Websites:
http://www.lifesciencesite.com
http://www.sciencepub.net

Emails:
editor@sciencepub.net
sciencepub@gmail.com

Life Science Journal

MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

PREVALENCE OF BOVINE SCHISTOSOMIASIS AND ITS ASSOCIATED RISK FACTORS IN MECHA DISTRICT, NORTH WESTERN, ETHIOPIA

DAGNINET MOLLA

WOLLO UNIVERSITY, SCHOOL OF VETERINARY MEDICINE

PREVALENCE OF BOVINE SCHISTOSOMIASIS AND ITS ASSOCIATED RISK FACTORS IN MECHA DISTRICT, NORTHWESTERN, ETHIOPIA

ABSTRACT: A cross-sectional study was conducted commencing from October 2015 to April 2016 in Mecha District, West Gojam Zone of Amhara region, Northwestern Ethiopia in order to determine the prevalence of bovine schistosomiasis. Simple random sampling was used to select the study animals and coprological examination using sedimentation technique was applied for the recovery of *schistosoma* eggs from freshly collected fecalsamples. Out of 384 fecal samples examined 37(9.6%) were found positive for schistosomiasis. There was no statistically significant difference observed (P>0.05) among the three peasant associations visited even though Kudimi showed higher prevalence 17(12.1%) than the other two Peasant associations. Similarly, though 14(9.0%) male and 23(10.1%) female cattle were found positive, there was no statistically significant difference observed between the two sexes (P>0.05). Cattle having less than 2 years, 2-5years and greater than 5 years old had prevalence of 5(4.9%), 17(11.8%) and 15(10.9%) respectively. Nevertheless, there was no statistically significant differences appreciated among the three age categories (P>0.05). The prevalence in poor body condition 19(14.1%) was higher than that of medium body condition 15(10.7%) as well as good body condition 3(2.8%) and variation was statistically significant(P<0.05), and with regard to breed schistosomiasis was higher in local breed (9.8%) than cross breed cattle(8.3%). In relation to production system the prevalence of the disease was highest in extensively managed animals 34(11.9%) compare with semi intensive 3(3.7%) and zero prevalence in intensive management system and the difference was statistically significant among the three management systems (P<0.05). Therefore, this study indicated that bovine schistosomiasis is still one of the major cattle health problems in Mecha district. Accordingly, farmers should be educated and advised about the diseases and its intermediate host. Hence, control of schistosomiasis based on drug treatment (strategic anthelmintics practice), snail control and appropriate sanitation measures were recommended.

[DAGNINET MOLLA, **PREVALENCE OF BOVINE SCHISTOSOMIASIS AND ITS ASSOCIATED RISK F ACTORS IN MECHA DISTRICT, NORTH WESTERN, ETHIOPIA**. *Life Sci J* 2024;21(2):39-56]. ISSN 1097-8135 (print); ISSN 2372-613X (online). http://www.lifesciencesite.com.03. doi:10.7537/marslsj210224.03.

Key words: *Bovine, Coprology, Mecha, prevalence, schistosomiasis, sedimentation, snail*

DVM THESIS

JUNE, 2016

DESSIE, ETHIOPIA

WOLLO UNIVERSITY
SCHOOL OF VETERINARY MEDICINE

PREVALENCE OF BOVINE SCHISTOSOMIASIS AND ITS ASSOCIATED RISK FACTORS IN MECHA DISTRICT, NORTHWESTERN, ETHIOPIA

A thesis submitted to the school of Veterinary Medicine, Wollo University in partial fulfillment of the requirements for the degree of Doctor of Veterinary Medicine.

BY
DAGNINET MOLLA

WOLLO UNIVERSITY
SCHOOL OF VETERINARY MEDICINE

PREVALENCE OF BOVINE SCHISTOSOMIASIS AND ITS ASSOCIATED RISK FACTORS IN MECHA DISTRICT, NORTHWESTERN, ETHIOPIA

As DVM research academic advisor, I hereby certify that I have supervised, read and evaluated this DVM thesis prepared under my guidance by **Dagninet Molla** entitled, **Prevalence of bovine Schistosomiasis and its associated risk factors in Mecha District, North western, Ethiopia,** and I recommend that it can be submitted as fulfilling requirement for the Degree of Doctor of Veterinary Medicine (DVM).

Advisor name	**Signature**	**Date**

Dr. Faris Delil 03/10/2008 E.C.

As member of board examiners of the DVM thesis open defense examination, we certify that we have read and evaluated the thesis prepared by **Dagninet Molla** and examined the candidate. We recommend that the thesis be accepted as fulfilling the DVM thesis for partial requirement of the Degree of Doctor of Veterinary Medicine.

Board of examiners Name	**Signature**	**Date**
1. Dr. Tesfaye Sisay (DVM, MSc, PhD, Asso.Prof.)	----------	16/06/16
2. Dr. Hagos Ashenafi (DVM, MSc, PhD, Asso.Prof)	----------	---------
3.Dr. Teshale Sori (DVM, MSc, Asso.Prof)	----------	16/06/16
4.Dr. Belyineh Getachew (DVM, MSc, PhD, Asso.Prof)	----------	---------

Table of Contents

ACKNOWLEDGMENTS

First of all, I would like to thank the almighty GOD of the universe that keeps and helps me throughout my life. My special thanks go to my advisor Dr. Faris Delil for his intellectual guidance and devotion of his time to correct this manuscript.

I would like to thanks my lovely mother Wudie Yenesew for her continous encouragement to thrive my goal.
I wish also to express my profound gratitude to personnel of Bahir Dar Regional Veterinary Laboratory, for their unreserved guidance, valuable suggestions and voluntariness to do this research.
Finally my deeper feeling goes to all my friends who have been with me during the good and bad times in my student life.

