Global Scientific JOURNALS

GSJ: Volume 11, Issue 9, September 2023, Online: ISSN 2320-9186

www.globalscientificjournal.com

THE STUDY ON PREVALENCE OF GASTEROINTESTINAL NEMATODES IN CATTLE AND IT'S ASSOCIATED RISK FACTORS IN HORO DISTRICT, OF HORO GUDURU WOLLEGA ZONE, OROMIA, ETHIOPIA.

BY:

MISGANA AMENU

AUGUST, 2018

HORO DISTRICT OF HORO GUDURU WOLLEGA ZONE, ETHIOPIA

APPROVAL SHEET

I, under signed, declare that this Research entitled with "**The Study on Prevalence of Gasterointestinal Nematodes in Cattle and It's Associated Risk Factors in Horo District, Horo Guduru Wollega Zone, Oromia Regional State, Ethiopia** is my original work and has not been submitted earlier in any Horo Guduru Woredas.

Reaserch is done By	**Signature**	**Date**
Misgana Amenu	_____	_____

I hereby to certify that I have followed and evaluated this research prepared under my guidance by **Misgana Amenu and** I recommend that it can be submitted for research with my approval as fulfilling problem solving research.

Approved By	**Signatures**	**Date**
_____	_____	_____

Table contents page

Contents

ACKNOWLEDGEMENTS IV

ABBREVIATIONS V

LIST OF TABLES V

LIST OF FIGURE V

LIST OF ANNEXES VI

SUMMARY VI

1 INTRODUCTION 1

2 GASTROINTESTINAL NEMATODES 2

2.1 Bovine Gastrointestinal Nematodes 2

2.2 Etiology 3

2.3 Morphology 3

2.4 Gastrointestinal Nematode Species in Cattle 3

2.5 Life Cycle of Nematode Parasites 4

2.6 Epidemiology 4

2.7 Pathogenesis and Clinical Signs 5

2.8 Diagnosis of Gastrointestinal Nematodes 6

2.9 Laboratory diagnosis 6

2.10 Fecal examination 7

2.11 Direct fecal smear examination 7

2.12 Concentration techniques 7

2.13 Egg counting technique 8

2.14 Fecal culturing 8

2.15 Prevention and Control Methods 8

3 MATERIALS AND METHOD 9

3.1 Study Area Description 9

3.2 Study Animals 10

3.3 Study Design 10

3.4 Sampling and Sample Size Determination 10

3.5 Study Methodology 11

3.5.1 Fecal sample collection 11

3.5.2 Parasitological technique 11

3.6 Data Analysis 11

4 RESULTS 12

4.1 Prevalence of Gastrointestinal Nematodes within Age and Sex Groups 12
4.2 Prevalence of Gastrointestinal Nematodes within Different Peasant Associations (PAs) 13
4.3 Prevalence of Gastrointestinal Nematodes within Body Conditions 13
4.4 Rate of Gastro-Intestinal Nematodes Infection Identified 14
DISCUSSIONS 15
CONCLUSION AND RECOMMENDATIONS 16
REFERENCES 17
ANNEX 22
Annex 1. Body condition scoring system 22
Annex 2. Age determination up on dentition pattern 22
Annex 3. Research protocol 23

ACKNOWLEDGEMENTS

First and for most I would like to thank my advisor _____ who helped me throughout my Research Project by giving professional advice and comment on my paper to come with the end.

I would also to animal health office expert for their tireless work in helping and co-ordinating me during my study period and supporting me by giving information with related to my research paper.

Lastly, I would like to whole heartily thank all those too numerous to mention who in one way or another contributed to the success of this research paper. Your contribution has finally borne fruit.

