence of *Strongyle*s and *Fasciola species* 75(23.07%) than other than other helminths combination prevalence in different age groups. Triple infections with *Strongyles*, *Parascaris eqourum* and *Fasciola* 7 (2.15%), *Strongyles*, *Parascaris eqourum* and *Gastrodiscus aegypticus* 5(1.54%), *Strongyles*, *Parascaris eqourum* and *Anocephala* species 3(0.92%) were recorded (Table 7).

Larval Culture: Identification of infective larvae of helminth showed that *Stronglus vulgaris* and *Strongylus westeri* were the major larvae encountered with the highest percentage of 100%. This finding disagrees with findings of Zerihun *et al.* [21] who reported in *Strongylus vulgaris* and *Strongylus westeri* 73.8% and 42.8% respectively in Sululta and Gefersa districts.

CONCLUSION AND RECOMMENDATIONS

Gastro-intestinal parasitism has been identified as a significant cause of disease in working donkeys in many countries. The current study showed a very high prevalence of helminthes in all age groups of donkeys of Sululta district. This suggest that parasitic helminthes of donkeys are responsible for enormous economic losses, severe health and productivity problems in the study area hence helminthes are one of the major constraints that confront the utilization, productivity, health and reproductive of donkeys of the study area.

Therefore, based on the above conclusions the following recommendations are forwarded;

- Treating anthelmintics after donkeys are infested with endoparasites are not sufficient in the control of helminth parasites.
- In the control of helminth parasites of donkeys seasons which promote life cycles of helminthes should be taken into account.
- Awareness should be created in donkey owners about controlling of helminth parasites.
- Government or non profitable development agencies should include donkeys in their priority lists of research and develop sustainable integrated diseases prevention and control programs that are practical for developing communities.

REFERENCES

1. FAOSTAT, 2012. Food and Agricultural Statistical Database:http://www.fao.org/corp/statistics/access online/.
2. Bernke, R. and F. Meteferia, 2011. The Contribution of Livestock to the Ethiopian Economy-PartII. IGAD LPI Working Paper No. 02-11. pp: 43. Blench, R. Wild asses and donkeys in Africa: interdisciplinary evidence for their biogeography, history and current use. 2013.
3. Marshall, K. and Z. Ali, 2004. In: Fielding and Starkey P (editors). Donkeys, People and Development. A resource book of the animal traction network for eastern and Southern Africa (ATNESA). Technical center for agriculture and rural cooperation (CTA), pp: 77-81, Wageningen, The Netherlands, ISBN 92-9081-219-2.
4. Fikru, R., D. Reta, S. Teshale and M. Bizunesh, 2005. Prevalence of equine gastrointestinal parasites in western highlands of Oromia. Bull. Anim. Health prod. Afr., 53: 161-166.
5. Getachew, M., A. Trawford, G. Feseha and S.W.J. Reid, 2010. Gastrointestinal parasites of working donkeys of Ethiopia. Trop. Anim. Health Pro., 42: 27-33
6. Pereia, J.R. and S.S.S. Vianna, 2006. Gastrointestinal parasitic worms in Equines in peraibavally, state of soa Paulo, Brazil. Vet. Parasitelogy, pp: 140.
7. Ayele, G., G. Feseha, E. Bojia and A. Joe, 2006. Prevalence of Gastro-intestinal parasites of donkeys in Dugda Bora District, Ethiopia. Livest. Rural Dev., 18: 2-6.
8. Getachew, M., G. Feseha, A. Trawford and J.W.S. Reid, 2009. Seasonal patterns in the strongylefaecal worm egg counts of working equids of the central midlands and lowlands, Ethiopia. Tropical Animal Health and Production. D0110.1007/511250-008-9142-5., pp: 2-6.
9. Central Statistical Agency (CSA), 2018. Federal Democratic Republic ofEthiopia, central statistical agency, agricultural sample survey 2017/2018.
10. Pearson, R.J. and M. Ouassat, 2000. A guide to live weight estimation and body condition scoring of donkeys. (CTVM, Endinburgh).
11. Sevendesen, M.B.E., 1997. Professional donkey hand book. Anley Road, London W14 OBY, 61. 9.
12. Yoseph, S., G. Feseha and W. Abebe, 2001. Survey on helminthosis of equines in Wonchi, Ethiopia. Journal of the Ethiopian Veterinary Association 2001, 5: 47-61.
13. MAFF, 1979. Manual of Veterinary Laboratory Techniques. Technical Bulletin, No. 18, Ministry of Agricultural Fishieries and Food, London, pp: 129.
14. Urquhart, G.M., J. Armoul, J.L. Duncan, A.M. Dunn and F.W. Jenning, 1996. Veterinary Parasitology 2nd edition. Blackwell Science Limited, London, pp: 277-307.
15. Kaufmann, J., 1996. Parasitic Infection of domestic animals, A Diagnostic Manual, Birhavsen Verleg, Germany, pp: 5-21 and 224-227.
16. Soulsby, E.J.L., 1986. Helminthes, Arthropods and Protozoa of Domesticated Animals, 7th edn. Bailliere Tindall, London, pp: 167-174.
17. Feseha, G., 1997. Diseases and Health problems of the donkey abroad. In: The professional hand book of donkey, 3rd eds. Whittet Books Limited, 18 Anleyroad, W140BY, London, pp: 207-226.
18. Thrusfield, M., 2018. Veterinary Epidemiology, UK, Black Well Science, 4nd edn, pp: 178-197.
19. Mulate, B., 2005. Preliminary study on helminthosis of Equines in s outh and north Wollo Zones. Journal of Veterinary Association, 9(2): 25-37.

20. Wubishet, Z., 2008. Coproscopic survey on Equine gastrointestinal Strongylosis and Fasciolosis in and around Goba. DVM thsis: CVMA, AAU, Bishoftu.
21. Zerihun, A., K. Bersissa, E. Bojia, G. Ayele, M. Tesfaye and D. Etana, 2009. Endoparasites of Donkeys in Sululta and Gefersa Districts of Central Oromia, Ethiopia, 10(14): 1850-1854.
22. Nuraddis, I., B. Tilahun, D. Benti and T. Tadele, 2011. Survey of prevalence of helminth parasites of donkeys in and around Hawassa Town, Southern Ethiopia. Global Veterinaria, 6(3): 223-227.
23. Zerihun, M., 2008. The status of Strongyle and Parascaris population in working donkeys in central Ethiopia. DVM; AAU, Bishoftu.
24. Hammami, H. and A. Ayadi, 1999. Ecology of Lymnaeatruncatula Muller, intermediate host of Fasciola hepatica Linne in the microclimate of Tozeur (southeast of Tunisia). Bulletin De la Société De Pathologie Exotique, 92(5): 302-4.
25. Hardy, F.M., T.A. Morsy, N.I. Gawish, T.N. Antonios and A.G. Abdel Gaward, 2002. The potential reservoir role of donkeys and horses in zoonotic fasciolosis in Gharbia Governorate, Egypt. Egyptian Society of Parasitology, 32(2): 561-70.