LIST OF TABLES **PAGES**

LIST OF ABBREVIATIONS

AAPMDA	Animal, animal products and by-products Market Development Authority
BCS	Body condition Scores
ANRS	Amhara National Regional State
CDC	Center for Disease Control and Prevention
CSA	Central Statistical Authority
EPCC	Ethiopian Population Census Commission
GDP	Gross Domestic Product
ILCA	International Livestock Center for Africa
m.a.s.l	Metera Above Sea Level
MWADRDO	Mecha Wereda Agricultural and Rural Development Office
PA's	Peasant Associations
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

ABSTRACT

A cross-sectional study was conducted commencing from October 2015 to April 2016 in Mecha District, West Gojam Zone of Amhara region, Northwestern Ethiopia in order to determine the prevalence of bovine schistosomiasis. Simple random sampling was used to select the study animals and coprological examination using sedimentation technique was applied for the recovery of *schistosoma* eggs from freshly collected fecalsamples. Out of 384 fecal samples examined 37(9.6%) were found positive for schistosomiasis. There was no statistically significant difference observed (P>0.05) among the three peasant associations visited even though Kudimi showed higher prevalence 17(12.1%) than the other two Peasant associations. Similarly, though 14(9.0%) male and 23(10.1%) female cattle were found positive, there was no statistically significant difference observed between the two sexes (P>0.05). Cattle having less than 2 years, 2-5years and greater than 5 years old had prevalence of 5(4.9%), 17(11.8%) and 15(10.9%) respectively. Nevertheless, there was no statistically significant differences appreciated among the three age categories (P>0.05). The prevalence in poor body condition 19(14.1%) was higher than that of medium body condition 15(10.7%) as well as good body condition 3(2.8%) and variation was statistically significant(P<0.05), and with regard to breed schistosomiasis was higher in local breed (9.8%) than cross breed cattle(8.3%). In relation to production system the prevalence of the disease was highest in extensively managed animals 34(11.9%) compare with semi intensive 3(3.7%) and zero prevalence in intensive management system and the difference was statistically significant among the three management systems (P<0.05). Therefore, this study indicated that bovine schistosomiasis is still one of the major cattle health problems in Mecha district. Accordingly, farmers should be educated and advised about the diseases and its intermediate host. Hence, control of schistosomiasis based on drug treatment (strategic anthelmintics practice), snail control and appropriate sanitation measures were recommended.

Key words: *Bovine, Coprology, Mecha, prevalence, schistosomiasis, sedimentation, snail*

1. INTRODUCTION

Livestock production constitutes one of the principal means of achieving improved living standards in many regions of the developing world. In sub-saharan Africa countries livestock plays a crucial role both for the national economy and the livelihood of rural communities. It provides draught power and raw material for industry (ILCA, 2007). Livestock in great horn of Africa is a vital resource in promoting development. They provide 20-30% of , gross domestic product (GDP) and as much as 70% of cash income is generated from livestock (Swell and Brocklebsy, 2005). In Ethiopia, livestock contribute about 30-35 % of agricultural gross domestic product (GDP) and 12-16 % of total GDP (AAPMDA, 1999).

Schistosomiasis or Bilharziasis/snail fever is a disease caused by trematodes of *Schistosoma* with different species. After malaria and intestinal helminthiasis, schistosomiasis is the third most devastating tropical disease in the world, being a major source of morbidity and mortality for developing countries (WHO, 2010) and common in many tropical and subtropical areas as well as in Africa, Asia and India. *Schistosoma bovis, Schistosoma mattheei, Schistosoma Intercalatum, Schistosomaspindale, S.nasalis and Schistosoma indicum* have significant veterinary important in livestock production in Africa, Asia, and south Europe (Bont, 1995). The distribution of Schistosoma infection varies from place to place. *Schistosoma bovis* is the commonest species in Africa and Mediterranean region (Aemro, 1993) whereas; *Schistosoma spindale, Schistosoma indicum* and *Schistosoma nasalis* have been reported in Asia as the major cause of Schistosomiasis (*Bont, 1995).* In this study *Schistosoma bovis* was commonly found in the study area under faecal examination. Though, Ethiopia is recognized for its vast wealth of livestock, the economic benefit derived from the livestock center does not commensurate with the potential (FAO, 1993). Development of large animal is constrained among other important factors, by wide spectrum of the diseases like Schistosomosis. In our country, Schistosomosis appears to be spreading. The major transmitting sites are small streams all over the highlands of Ethiopia, lakes like Tana, Zeway as well as irrigation systems, such as sugar state Wonjido also play a similar role (Shibru *et al*., 1989).

However, the distribution of the disease has been primarily determined by the distribution of snail intermediate host, particularly *Bulinus* and *Physopsis* species which are important for bovine Schistosomiasis (Urquhart *et al*., 1996). Ethiopia is highly endemic for schistosomiasis, since temperature in Ethiopia appears to be the major factor that affects the distribution schistosoma species (WHO, 2010). Schistosomiasis is a chronic debilitating infection that affects both animals and humans by its' different species. It is one of the major concerns of animals in the world (Okpala *et al.*, 2004; Lefevre *et al*., 2010) and the disease has Public

health importance (Belayneh and Tadesse, 2014). It can cause high economic losses by resulting mortality, low fertility**,** retard growth, poor productivity, low milk yield and increased susceptibility to other disease in livestock (Pitchford and Visser, 1998).

