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Prevalence of Endo-parasites of Donkey and Mules in and around Ambo town

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Abstract

A cross-sectional study was conducted from November 2014 to April, 2015 to determine the prevalence of endo-parasites in donkeys and mules in and around Ambo town, in Oromia Region, Central Ethiopia. Ethiopia possesses approximately half of Africa's equine population with 37%, 58%, and 46% of all African donkeys, horses, and mules, respectively. The low level development of the road transport system, the rough terrain, mountainous in the rural area and in the cities where narrow streets prevent easy delivery of merchandise make the equines the most valuable, appropriate and affordable packing and carting animals in most parts of the country. Even though donkey and mules have often been described as sturdy animals; they are often the choice of many people for use especially in the country side. Endo-parasites are one of the most common factors that constrain the health and working performance of donkeys and mules in the country. They reduces the performance, production and productivity in these animals mainly in loss of body weight or failure to gain weight or even increase the mortality in acute case. Fresh faecal samples were directly collected from 384 randomly selected donkeys (n=325) and mules (n=59) and coprological examination for the detection of endo-parasite eggs was performed using floatation, sedimentation and direct fecal smear techniques. The overall prevalence of endo-parasites obtained in this finding was 55.2% (212/384). From this prevalence, 55.1% (179/325) donkeys and 55.9% (33/59) mules were recorded. The data was analyzed by using SPSS, version 17 software packages. Generally, donkeys and mules are often heavily parasitized by endo-parasites, the prevalence and type of such parasites affecting these animals have not been determined to a great extent in Ethiopia, particularly in and around Ambo town.

Keywords: donkey, endoparasite, equines, fecal, mule, parasites

1. Introduction

The equine population of the world is estimated to be 122.4 million of which, 40 million are donkeys, 15 million mules and 43.3 million horses (Abaynesh *et al.*, 2002). The number of equines in Africa is in the range of 17.6 million, comprising 11.6 million donkeys, 2.3 million mules and 3.7 million horse (Fielding, 1991). Ethiopia, located in Eastern Africa, is predominantly an agricultural nation. The country has diverse agro-ecological zones, which contributed to the evolution of different agricultural production systems and animal production is practiced in all ecological zones of the country (Azage and Crawford, 2000). The country possesses approximately half of Africa's equine population with 37%, 58%, and 46% of all African donkeys, horses, and mules, respectively (FAO, 1996). According to the information obtained from Central Statistical Authority; there are 5.57 million donkeys and 380 thousand mules in the country (CSA, 2009).

There is one equine for every four people in the agricultural sector and for every five persons of the total population (Wilson 1991). The Domestic donkey of Ethiopia traces its ancestry to the wild asses found in Egypt, the Sudan, Somalia and Ethiopia, namely *Equus asinus africanus* and *Equus asinus somalicus* (Feseha 1991). The low level development of the road transport system, the rough terrain, mountainous in the rural area and in the cities where narrow streets prevent easy delivery of merchandise (Woodford, 2009) make the donkey and mules the most valuable, appropriate and affordable packing animals in most parts of the country (Gebrewold, *et al.*, 2004).

Even though Donkey and mules have often been described as sturdy animals; they are often the choice of many people for use. The attention given by Governmental and non-Governmental organizations to these animals especially to donkeys has been far below to what they deserve. 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 (Marshall and Ali 2004). These animals play a great role in the agricultural economy of the country and their power is vital for both rural and urban transport system which is cheap and easily available throughout the year (Yoseph *et al.*, 2005). This is most probably because of their strong power, adaptability to dry or harsh environment, capability of resisting different diseases and no such additional feed is needed or provided in addition to grazing pasture. Mostly, donkeys and mules are used for riding especially by men, driving, breeding (donkeys), packing, ploughing, carting, threshing, farm cultivation, and provide urban dweller with opportunity of income generation in different part of the country (Wilson *et al.*, 1991).