ABBREVIATIONS

BCS Body condition Score

CSA Central Statistical Authority

ELISA Enzyme Linked Immune Sorbent Assay

GIN Gastrointestinal Nematode

GIT Gastrointestinal Tract

HAO Horo Agricultural Office

L1 First stage larva

L2 Second stage larva

L3 Third stage larva

L4 Four stage larva

NMS National Metrological Service

PA Peasant Association

Rpm Revolution per minute

SPSS Statistical Package for Social Science

LIST OF TABLES

Table 1: Prevalence of GIT nematode infection of cattle based on age and sex of animals 12

Table 2: Prevalence of GIT nematode infections based on origin (PAs) of animals 13

Table 3: Infection of Gastro intestinal parasites within different body conditions 14

Table 4: Prevalence and identification of specific genera of nematodes 14

LIST OF FIGURE

Figure 1: Shows the Map of the study area 11

LIST OF ANNEXES

Annex 1. Body condition scoring system---------- 26
Annex 2. Age determination up on dentition pattern ---------- 26
Annex 3. Research protocol ---------- 27

SUMMARY

A cross sectional study was carried out from December 2017to Augest 2018 to determine the prevalence and risk factors associated with cattle gastrointestinal nematode parasitism in Horo District of Horo Guduru Wollega Zone, Oromia, Ethiopia. A total of 384 fecal samples of cattle of different sexes and ages were collected and examined for gastrointestinal nematode eggs using floatation techniques. Out of these, 159 (41.4%) of animals were found positive for one type of gastrointestinal nematode infection which includes *Ostertagia spp* 12(3.1%), *Oesophagostomum spp* 8(2.1%), *Strongloid spps* 15(3.9%), *Trychostrongylus spp* 18(4.7%), *Hemonchus spp* 64(16.7%), *Bunostomum spp* 27(7%) and *Trichuris spp* 15(3.9%). A significantly higher prevalence (P<0.05) of infection with gastrointestinal nematodes was recorded in adult (48%) than in young (44.2%) and calf (21.5%) animals. Sex-wise prevalence of gastrointestinal nematodes was not significant (p>0.05). There was a statistically significant variation (P<0.05) among the different body conditions study animals, where highest prevalence was recorded in poor (58.3%) followed by medium (38.2%) and good (32.2%) body condition. Hence, in this study the sex of the animal, body condition and age are important risk factors associated with gastrointestinal nematodes in the study area.

Keywords: Cattle, Fecal, Flotation, Gastrointestinal, Nematode, Prevalence, Horo District.

1 INTRODUCTION

Ethiopia possess the largest livestock population in Africa with an estimated population of 60.4 million cattle, 9.04 million equines, 56.6 million chickens, 31.30 million sheep and 32.74 million goats (CSA,2018). With the livestock ownership currently contributing to the livelihoods of an estimated 80% of the rural population. But this extensive livestock resource is not exactly exploited because of many constraints, not exactly exploited because of many constraints, of which poor animal production and management, improper evaluation of public health importance due to various individual parasitic diseases and inadequate knowledge of epidemiology of parasites which otherwise is of great relevance where the distribution of the disease determine the type and scope of control measures to be applied (Ento, 2005).

The Gastrointestinal tract (GIT) of cattle harbor a variety of parasites particularly helminthes, which causes clinical and subclinical parasitism. These parasites adversely affect the health status of animals and cause enormous economic losses to the livestock industry (Rafiullah *et al*., 2011). Almost mature worms produce toxins that destroy red blood cells, leading to unthrifty anemic condition. Immature worms migrating through the body tissues and open the way for bacteria and fungi complication. Other economic losses are poor work performance, involuntary culling, lower milk production, treatment costs and mortality in heavily parasitized animal (Lebbie *et al*., 1994).

The nematodes, or ‘round worms’, make up a large assemblage of relatively simple structure with a wide spread distribution, their cylindrical non segmented bodies distinguishing them easily from other helminthes. They occur in fresh water, in the sea and in soil and are among the most successful parasites of plants and animals. Most of the free- living nematodes are microscopic, as are many of the parasitic species invading the body fluids such as the blood or lymph channels of their hosts. These species which live in the intestine are generally larger, while some in tissue habitats (the kidney) grow to relatively enormous lengths (Symth *et al*., 1994).