In Ethiopia, various epidemiological studies were conducted on bovine schistosomiasis which was indicative of the epidemicity of the disease particularly in large stagnant water bodies and marshy free grazing areas. The prevalence of *schistosoma*infectionhas been reported from different areas of the country by faecal examination andpostmortem examination after the animals were slaughter at abattoir. Bovine schistsomiasis is one of the major constraints for livestock production in the Mecha district. The study area ended with wetland fields that favor the breeding and development of biological vectors (snails). Nevertheless, there was no research work still done and no any epidemiological data with regard to risk factors of the disease in mecha district. Therefore, the main objective of this study were:

- To estimate the prevalence of bovine Schistosomiasis in mecha district
- To identify the possible risk factors for the occurrence of the disease in the study area.

2. MATERIALS AND METHODS

2.1 Study area

Mecha district is one of the 105 District of Amhara Regional State which is found in west Gojjam Zone, northwestern parts of Ethiopia.It is located at about 535 km North West of Addis Ababa and 30 km south west of Bahir Dar. The altitudinal variation of the District ranges from 1800-2800 m a.s.l. and it covers total surface area of 159,027 hactares. Currently, the District consists of 43 kebeles of which 3 kebeles are found in Merawi Town and the rest in the rural kebeles (MWAO, 2010). The District lies between the coordinatesof 110 05' to 110 38' N and 370 00' E to 370 23' E. The agroecology of the District is classified as 'Weina Dega' (80%) and 'Dega' (20%). The total population of the District is 248,127 of whom 126, 136 are males and 121, 991 are females. The annual rainfall is 1703 mm and the minimum, maximum and mean annual temperature is 5.70C, 30.60C and 18.80C respectively.The livestock population of in ANRS comprises about 10.6 million cattle, 5.7 million sheep, 4 million goats, 2.1 million equines, 0.017 million camels and 13.5 million poultry. But, the District comprises of 20106 equines, 190000 cattle, 148971 ovine and 204181 poultry (MWARDO, 2011). The landscape is marked by the presence of Qoga dam andlivestock is reared in the area with mixed farming thusfarm animals are the major source of agricultural income for the livestock owners (CSA, 2008).

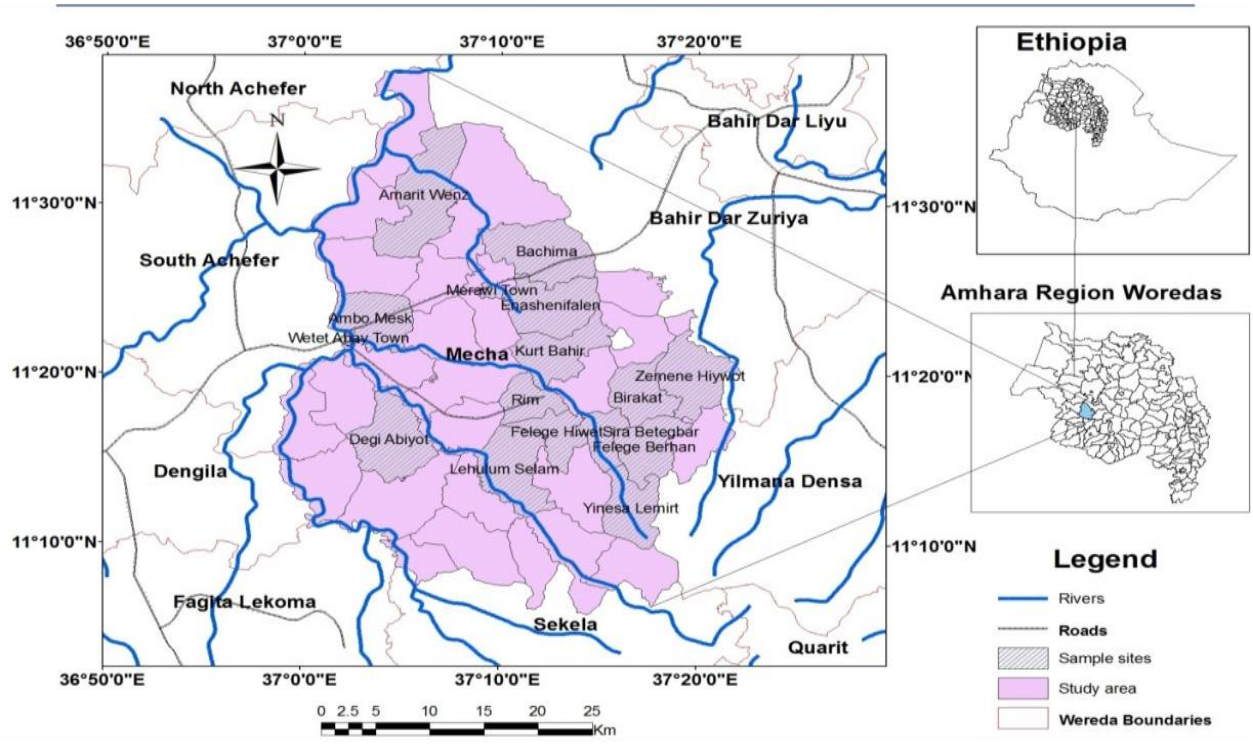

Figure5: Mapofthe studyarea

Source: (CSA,2007)

2.2 The study population

Study animals were cattle of different breed, age, sex and that were found in Mecha district. The animals were sampled from different sites of the study area. The breed of cattle was categorized as local and cross breeds. This study included both sex of cattle and their age groups, which were categorized as <2 years, 2-5 years and >5 years old. The age of each animal was estimated using the dentition pattern and ask owners (Pope, 2008). The cattle had different body condition scores like, good, medium and poor body condition score (Ferguson, 2011) and kept under extensive, semi intensive and intensivemanagement system used for draft, milk and meat purpose.