Although Ethiopia has a large numbers of donkey and mules, which contributes a great national economy for the country, certain impediments hinder the maximum utilization of these animals to their potential. Many infectious disease and parasitic diseases as well as the poor management system are the most common problems encountered in these animals (MOARD, 1997). Endo-parasites are one of the most common factors that constrain the health and working performance of donkeys and mules in different parts of the country. Different Studies and observations was conducted in the last decade have pointed endo-parasites as being a major health hazard, affecting the overall performance of donkeys and mules (Hinney *et al.*, 2011). In addition to this, different available information suggests that endo-parasites are the main reasons for early demises of donkeys and mule in the country (Yoseph *et al.*, 2001; Fikru *et al.*, 2005; Ayele *et al.*, 2006). These parasites cause various degrees of damage depending on the species and number at present, management system, nutritional and the immune status of these animals (Asefa *et al.*, 2011).

Endo-parasites reduces the performance, production and productivity in the animals mainly in loss of body weight or failure to gain weight or even increase the mortality in acute case (Ramaswamy 1994). The most common endo-

parasites in these animals including round worms (families: Strongylidae, Spiruridae, oxyuridae, Trichostrongylidae and Ascaridae) and tapeworm (family: Anoplocephalidae) which damage the internal organs specially the intestine depend on the age and natural defense of the individual animals (Pereira and Vianna, 2006). Some of the previous work record the status of endo-parasites in different parts of the country with various level of occurrence rate. Thus, it was reported that the prevalence of endo-parasites of equine in Sululta and Gefersa districts of Central Ethiopia with 99.5% *Strongyles*, 53% *Parascaris equorum*, 9.8% fasciolaspecies, 5.7% *Gastrodiscus aegypticus* and 2.8% Anoplocephala species (Getachew *et al.*,2011); Gizachew *et al.*, 2009), also reported that prevalence of GIT parasite in Ethiopia with the prevalence of 99% of *Strongyles species* 80% of fasciola,51% of *Parascaris* and 8% of *Tapeworm*. Although some of the above-mentioned findings were recorded in the country so far, scarce information is available especially in the current study area. Hence, this research work was designed with the objectives of estimating the prevalence of endo-parasite, based on the eggs obtained from the fecal samples and assessing the associated risk factor in these animals.

The type of endo-parasites affecting donkeys and mules in general, are life treating due to their exposure throughout their lives. Although they are often heavily parasitized by endo-parasites the prevalence and type of endo-parasites affecting donkeys and mules have not been determined to a great extent in the country, particularly in and around Ambo town. Therefore, the current study was designed to determine the prevalence of endo-parasites of donkeys and mules in and around Ambo town.

Thus the objective of this stud was:

- ✓ To identify prevalence of endo-parasites of donkeys and mules in the study area.
- ✓ To aware the owners about the effect of endo-parasites on their animals.

2. Materials and Methods

2.1. Study Area

The study was conducted from November 2014 to April 2015 on the prevalence of endo-parasites of donkeys and mules in and around Ambo town, which is a capital city of Western Showa zone of Oromia regional state. The study area is located on 114km distance to the western direction from Addis Ababa. The latitude and longitude of this area is 8°59'N- 37°51'E and 8.98°N 37.85°E respectively. The elevation of this area is 2101 meters above sea level and receives a mean annual rain fall from 800-1000 (900)millimeters. The rain fall is bimodal with heavy rain fall (70%) from June to Septembers while short rain fall (30%) is from February to April. The maximum and minimum temperature is 15°C and 29°C respectively, which has the average temperature of 22°C. The common vegetation of the area are shrubs, bushes, fibrous grasses of dry season and soft grasses of rainy season. There are about 13,3202 cattle, 25,405 equines, 96,053 shoats, 138,754 poultries and 6,202 bee hives (intensive and extensive) system and the livestock production system is dominated by extensive production system where animals are kept on grazing pasture with limited intensive and semi-intensive production systems(AWDADB, 2014).

2.2. Study Design and Animals

A cross sectional study was conducted on 384 randomly selected donkey and mules which comprises 59 mules and 325 donkeys in the study area. Information about species, sex, age, and body condition and management system of the animals under study were gathered from the owners as well as by observing the individual animal. As a chance, the number of female and male animals in this finding was equal, 192 in both sexes. Depend on the age of the animals; there were 327 adults and 57 young respectively. The ages of animals was determined using information obtained from the owners and dentition (Crane, 1997).