Adult female nematodes produce eggs that are passed out of the host with the feces. Under optimal conditions in the external environment, first- stage larvae (L1) can develop and hatch

eggs within 24 hours. L1 grow and develop to second-stage larvae (L2), which in turn grow and develop in to third -stage larvae (L3). In general, the third stage larvae are the infective. After ingestion, L3 develop in to fourth-stage larvae (L4), which then develop in to immature adults. Sexually mature adult nematodes develop within 2 to 4 weeks after ingestion of the L3 unless arrested larvae development occurs (Smith, 2009).

Diagnosis of nematodes based on the fecal examination of feces beyond the clinical sign, the presence of worm eggs or larvae is the most common routine aid to diagnosis. The egg and larvae of nematodes are most often diagnosed done fecal floatation and fecal culture (Hendri, 1998). Most of the studies conducted on the prevalence and distribution of gastrointestinal nematodes in the country tended to be in the central and Northern highlands and semi-arid regions of Ethiopia and little is known about the prevalence and distribution of gastrointestinal nematodes infecting cattle in Horo District of Horo Guduru Woreda Zone.

Therefore the objectives of this study were:

- To assess the prevalence of gastrointestinal nematodes in cattle in the study area
- To investigate the main risk factors associated with gastrointestinal nematodes
- To forward some important recommendations for the control of parasitic infections in the study area and to forward a base line data for further studies.

2 GASTROINTESTINAL NEMATODES

2.1 Bovine Gastrointestinal Nematodes

Gastrointestinal nematodes are numerous parasites which develop within the digestive tract (abomasums, intestines) of domestic ruminants. They include a range of nematode species, which belong to the order Strongylida and they are roundworms. Gastro-intestinal nematode parasitic infection is one of the major health problems in the world reported that nematode infections affect the health of millions of people and animals, causing huge economic loss in livestock farming (Abebe *et al*., 2018). The majority of livestock nematodes typically have an external cycle without intermediate hosts and rely on their natural resistance to survive in the environmental condition long enough to be ingested by a new definitive host (Mavrot and Fabien, 2016).

2.2 Etiology

The vast majorities of gastrointestinal parasites of cattle belong to the super family *Trichostrongyloidea*, order *Strongylida*, phyla Nematoda and comprise some twenty species. Generally, species are site specific and are located either in the abomasums, the small intestine or large intestine. Parasitological investigations carried out in different regions of the country have demonstrated the existence of a wide range of GIN which belong to the genera of *Haemonchus*, *Trichostrongylus*, *Oesophagostomum*, *Ostertagia Strongyloides*, *Cooperia*, *Bunostomum*, *Nematodirus* and *Trichuris* (Waruiru *et al*.,2001).

2.3 Morphology

Concerning the morphology of nematodes the body is elongated, cylindrical and tapered at the extremities. The body is also unsegmented and covered with cuticle which is thick and continuous with the cuticular lining of the buccal cavity, the esophagus, the rectum and the distal portions of the genital ducts (Jacob *et al*., 2003).

2.4 Gastrointestinal Nematode Species in Cattle

Gastrointestinal nematodes are found in different organs of the bovine GIT, the common GIN species of the abomasums include *Ostertagia ostertagi*, *Haemonchus placei*, *Haemonchus contortus* and *Trichostrongylus axei*. Species commonly found in the intestines include *Cooperia onchophora*, *Cooperia punctata*, *Nematodirus helvetianus*, *Trichostrongylus colubriformis*, *Oesophagostomum radiatum* and *Trichuris* spp. (Zajac and Conboy, 2012). Of these species, *O. ostertagi* is of primary importance because it is considered the most pathogenic for cattle in temperate climates (climate characterized by moderate temperatures; intermediate between tropical and polar), while *C. oncophora* is currently one of the most anthelmintic resistant species (Geurden *et al*., 2015).