2.3 Sampling and Study design

The type of study was cross-sectional which was conducted from October 2015 to April 2016 in in mecha district to establish the prevalence of bovine schistosomiasis and associated risk factors in the study area. The study area were selected purposively while the individual animals were sampling by using simple random sampling technique. From these, individual animals were examined for the prevalence of bovine schistosomiasis.

2.4 Sample size determination

The appropriate sample size for this study was calculated using the formula given (Thrusfield ,2005).

$$n = \frac{1.96^2 Pexp\ (1-Pexp)}{d^2}$$

Where: n = required sample size,

Pexp = expected prevalence, and

D = desired absolute precision.

1.96^2 = value for the 95% confidence interval

Since there was no any research conducted before on the area, the expected prevalence was taken as 50% expected prevalence and 5% was absolute precision at 95% confidence interval. Therefore, 384 cattle were needed in the study area and calculated.

2.5 Study methodology

2.5.1 Coprological examination

Faecal samples were collected directly from the rectum using sterile gloves. The collected samples were placed in clean universal bottle preserved with 10% formalin and closed with screw top in air tight condition. The samples were transported to Bahir Dar Animal Health Diagnostic and Investigation Laboratory. All samples were clearly label with the date of sampling, sex, age, body condition score, altitude and management system that was used. The collected samples were subjected to qualitative coprological examination using sedimentation technique (annex:3).

For the trematodes eggs identification, a drop of methylene blue was added. Sedimentation technique was employed to assess the presence of *Schistosoma* eggs through repeating dilution of the fecal suspension and sedimentation of the eggs, which were heavier than most of the fecal particles (Hansen and Perry, 1994; Urquhart *et al.*, 1996).

2.6 Data analysis

The collected data was entered and stored into Microsoft Excel spread sheet 2007. The data were thoroughly screened for errors and properly coded before subjecting to statistical analysis. The data were imported from the Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 16.0. Descriptive statistics was used to determine the prevalence of schistosomiasis and Pearson's chi-square ($\chi 2$) test was used to assess the association of the potential risk factors like age, sex, body condition, orgin, breed and management for the occurrence of the schistosomiasis. In this analysis p-value less than 0.05 at 5% level of significance were considered as statistically significant.

3. RESULTS

The prevalence of schistosomiasis in bovine was investigated based on the presence of *Schistosoma bovis* eggsin the faecal samples. The prevalence of *S. bovis* infection was compared between different groups of animals. When the prevalence of the disease was compared among animals with different body condition, origin, and breeds, there was only statistically significant difference on body conditions and management system. However, there was no statistically significant difference in prevalence between local and cross breeds of cattle, among different age groups and between sex groups of study animals. Overall the coprological examination using 384 samples indicated 37(9.6 %) to be positive for *Schistosoma bovis* eggs.

3.1 Prevalence of bovine schistosomiasis in relation with selected peasant associations

When the prevalence of *Schistosoma* infection was compared between animals of different origin encompassing three PAs, the highest prevalence was observed in Kudmi (12.1%) followed by Kurt bahir (10.5%) and Enashenfalen(5.4%). However, there was not statistically significant difference in these three PA's of the district (x^2= 3.41, P = 0.18) as shown in Table 1.

Table 1**:** The prevalence of *Schistosoma* infection in relation to study site.

Orgin	No of examined animals	No of positive Animals	Prevalence (%)	P-value (X^2)
Enashenfalen	111	6	5.4	
Kudmi	140	17	12.1	0.18 (3.4)
Kurt Bahir	133	14	10.5	
Total	384	37	9.6	

3.2 Prevalence of bovine schistosomiasis in relation with breed

The prevalence of bovine schistosomiasis was higher in local breed cattle (9.8%) than cross breed cattle (8.3%). However, there was no statistically significant difference in prevalence of *Scistosoma* infection between the two groups of breeds of cattle (p>0.05) as shown in Table 2.

Table 2: Prevalence of *Schistosoma* infection between local and cross breed cattle in mecha district

Breed	No of animals examined	No of positive Animals	Prevalence (%)	P-value (X^2)
Local	296	29	9.8	
Cross	88	8	8.3	0.62 (0.25)
Total	384	37	9.6	

3.3 Prevalence of bovine schistosomiasis in relation with sex

As the prevalence of *Schistosoma* infection in the two sex groups of animals was compared, the prevalence in females was higher (10.1%) than in males (9.0%). However, there was no statistically significant difference between the two sexes (P > 0.05) as shown in Table 3.

Table 3: Prevalence of *Schistosoma* infection between sex groups of cattle in the study area.

Sex	**No of animals examined**	**No. of positive animals**	**Prevalence (%)**	**P-value (χ^2)**
Male	156	14	9.0	
Female	228	23	10.1	0.7 (0.13) .
Total	384	37	9.6	

3.4 Prevalence of bovine schistosomiasis in relation with age

The highest prevalence of *schistosoma* infection was observed in cattle with the age range of 2 to 5 years (11.8%) followed by those > 5 years of age (10.9%) and the lowest prevalence was observed in cattle of less than 2 years of age (4.9%). However, there was no statistically significant difference in prevalence among the different age groups of cattle (P> 0.05) as shown in Table 4.

Table 4: Prevalence of *Schistosoma* infection among the different age groups of cattle in the

Age (year)	No of examined animals	No. of positive animals	Prevalence (%)	P-value (χ^2)
< 2	103	5	4.9	
2-5	144	17	11.8	0.15 (3.8)
>5	137	15	10.9	
Total	384	37	9.6	

3.5 Prevalence of bovine scistosomiasis in relation with animal body condition scores

The prevalence of scistosomiasis with regard to BCS has been investigated. The prevalence was the highest in poor body conditioned animals (14.1%) followed by those having medium body conditioned animals and lowest in those with good body conditioned. The difference in the prevalence in relation with the body condition was statistically significant (p<0.05) (Table 5).