2.3. Sample size determination

The number of animals required for the study was determined using the formula given by Thrusfield (2005) for simple random sampling

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

Where N = required sample size

P_{exp} = expected prevalence

d = desired absolute precision (usually 0.05)

The size of the sample collected was determined using 95% level of confidence, 50% expected prevalence and 0.05-desired absolute precision. Therefore, 384 animals were included in the sample (325 donkeys and 59 Mules).

2.4. Sampling strategy

A total of 384 fecal samples were collected during the study period from examined animals by using simple random sampling in the study area. The species of animals from which the sample was collected were donkeys and mules.

2.5. Study Methodology

Fecal samples were collected directly from the rectum of donkeys and mules into universal bottle or plastic materials using sterile disposable gloves. Each sample was labeled with necessary information such as animal identification, owner's name, date and place of collection and immediately transported to Veterinary technology

Laboratory of Ambo University. Samples were kept in refrigerator at 4°C if immediate processing was not possible, but it had been processed within 48 hours. Gross examination was performed immediately after sample collection. Direct fecal smear, sedimentation and floatation techniques were utilized to identify the eggs of endo-parasites from the fecal samples and then examined under different objective of microscope (10× and 40×). Accordingly, identification of the eggs was made on the basis of their morphology (Soulsby, 1982).

2.6. Data Analysis

The collected data was coded and entered into Microsoft Excel spread sheet. Statistical analysis was performed using SPSS, version 17 software packages and data was statistically analyzed using chi-square. Percentage was used to calculate prevalence. In all cases 95% confidence interval (CI) and $p < 0.05$ was considered for statistically significant difference.

3. Results

Fecal specimens were directly taken from rectum of 384 equines (325 donkeys and 59 mules) and thoroughly observed under the microscope for the presence of different endo-parasites. The total prevalence of endo-parasites obtained in this finding was 55.2% (212/384) during the study period. From the observed animals, 55.1% (179/325) donkeys and 55.9% (33/59) mules were infected with different types of endo-parasites in the study area.

Table 1: Over all prevalence of endo-parasites infection in donkeys and mules.

Parasites Studied	No of animal examined	No of positive animals (%)	X^2	P-value
Donkeys	325	179 (55.1)	0.015	0.903
Mules	59	33(55.9)		
Total	384	212 (55.2)		

As it indicated in the next table, the parasites affect the animals without any statistically significant between all risk factors ($p > 0.05$).

Table 2: Prevalence of endo-parasites among different risk factors.

Risk factors		Animal examined	Strongyle	<i>S.westri</i>	<i>p.equorum</i>	<i>O.equi</i>	<i>D.caulus</i>	<i>T.conuicollis</i>
Spps.	Donkey	325	92 (28.3)	26 (8.0)	28(8.6)	16 (4.9)	10 (3.10)	13 (4.9)
	mule	59	16 (27.1)	6 (10.2)	9 (15.3)	3 (5.1)	0 (0.0)	0 (0.0)
X ²			0.035	0.308	2.28	0.003	1.864	2.443
P-value			0.852	0.570	0.112	0.958	0.172	0.118
Age	young	57	15 (26.3)	26 (8.0)	32 (9.8)	3 (4.9)	8 (2.4)	13 (4.0)
	Adult	327	93 (28.4)	6 (10.5)	5 (8.8)	16 (5.3)	2 (3.5)	0 (0.0)
X ²			0.108	0.421	0.057	0.14	0.216	2.345
P-value			0.742	0.516	0.811	0.905	0.642	0.126
Sex	male	192	55 (28.6)	16(50.0)	18 (9.4)	10 (5.2)	6 (3.1)	5 (2.6)
	female	192	53 (27.6)	16(50.0)	19 (9.9)	9 (4.8)	4(2.1)	8 (4.2)
X ²			0.052	0.000	0.030	0.055	0.411	0.717
P-value			0.820	1.000	0.863	0.814	0.522	0.397
Origin	In Ambo town	111	32 (28.8)	8 (7.2)	13 (11.7)	6 (5.4)	2 (1.8)	2 (1.8)
	Around Ambo town	273	74(27.8)	24(8.8)	24(8.80)	13(4.8)	8 (2.9)	11(4.0)
X ²			0.038	0.259	0.773	0.069	0.396	1.197
P-value			0.845	0.611	0.379	0.792	0.529	0.274
Body condition	Poor	185	56 (30.3)	16 (8.6)	16 (8.6)	8 (4.3)	5 (2.7)	6 (3.2)
	medium	118	34 (28.8)	8 (6.8)	10 (8.5)	4 (3.4)	5 (1.3)	4 (3.4)
	good	81	18 (22.2)	8 (9.9)	11 (13.6)	7 (8.6)	0 (0.0)	3 (3.7)
X ²			1.845	0.649	1.837	3.112	3.414	0.037
P-value			0.398	0.723	0.399	0.211	0.181	0.982
Work type	pack	323	92 (28.5)	27(8.4)	27 (8.4)	16(5.0)	10(3.1)	13 (4.0)
	cart	61	16 (26.2)	5 (8.2)	10 (2.6)	3 (4.9)	0 (0.0)	13 (3.4)
X ₂			0.129	0.002	3.804	0.000	1.939	2.541
P-value			0.720	0.966	0.051	0.991	0.164	0.111