2.5 Life Cycle of Nematode Parasites

Although each species has unique variations and adaptations the general GIN life cycle has common stages. Gastrointestinal nematodes in cattle have a direct life cycle and are almost exclusively transmitted on pasture via fecal-oral transmission (Sutherland and Leathwick, 2010). Consequently, cattle on pasture are at a greater risk of parasitic infection. Adult parasites live in the GIT of their definitive host (cattle), where they undergo sexual maturation and reproduction (Sutherland and Leathwick, 2010). Female adults lay eggs, which are then passed in the manure into the environment. The eggs hatch into free-living first stage larvae (L_1), which moult into second (L_2) and then into the infective third stage (L_3) larvae. This maturation process can occur in as little as 10 days at an ideal environmental temperature of 25°c (Ciordia and Bizzell, 1963). The infective L3 migrate away from the fecal pat onto nearby vegetation where they are inadvertently ingested by grazing cattle (Sutherland and Leathwick, 2010).

Once inside the host, the larvae undergo one more moult into fourth and fifth stage (L_4, L_5) larvae that finally develop to adult worms to complete the life cycle, which takes approximately 21 days in the host (Gibbs, 1982). Many nematode species become dormant a process known as hypobiosis over the winter months in the northern hemisphere and cattle will not shed eggs during this period (Sutherland & Leathwick, 2010). It is important to note that host-parasite interactions are highly dependent on external environmental conditions mainly temperature and moisture, which can greatly affect the population dynamics of the parasites. Although optimal larval development temperatures vary among nematode species (Ciordia and Bizzell, 1963) recorded 25°c as the ideal temperature for the development of larvae in the laboratory, and observed no development below 5°c. Sufficient moisture allows for the survival of free-living stages of parasitic larvae in the environment, particularly in the summer month with ambient temperature (Fiel *et al*., 2012).

2.6 Epidemiology

Helminths have a world-wide distribution and often all animals in a herd are exposed to these parasites. The epidemiology of GIT parasites in livestock varied depending on the local climatic condition, such as humidity, temperature, rainfall, vegetation and management practices. These factors largely determine the incidence and severity of various parasitic diseases in a region

(Takelye, 1991). Clinical diagnosis of GIN is difficult, since the signs are not pathgnomonic. However, diagnosis of gastrointestinal nematode infections plays a major role in investigating parasite epidemiology. The ante mortem diagnosis of nematode infections in livestock has been based on the detection of nematode eggs or larvae in the feces by microscopic examination using the methods of flotation or larval culture.

Despite the large livestock population of Ethiopia, the economic benefits remain marginal due to prevailing diseases, poor nutrition, poor animal production systems, reproductive inefficiency, management constraints and general lack of veterinary care (Tibbo *et al*., 2003). Parasitic diseases are global problem and considered as a major constraint in weight gain, health and product performance of livestock. They cause lowered productivity and high economic losses affecting the income of small holder farming communities. Parasitological investigations carried out in different regions of Ethiopia have demonstrated the existence of a wide range of GIN which belong to the genera of *Haemonchus*, *Trichostrongylus*, *Oesophagostomum*, *Ostertagia Strongyloides*, *Cooperia*, *Bunostomum*, *Nematodirus* and *Trichuris* (Waruiru *et al*., 2001).

2.7 Pathogenesis and Clinical Signs

Of the GIN most commonly infecting cattle in temperate climates those living in the abomasums, such as *O. ostertagi*, are considered the most pathogenic (Gasbarre, 1997). Adult *Ostertagia ostertagi* lay their eggs in the gastric glands that rupture as the eggs are released, resulting in an increased abomasal pH, which decreases the abomasum's digestive capacity (Fox, 1993). On the other hand, intestinal *Cooperia spp* have generally been categorized as less pathogenic than other GIN, but are commonly present in grazing cattle (Leathwick, 2011). In reality, cattle are rarely infected with only one GIN species, and co-infections with several species are the norm (Avramenko *et al*., 2015). Young cattle in their first grazing season are most commonly infected with higher burdens due to their naïve immune system, and any per gram egg predominantly occurs in this age group of cattle (Balic *et al*., 2000). It has also been suggested that while cattle are growing, there is an energy prioritization towards growth at the expense of developing an immune response against nematodes (Anderson *et al*., 1996).