Table 5: Prevalence of *Schistosoma* infection among animals of different body conditions in Mecha district.

Body conditions	No of animals examined	No of positive animals	Prevalence (%)	P-value (χ^2)
Poor	135	19	14.1	
Medium	140	15	10.7	0.01(9.1)
Good	109	3	2.8	
Total	384	37	9.6	

3.6 Prevalence of bovine schistosomiasis in relation with production systems

When prevalence of *schistosoma* infection was compared in animals of different management system in the study area, the highest prevalence was observed in cattle kept under extensive management system (11.9%) than semi-intensive management system (3.7%), while zero prevalence was observed in animals kept under intensive management system (Table 6) and the difference in the prevalence in relation with the production system was found to be statistically significant (p<0.05).

Table **6.** Prevalence of *Schistosoma* infection among animals of different management system

Management system	No animals examined	No of positive animals	Prevalence (%)	P-value (χ^2)
Extensive	284	34	11.9	
Semi intensive	81	3	3.7	0.03 (7.1)
Intensive	19	0	0	
Total	384	37	9.6	

4. DISCUSSION

Schistosomiasis is known to pose livestock and public health impact so that for establishment of a control strategy, detailed information on local epidemiology and significance of the disease need to be known. In this study, the prevalence of *Schistosoma* infection was examined based on the presence of schistosoma eggs in the faecal samples. The overall prevalence of bovine schistosomiasis in this study was (9.6%, n=37). The result of this study is almost comparable with the prevalence studies in Fogera district 10.15% (Mengistu *et al*.,2012), in Bahir Dar (ALRC) 9.89% (Assres *et al*., 2012), in and around Bahir Dar 10.93% (Almaze, 2007), in and around Debre Tabor 7.6% (Mihret and Samuel, 2015) and in Dangla district 11.5% (Adane and Mulat, 2015). However, the prevalence from this study is lower than other studies done previously in and around Bahir Dar 29.4% Hailu (1999), 17.4% Yalelet (2004), 22.06%, Solomon (2008), 37.3 % Almaz *et al.*(2011), 24.3% Belayneh and Tadesse (2014) and 27.13% in Dembia district by Alemseged (2010),and also 28% in Kemissie by Ameni *et al.* (2001).

The lower prevalence of schistosomiasis in the present study might be due to a recent reduction in stagnant (swampiness) water and development of mechanized irrigation system in the study area which drained the swampy nature of the land and changed the ideal moisture condition making unfavorable for snail breeding and development of larval stages within the snail intermediate host. Urguhart *et al.* (1996) elaborates unavailability of a suitable snail host being one of the most important factors that influence the occurrence of schistosomiasis.

With regard to the origin, although no statistically significant difference observed among PA's in included in the current study (P>0.05), highest prevalence of *Schistosoma* infection was observed in Kudimi (12.1%) followed by Kuritbahir (10.5%) and the lowest prevalence of the disease was observed in Enashenfalen (5.4%). These might be due to variation in the ecology as most of the kebeles included in this study have Qoga dam and also still a swampy pasture land that creates a favorable environment for the existence of the snail vectors. Other reasons may be due to the variation in sample size, humidity and management system between localities.Similarly, Almaz (2007) has reported that water lodged and poorly drained areas with acidic soils are often endemic for schistosomiasis.

Although the prevalence of bovine schistosomiasis in this study was a little bit higher in local breed cattle (9.8%) than cross breed cattle (8.3%), the difference was not statistically significant (P>0.05). The finding of Adane and Mulat (2015) is in agreement with the current finding whereby higher prevalence reported in local breed (12%) and bit lower in cross breed cattle (8.5%) in Dangla district. Similarly, Alemseged (2010) reported higher prevalencein local breed(29.68%) thanin cross breeds (17.14% in Dembia district. This might be due to less exposure of cross breed cattle to the marsh areas as compared with local breeds of cattle. On the contrary, Miheret and Samuel (2015) recorded higher prevalence of bovine schistosomiasis in cross breed (8.3%) than local breed (7.2%) in and around Debre Tabor. Solomon (2008) also reported higher prevalence (25.83) in cross breed cattle than local cattle (16.66%) in and around Bahir Dar. This difference might be because of the local breeds better adaptation and immunity compared with pure or cross breeds if there is equal exposure to parasite in question.

In the case of variation in relation with the difference in sex, a relatively lower prevalence reported in male (9.0%) than in female (10.1%). However, there was no a statistically significant (P>0.05) difference between the two sexes. This is concordance with the previous studies including Adane and Mulat (2015), 12.6% in female and 9.9% in male in Dangla district; Miheret and Samuel (2015), 30.70% in female and 23.30% in male in and around Debre Tabor Town. The results indicated that both sexes at the same risk to acquire the infection because of similar exposure to the risk factors as there were no restrictions on movement for grazing

and contact with the parasite in terms of sex. In addition, since both sex groups were grazing in a similar contaminated pasture land and have access to similar water points, they prone to the risk of acquisition of the infection. Kassaw (2007) also reported that the increased contact time with *Schistosoma*infested habitat increases the rate and endemicity of schistosomiasis. However, the difference in previous report, a relatively higher figure in female than in male might be due to unproportional representation of male and female animals.