Table 3: Chi-square analysis of different risk factors of endoparasites infection in donkeys and mules.

Risk factors		Animal examined	Positive animals	Prevalence	X2	P-v
Species	Donkeys	325	179	55.1	0.015	0.903
	Mules	59	33	55.9		
Age	Young	57	30	52.6	0.180	0.672
	Adult	327	182	55.1		
Sex	Males	192	110	57.3	0.674	0.412
	Females	192	102	53.1		
Origin	In Ambo town	111	62	55.9	0.026	0.871
	Around Ambo town	273	150	54.9		
Body condition	Poor	185	98	53.0	0.751	0.687
	Medium	118	67	56.8		
	Good	81	47	58.0		
Work type	Packing	323	178	55.1	0.008	0.928
	Carting	61	34	55.7		

Table 4: Related proportion of endo-parasites in the animals under study.

Types of parasites	Total animal examined	Positive animals (frequency)	Prevalence (%)
Strongyle species	384	108	28.1
Strongyloides westeri	384	32	8.3
Parascaris eqourum	384	37	9.6
Oxyuris equi	384	19	4.9
Dictyocaulus arnifield	384	10	2.6
Triodontophorus tenuicollis	384	13	3.4
Total	384	219	56.9

4. Discussion

The prevalence of endo-parasites may vary temporally and spatially. The results of the present study demonstrated the presence of 6 and 4 different types of endo-parasites in donkeys and mules respectively. The overall prevalence of different endo-parasites was found to be 55.2%

(212/384).The overall prevalence of endo-parasites (55.2%) recorded in the current study was relatively lower than some of the earlier reports of 92.71% (Mezgebu *et al* 2013, 96.9% (Ibrahim *et al.*, 2011), 98.2% (Ayele *et al.*, 2006) and 84.4% (Ulima *et al.*, 2006.) around Gonder, around Hawassa town, Dugda Bora District and Awi Zone, respectively.

The prevalence of these parasites in donkeys 55.1% (179/325) and mules 55.9% (33/59) were the same in this work. This could be due to equal chance of exposure of both sex to the parasites (Rodiosistis et al., 2007). On this concept, analysis of data for sex related susceptible endo-parasites infections indicates a lack of any difference among the two groups ($p > 0.05$) and gender does seem to play no role in this regard. This finding agrees with the work of (Fikru et al., 2005) and (Chapman et al., 2002) who reports no significance difference between sexes and (Feseha et al., 1999) who reports the same idea with a prevalence of 100 % in mules and 100 % in donkeys in internal parasites around Menagesha.

Data on age related prevalence indicates no statistical difference ($p > 0.05$) among various age groups. In the present study, the prevalence in related to age in this finding is agrees with the work of (Niredin et al. 2011, Ayele and Dinka 2010) in Hawassa and its surrounding and central Shoa, Ethiopia, respectively. But the present finding opposes the report of (Shiferew et al., 2005) in which the high prevalence was reported in young animals. The prevalence of these parasites in relation to the animal origin was statistically insignificant. The reason for this may be the similarity of climatic condition where all animals included in the present study were reared.