General clinical symptoms of gastrointestinal parasitism include a rough, dull hair coat, rapid weight loss, submandibular edema, stunted development, and in severe cases, profuse diarrhea (Smith, 1972). Gastrointestinal parasites impair nutrient digestion and absorption by destroying parietal cells, and can cause marked inappetence accounting for weight loss and stunted growth. Not surprisingly, cachexia is common among cattle with clinical GIN infections (Fox, 1993). Clinical infections may occur in severely infected cattle, but sub-clinical infections are much more common and are characterized by decreased weight gain and impaired production (Leathwick, 2010). While a number of studies have demonstrated the effect of GIN on milk production in adult dairy cows, there is a dearth of studies in growing dairy heifers (Vanderstichel *et al*., 2013).

2.8 Diagnosis of Gastrointestinal Nematodes

Clinical diagnosis of GIT nematodes of cattle needs history of the area, history of anti-helminthes treatment, grazing history, age of animal and clinical signs manifested by the disease. But as GIT nematodosis share common clinical manifestations with other diseases laboratory diagnosis is important. The diagnosis of nematode parasites of ruminants is based on demonstrating the presence of their eggs, larvae, in fecal samples, or the presence of parasites recovered from the digestive tracts of the animals (Kassai, 1999).

Following diagnostic procedures for helminthes infection of ruminants are relevant to African conditions. Fecal examination by means of the modified McMaster technique for the enumeration of worm eggs and larval differentiation by fecal culture methods are the most common routine means for the diagnose helminthosis in cattle. The *stronglid* nematode genera produce eggs that are similar in appearance and cannot be easily discriminated, which means that genus identification cannot accurately be made by fecal examination alone. To identify nematodes in fecal samples, fecal cultures are required to yield L3 larvae, which generally can be differentiated to genus level. *Nematodirus*, *Strongyloides* and *Trichuris* species have eggs that can be differentiated by their distinct morphological features (Van Wyk *et al*., 2004).

2.9 Laboratory diagnosis

Although there is much current interest in the use of serology as an aid to the diagnosis of helmenthosis, particularly with introduction of ELISA test, diagnosis GIT parasitic infections still depend mostly on parasitological findings of eggs or parasite in fecal samples (Urquhart *et al*., 1996).

2.10 Fecal examination

Fecal examination for the detection of worm eggs is most common and routine work in GIT nematode diagnosis. Examination of feces for nematode eggs may vary from a simple direct smear to more complex methods involving centrifugation and the use of flotation fluids (Hendrix, 1998).

2.11 Direct fecal smear examination

The presence or absence of worm eggs in fecal sample using direct smear of fresh feces on microscope slide and examination under low power objective microscope is routine procedure. However, this technique is only useful to detect nematode eggs when it exists in high concentration in feces. Other disadvantages of direct techniques include difficulty to identify them since the eggs are partially covered by debris and quantitative results could not be obtained although it is fast and easy technique (Hendrix, 1998).

2.12 Concentration techniques

Light infections are not easily detected using direct smear therefore; concentration technique was developed to overcome the short coming of direct smear. The concentration techniques that are widely used include the use of salt or sugar solution and centrifugal concentration techniques. In both cases the logic behind is to concentrate the nematode eggs in each portion of sample or processed fecal material. In flotation the type of egg recovered is related to specific gravity of solutions half saturated sodium chloride with specific gravity of 1.125g is capable of floating *Trichostrongloids* and *stronglid* eggs while fully saturated sodium chloride with specific gravity of 1.204g is preferred as general-purpose solution (Bowman, 1999).

2.13 Egg counting technique

The demonstration of a parasitic element in excreta includes the presence of parasite. However, this information is not always enough. In the case of gastrointestinal *strongylosis,* the number rather than the presence of parasites is important. A technique called Mac Master. This technique is said to be easily applicable low technology parameter to indicate the level of infestation and degree of worm burden in some instances. The method enables to determine the number of eggs per gram of feces, although it is difficult to relate directly with the burden of parasites in large ruminants, still it is widely used and the method is also used to detect anti helmhentic resistance (Zajac and Conboy, 2012).