The prevalence of *Schistosoma*infection in relation with the different age groups in this study indicated that highest prevalence in age group ranging between 2 to 5 years (11.8%), followed by those with the age greater than 5 years (10.9%) and least in age groups below 2 years (4.9%). However, the difference in the prevalence among the three age groups was not statistically significant (P>0.05). This could be attributed to the fact that adult and old cattle groups cover large areas and have high grazing capacity than young age groups under extensive management system where, the prevalence of cercaria infection is predominated. But, calves may not be weaned up to an average of 2 years and do not graze on the field with adult cattle rather, they are kept indoor. So they have low probability to be exposed for the vector. On the other hand, the slightly lower prevalence in older age group of cattle than adult age groups might be due to the development of acquired resistance against the parasites, which could suppress the worm fecundity and decrease the release of parasitic eggs within the faeces (Bushara *et al*., 1982).This finding is in agreement with those work of Mihret and Samuel (2015) in Debre tabor Town, and Belayneh and Tadesse (2014) in Bahir Dar Town. In different with the current finding, Mengistu *et al*. (2012) reported that cattle less than 2 years old has highest prevalence since they are not with good immunity to resist the new infection than others.

The statistical analysis of this study showed that body condition score had significant influence on the prevalence of bovine schistosomiasis in the area. Highest prevalence was recorded in cattle with poor body conditioned (14.1%) followed by those with medium body condition (10.7%) and least in those with good body conditioned (2.8%), and the difference was statistically significant (P<0.05). The reason might be related to the body defense mechanism of cattle whereby those with better body condition certainly have better immunity than those with poor body condition so that animals with poor body condition score were more affected than other groups of animals. Similarly, Merawe *et al.* (2014) affirmed that the infection rate increase in animals with poor body condition score in which weak animals become more suppressed and susceptible due to malnutrition and other parasite infection. As described by Lawrence (1979); immunity did not act primary by absolute prevention of maturation of challenge infection, but mainly by suppression of worm fecundity.

The current bovine schistosomiasis prevalence figure in relation with BCS is in agreement the works of Belayneh and Taddese (2014), and Adane and Mulat (2015) that accounted the prevalence of *Schistosoma* infection to be more common in animals with poor BCS than those with medium and good BCS. The other reason might be related with feeding practice of farmers where they usually harvest green fodder grown on the marsh areas and feed their weak animals in order to compensate their body condition score.

With regard to cattle production system in the current study are, the highest prevalence of bovine schistosomiasis was reported in those kept under extensive management system (11.9%) followed by those reared by semi-intensive management system (3.7%) and zero prevalence was observed in animals that were kept under intensive management system, and the difference was statistically significant (P<0.05). The grazing habit in extensive system is potential source of *Schistosoma* infection due to the frequent contact of animals to the water. In semi-intensive management system, cattle are kept in doors and partly outdoor which might be risk of acquiring the vector while grazing. However, animals that are kept in indoor intensive management system are rather supplemented with adequate quantities of food and clean water thereby free of sullying. The current report is in agreed with Alemseged (2010), Belayneh and Tadesse (2014), and Adane and Mulat (2015) in which bovine schistosomiasis was lower in intensive management system than semi-intensive and extensive management systems. The main reason might be because of management system in which unlike semi-intensive and extensive systems, animals are kept indoors and the risk of exposure for the disease is low. However, they may be exposed for the disease in the condition of contamination of feeding and watering troughs as well as in supplementation of green foodders which is harvested from marsh areas containing cercarial stage of the parasite.

In general, the present finding shows that prevalence of bovine schistosomiasis progressively becomes reduced than previous finding that might be partially due to relatively reduction in swampy nature of the pasture land, better implementation of schistosomiasis control activity and the ongoing public education to create

awareness to animal owners regarding impact and control measures by management.

5. CONCLUSION AND RECOMMENDATIONS

The outcome of the study strongly suggests that the prevalence of bovine schistosomiasis recorded in this study based on coprological examination revealed that bovine schistosomiasis is one of the endemic diseases in the study area that deserve serious attention in the future. The disease can cause significant economic loses throughout the world. The disease was detected in breeds of cattle, sexes, age groups, body condition score and management systems in randomly selected origins of the study animals. In addition, occurrence of the disease is closely linked to the presence of bio-types suitable for the development and multiplication of intermediate hosts. Therefore, this study revealed that bovine schistosomiasis was one of the major parasitic diseases contributing to loss in productivity and production of cattle in the study area. Based on the present study the following recommendations are forwarded;

- Schistosomosis should be taken into consideration as a one of the major limiting factor to livestock productivity in Mecha district; thus any endeavor towards animal disease control strategy must include it in the priority list.
- Direct killing of intermediate host; snails with chemicals or destroying their habitats through drainage system should be implemented. The native Ethiopian plant *Phytolacca Dodecandra*, locally known as "*Endod*" which is considered as potent molluscicide for the control of human schistosomiasis, should be also effectively used against intermediate host of bovine schistosomiasis.
- Awareness should be created for the farmers about the risk factors of the disease and its transmission, as much as possible do not allow to graze their cattle freely on swampy or marsh areas and also supply dry feeds and clean water for their cattle regularly.
- Biological control through the use of insects or fish, which will feed on snails, or use of competitor snails, is another option as control of *Schistosoma*infection.
- Strategic treatment and deworming interventions should be applied to prevent losses incurred by schistosomosis and also further detailed studies are needed to gather enough information about the parasite itself and its intermediate host, which is used to control *Schistosoma* infection in the area.
- Researches should be encouraged towards the development of vaccines for *Schistosoma* infection which is considered as control measurement of the disease.

6. REFERENCES

[1]. Adane, A .and Mulat, A. (2015):Crossectional Study on Prevalence of Bovine Schistosomiosis and its Associated Risk Factors in Dangila District. DVM Thesis, Wollo University, School of Veterinary Medicine, Dessie, Ethiopia. *Journal of Animal Research*, **5(3)**: 397-402.

[2]. Aemro, T. (1993): Assessment of prevalence, economic significance and drug efficiency trial on bovine Schistosomosis in Bahir Dar, Ethiopa. DVM Thesis, faculty of veterinary medicine, Addis Ababa University, Debre Zeit, Ethiopia.