Varied prevalences, which ranged from 2.6 % to 28.1%, were observed in equines during the study period. Among the six different types of endoparasites identified in the current study, strongyles (28.1% in donkeys and % in mules) were found to be dominant in the study area. This was in agreement with the finding of Ayele et al., (2006) who reported 100% prevalence of strongyles in Dugda Bora.

The highest prevalence of strongyles infestation was seen in animals of old age in both donkeys and mules than in their young. This finding disagrees with the work of (Niredin et al., 2011), (Ayele and Dinka et al., 2010) in Hawassa and its

surrounding and central Shoa, Ethiopia, respectively.

Varied prevalence's, which ranged from 2.6 % to 28.1%, were observed among different endoparasites in the animals under study during the study period. Among the six different types of endoparasites identified in the current study, strongyles (28.3%, 27.1%), *Strongyloides westeri* (8.0%, 10.2%), *Parascaris equorum* (8.6%, 15.3%), *Oxyuris equi* (4.9%, 5.1%), *Dictyocaulus arnfieldi* (3.10%, 0.0%), triodontophorus (4.9%, 0.0%) were recorded in donkeys and mules respectively. This finding was in agreement with the work of Ayele Gizachew et al., (2006) who reported 100% prevalence of strongyles in Dugda Bora.

The prevalence of Strongyle spp. was 28.1% and this opposes with the work of Yoseph, S, et al (2001), Mulate et al., (2005) and Fikru et al., (2005) who have reported 100%, 100% and 98.2% in donkeys of Wonchi, high lands of Wollo province and western highlands of Oromia, respectively. In addition, the prevalence of strongyles species in the current study was lower than the previous 100% record prevalence of these parasites in equine at Western highland of Oromia (Regassa et al., 2005) Wonchi area (Yoseph et al., 2001) and highland of Wollo Province Mulate et al., (2005).

This finding is relatively closed to the work of (Sawsan, 2008), which was reported with the prevalence of 37.48% strongyles species in donkeys from South Darfur state. The prevalence of *Oxyuris equi* was recorded in this study with 4.9% in donkeys followed by 5.1% in mule. This finding is agreed with some of the earlier reports in different areas including the 4.3% in donkeys in Gonder (Mezgebu et al.,) 3% Ayele et al., (2006) and 2% (Getachew et al., 2008) in central Ethiopia. The relative low occurrence of endoparasites in and Ambo town might be associated with the agro-ecological differences, veterinary services, availability of anthelmintics nearby to the owners to buy and deworm their animals.

5. Recommendation and Conclusion

Equines have crucial importance in the livelihood of developing countries especially in Africa, particularly for transportation in different agro ecology. Besides the managerial problems, disease by endo-parasites have greater impact directly or indirectly on these important animal health. Moreover, endo-parasites causes failure in power of these animals and hence leads to economic loss. The present study showed the presence of some endo-parasites that will play a role in controlling the health and welfare of donkeys and mules in the study districts. In this study, six and four different endo-parasites were found in donkeys and mules respectively. The present study indicates that the high endo-parasite infection of donkeys and mules was with strongle species (28.1%) and the least infection was with *Parscais equorum* (2.6%). The overall prevalence in this finding was of 75.5% which is lower when compared with many reports on endo-parasite infection from different corners of the country.

However, the information on the different aspects of donkey and mules parasitology is still limited. Hence, a detailed study on the species composition, epidemiology, pathogenicity, treatment, control strategies and immune reaction to the most economically important species of endo-parasites in donkeys and mules is highly recommended. Additionally, owners of equines should be educated about proper management of equines such as providing sufficient food and shelter, minimizing overworking and extensive open grazing to take appropriate treatment and control.

In the line with the above conclusion, the following recommendation are forwarded:

- ✓ Strategic deworming program should be implemented in the study area.
- ✓ Rotational grazing should be recommended to reduce pasture contamination and infection of susceptible hosts.
- ✓ The owners should have get awareness on the equines health problems and manage mental approaches through education.

- ✓ Further studies on endo-parasites of donkeys and mules in the other areas should be recommended.

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