2.14 Fecal culturing

Grazing cattle usually have mixed nematode infections. Only few nematode parasites have characteristic eggs that enables as to differentiate to genus level (*Nematodirus spp, Trichuris spp, strongyloides spp,*) but those *trichostrongyle* and *strongyles* are not easily differentiated, for this reason fecal culturing and larval identification based on the keys available is useful technique (Abebe *et al*., 2018).

2.15 Prevention and Control Methods

There are numerous strategies used to prevent and control gastrointestinal nematodes in cattle, and a farm's parasite management program may consist of several different control methods. These plans generally include but are not limited to pasture management and rotation and treatments with anthelmintic drugs. The use of anthelmintic products will be the main control strategy discussed for the purpose of this review.

The use of anthelmintic drugs has successfully controlled gastrointestinal nematodes over the last 30 years but there is increasing evidence of anthelmintic resistance from livestock industries all over the world. Anthelmintic drugs can be categorized in major classes referring to their molecular structure which will determine their mode of action and the species of helminths against which they are effective. Major anthelmintic classes which are effective against nematodes are benzimidazole (broad spectrum), levamisole and ivermectin. The three major types of anthelmintic drugs commonly used in cattle in Ethiopia are macrocyclic lactones such as ivermectin (avermectin) and imidazothiazoles (levamisole), and benzimidazoles (fenbendazole) and albendazole group. The most commonly used products are the macrocyclic lactones (Johnson and Edmonds, 2010). Although the optimal timing of anthelmintic treatment

varies depending on season, geographic location and pasture rotation scheme (Elsener *et al*. 2001).

Prophylaxis against nematodes using slow or pulse release compounds has been in use for quite some time (Urquhart *et al*., 1996). Use of prophylaxis has the advantage that animals can be grazed throughout the year on the same pastures. However, there is evidence to suggest that protected animals become more susceptible to infection in the following season and there is risk of establishment of drug resistance. The report indicates that at the onset of rains in subtropical Africa, initial treatment of all animals in a herd followed by another treatment 4-6 weeks later into the rain season will significantly reduce the worm-load and consequent pasture contamination. In addition, due to the presence of Toxocara, it is important to deworm pregnant cows before delivery (Urquhart *et al*., 1996).

3 MATERIALS AND METHOD

3.1 Study Area Description

The study was conducted from September 2017to Augest 2018 in Horo District of Horo Guduru wolega Zone, Oromia regional State, which is situated at a distance of 314 km, western of Finfine, the capital city of Ethiopia; geographically, it is located between 9 9°34"12 N and 37°6'0"N. 'e Horo district is bordered by the Jardaga Jarte district in the north, Jimma ganati district in the south and southeast, Abe Dongoro district in the north, and Abay-coman district in the east. It covers total land area of 96,638.8 km2 (CSA2011), The total livestock population of the woreda is estimated to be 134,165 cattle, 207,181 sheep, 25,209 goat, 22,775 equines and 181,563 chickens (HAO, 2010).