[3]. Alemseged, G. (2010): Prevalence of bovine Schistosomiasis in Dembia District North west Ethiopia. DVM thesis, Faculty of veterinary medicine. Gondar, Ethiopia.

[4]. Almaz, H. (2007): Pathology of naturally occurring Schistosoma infection in cattle slaughtered at Bahir Dar Municipal Abattoir, Northwest Ethiopia. DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre Zeit, Ethiopia.

[5]. Almaz, H. and Solomon, W. (2011): Repeated Simple Sedimentation Technique and Prevalence of Bovine Schistosomiasis in Selected sites of Bahir Dar woreda, Bahir Dar, Ethiopia, *Ethiopia Veterinary journal*,**15(1)**: 49-57.

[6]. Ameni, G., Korok, B. and Bogale, T. (2001): Preliminary study on the major bovine trematode infection around Kemissie. Northeasten Ethiopia and treatment trial with praziquantel. American. *Eurasian Journal of Scientific Research*, **2(1)**: 24-28.

[7]. Animal, animal products and by-products Market Development Authority (AAPMDA), (1999): market problems and measures to be taken.

[8]. Belayneh, L. and Tadesse, G. (2014): Bovine Schistosomiasis: A Threat in Public Health Perspective in Bahir Dar Town, Northwest, Ethiopia. *Acta Parasitologica Globalis*, **5(1)** :1-6.

[9]. Bont, J. (1995): Cattle Schistosomosis host parasitic interaction. PhD.Thesis, University of Gent, Pp. 23.

[10]. Chimbari, M. (2012): Enhancing Schistosomiasis control strategy for Zimbabwe: Building on past experience. *Journal of parasitology research*, **103(3)**: 2-5.

[11]. EPCC, (2007): *Summary and Statistical Report of the 2007 Population and Housing*

Census: Ethiopian Population Census Commission, Addis Ababa,Pp. 34-38.

[12]. FAO, (1993): Agricultural statistical data statistics division Rome, Italy.

[13]. Farida, S. and Shombe, N. (2012): Socio-economic Effects of Schistosomiasis on Irrigation Rice Growers in Morogoro, Tanzania. *American Journal of Experimental Agriculture*,**2(3)**: 395-406.

[14]. Ferguson, J. (2011): Review of body condition scoring dairy herd.*Txanc.org/wp- content/upload ./Body-Condition-Scoring.pdf.*

[15]. Hailu, M. (1999): Observations on the prevalence and intensity of Schistosoma bovis infection in Bahir Dar area. North central Ethiopia. DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre-Zeit, Ethiopia.

[16]. International Livestock Center for Africa, ILCA, (2007): Annual Report. Addis Ababa, Ethiopia,

[17]. Kassaw, A. (2007): Major Animal Health Problems of Marketing Oriented livestock Development in Fogera. DVM Thesis. FVM, Addis Ababa University, Debreziet Ethiopia.

[18]. Lawerence, J. (1979): Schistosoma matheei in sheep: the parasite relationship. *Research of Veterinary Science*, **17**:263..

[19]. Lefevre, C., Blancou, J., Chermette, R. and Uilenberg, G. (2010): Infectious disease of livestock,1st ed. Paris: Lavoizer, Pp.1699-1703.

[20]. Mengistu, S., Tewodros, F. and Mersha, C. (2012): Prevalence of Bovine Shistosomiasis in Fogera District. DVM thesis FVM. University Gondar, Gondar Ethiopia. *Global Veterinaria*, **9 (5)**: 612-616.

[21]. Merawe, M., Amsslu, Y., Hagos, A. and Afera, B. (2014): Intestinal schistosomiasis of bovine and Ovine in Fogera district, South Gondar Zone, Amhara National Regional State, Ethiopia. *Acta Parasitolgical Globalis*, **5(2)**: 87-90.

[22]. Mersha, C., Belay, D. and Tewodros, F. (2012): Prevalence of Cattle Schistosomiasis and Associated Risk Factors in Fogera Cattle, South Gondar Zone, Amhara, and National Regional State, Ethiopia. *Journal of Advanced Veterinary Research*, **2**: 53-56.

[23]. Mihret, T. and Samuel, D. (2015): Prevalence of Bovine Schistosomiasis and its Associated Risk Factor inand Around Debre Tabor Town, North West of Ethiopia. Department of Veterinary Clinical Medicine, Faculty of Veterinary Medicine, University of Gondar, Gondar, Ethiopia. *European Journal of Biological Sciences*,**7(3)**: 108-113.

[24]. MWAO, (2010):*Annual Report on the Administrative office*. MWAO (Mecha WoredaAdminstrative Office).

[25]. MWARDO, (2011): (MWARDO), Mecha Wereda Agricultural and Rural Development Office

[26]. Okpala, H., Agwu, E., Agba, M., Chimezie, O., Nwobu, G. and Ohihoin, A. (2004): A Survey of the Prevalence of Schistosomiasis among Pupils in Apata and Laranto Areas in Jos, Plateau State, *Journal of Health Allied Sciences.* (*Online)* 1.1. Available at: http://www.ojhas.org/issue9/2004-1-1.htm (accessed 7 may 2016).

[27]. Pichford, R. and Visser, G. (1998): Schistosoma matches Veglia and Le Roux, 1929, egg output from cattle in a highly endemic area in the eastern transval. Annals of Tropical veterinary research, **49**: 233-235.

[28]. Pope, G. (2008): Determining the age of cattle by their teeth. Farmers' Bulleitin1066 USA Department of Agriculture, Pp. 1-12.

[29]. Shibru, T., Getachew,T. and Hailu, B. (1989): Parasitology. In: Shibru, T., Getachew, T. and Kloos, H., 1989. Schistosomosis in Ethiopia. Addis Ababa: Addis Ababa printing press,Pp. 18-26.

[30]. Solomon, A. (2008): Prevalence Bovine schistosomosis in and around Bahir Dar. DVM thesis FVM. Mekelle University, Mekelle Ethiopia.

[31]. Thrusfied, M. (2005): *Survey in veterinary epidemiology*, 2nd ed. Cambridge Blackwell science. Ltd; Pp.182-189.

[32]. Urquhart, G., Armour, J., Duncan, J., dunn, A. and Jennings, F. (1996): Veterinary helminthology: Veterinary Parasitology. New York, Churchill: Livingstone Inc,Pp. 114-116.

[33]. WHO, (2010): Schistosomiasis*;* Population requiring preventive chemotherapy and number of people treated in, *WeekelyEpidemiology*, **87(4):** 37–44.

[34]. Yalelet, W. (2004): Survey on Bovine Schistosomiasis in and around Bahir Dar, North west Ethiopia DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre- Zeit, Ethiopia.

[35]. Zangana, I. and Aziz, K. (2012): Prevalence and Pathological Study of Schistosomiasis in Sheep in Akra/Dohuk province, Northern Iraq.*Iraq Journal of Veterinary Sciences*, **26**:125-130.

ANNEXES

Annex 1: Age determination of cattle (Pope, 2008)

Age/years	Characteristic changes
1-1.5	I_1 erupted
2-2.5	I_2 erupted
3	I_3 erupted
3.5-4	I_4 erupted
5	All incisors and canine in wear
6	I_1 is leveled and neck has emerged from gum
7	I_2 is leveled and neck has emerged from gum
8	I_3 is leveled and neck has emerged from gum
9	I_4 is leveled and neck has emerged from gum
10	Dental star is squared in $I_1$and all teeth I_2 wear

- (young= <2yrs, adult= 2-5yrs and old= > 5yrs)

Annex 2: Determination of body condition **(**Ferguson, 2011)

Score 1. Emaciated; starving and weak; the entire body is extremely thin, and all skeletal structures are prominently visible. No muscle tissue is evident and no external fat is present. All the skeletal structures are visible and very sharp to the touch. The hair coat appears to be very dull. Survival during stress is doubtful.

Score 1.5. Very thin, somewhat emaciated; the vertebrae along the top line are prominent. The hooks and tail head are visually less prominent. There is no fat around the hip bone and pin bone and tail head**.**

Score 2. The animal is thin. The vertebrae along the top line are prominent. Muscle tissue is evident, but not abundant. Individual vertebrae can be felt, but are not as sharp. The short ribs can be identified individually when touched, but they feel sharp rather than very sharp. Individual ribs can be identified visually. There is some tissue cover around the hook and tail head.

Score 2.5. Individual ribs noticeable but overall fat cover is lacking; increased musculature through shoulders and hindquarters; hips and short ribs feel slightly round versus sharp.

Score 3. Increased fat cover over ribs and ribcage is only slightly visible. Muscle tissue is nearing the maximum. Generally only the 12 and 13 ribs are individually distinguishable. There are obvious fat deposits behind the front shoulder. Areas on each side of the tail head are fairly well filled but not rounded.

Score 3.5. Back, ribs, and tail head slightly rounded and feel spongy when palpated.

Score 4. Moderately fat the bone structure is no longer noticeable. The skeletal structure is difficult to identify. Individual short ribs cannot be felt even with firm pressure. Folds of fat are beginning to develop over the ribs and thurl area of the animal. Fat cover around the tail head is evident on both sides as slight "rounds" that are soft to the touch.

Score 4.5. Fat, very fleshy, squared appearance due to excess fat over back, tail head, and hindquarters. Individual short ribs cannot be felt even with firm pressure. Mobility may begin to be restricted.

Score 5. Very fat or obese - The animal has a "blocky" appearance. The bone structure is not noticeable. The back bone has a flat appearance and cannot be felt even with pressure. Folds of fat are apparent over the ribs, thurl and thighs. The hip bones and tail head to pin area on both sides are completely buried in fat. The animal's mobility is impaired by the large amounts of fat.

NB. Score 1, 1.5, 2=Poor; Score 2.5, 3, 3.5=Medium; Score 4, 4.5, 5=good

Annex3: Sedimentation technique(Hansen and Perry, 1994)

The sedimentation technique is a qualitative method for

detecting the parasitic eggs that have high specific gravity within the faecal/water suspension. Fresh faecal Samples were collected directly from the rectum of the cattle and proper labelling of every necessary information was performed. Then the samples were preserved in 10% formalin in a universal bottle and then transported to Bahir Dar regional laboratory. Then, the eggs were identified through sedimentation technique.

1. About 3 g of faeces were taken in to container 1.

2. Poured 40 ml of water and mixed thoroughly.

3. Filter the suspension through a tea strainer into container 2.

4. Left it for 15 minutes.

5. Decant the supernatant andadded water then left for 15 minutes (repeated this step 3 times).

6. A drop of methylene blue was added and then, the sediment was taken by using the pipette and added on a clean slide.

7. Examined under a low power microscope (10x, 40x).

Annex 3: Data collection format

S/N	Origin	Breed	Sex	Age	Body condition	Management system	Result

DECLARATION

I, the under signed, declare that the information present here in my thesis is my original work, has not been presented for degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Name: Dagninet Molla

Signiture_____

Date of submission: 10/06/2016

This thesis has been submitted for examination with my approval as advisor.

Name: Dr.Faris Delil

Signiture_____

2/5/2024