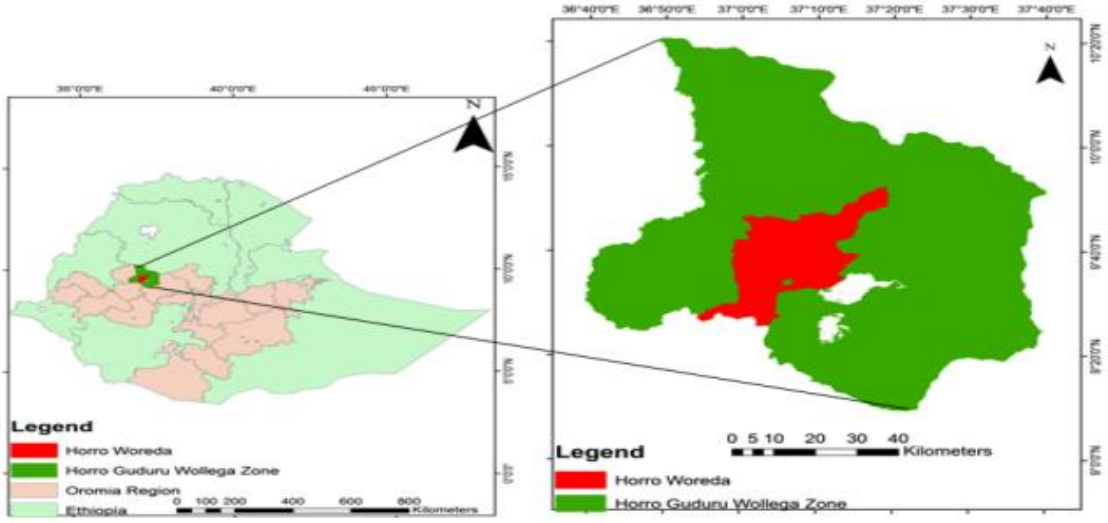

Figure 1: Map of Horo woreda

Source: Mulatu Kassa, (2017).

3.2 Study Animals

The study animals was 384 cattle of one breed (local breeds), both sexes male and female animals) and different age groups. Body condition scoring was made according to (Morgan *et al.*, 2006) and recorded as poor, medium or good. Due to the absence of written records, the age of the animal was estimated based on owners' response and also by looking the dentition pattern of the animals (Frandson, 1992). Based on this study animals will be classified as calf (<1 year), young (1-3 years) and adult (>3 years).

3.3 Study Design

Cross-sectional study design was used to determine the prevalence of gastrointestinal nematode parasite in bovine during the study period and to investigate the main factors influencing the prevalence of infection in cattle.

3.4 Sampling and Sample Size Determination

Random sampling method was used to select study animals. The three kebeles namely Didibe Kistana, Loti Ano, and Gitilo Horro was selected purposively based on the distance from shambu town and access to transportation. Determine the sample size an expected prevalence of

50% was taken in to consideration since there was no previous study conducted in the study area. The desired sample size for the study was calculated using the formula given by (Thrusfield, 2005) with 95% confidential interval and 5% absolute precision. Therefore based on the above formula:

$$n = \frac{1.96^2 \times P_{exp}(1-P_{exp})}{d^2} = 384$$

Where, n = required sample size, 1.96 = the value of z at 95% of confidences level, Pexp = expected prevalence, ^{d2} = desired absolute precision. Therefore, a total of 384 cattle were needed for the study.

3.5 Study Methodology

3.5.1 Fecal sample collection

During the study period a total of 384 cattle were sampled and fecal material was collected per rectum with gloves. Fecal material collected from each animal was put in to fecal sample bottles and labeled for different age, sex and origin and kept cool prior to transportation to woreda veterinary clinic where the sample was immediately examined or stored at refrigerated temperature 4c° for a maximum of one day before processing.

3.5.2 Parasitological technique

The fecal samples was collected per rectum and put into fecal pots, labeled and kept cool prior to transportation to the laboratory where they was examined immediately or stored in refrigerator 4c° or a maximum of 6 hours before processing. The sample was processed by Standard Flotation and Sedimentation techniques to investigate the eggs of helminthes parasites as described by (Soulsby, 1982).

3.6 Data Analysis

The information and data collected on GIT nematodes of cattle during the period were recorded in excel Sheet and analyzed using SPSS version 20. Prevalence was calculated using percentage. The significance of association between and among the considered variables was determined

using p-value, chi square X^2 test statistics. Association between variables was said to exist if the calculated level of significance is less than 5% ($p<0.05$) at 95% confidence level.

4 RESULTS

The Coprological examination conducted on 384 fecal samples revealed an overall prevalence of gastrointestinal nematode infection of 41.4%.

4.1 Prevalence of Gastrointestinal Nematodes within Age and Sex Groups

As shown in table 1 below animals were categorized in to three age groups. These were calf, young and adult. Out of total number of animals examined 79 were calves, 122 were young animals and the rest 183 were adult cattle. Out of which 17 (21.5%), 54(44.2%), 88 (48%) calves, young cattle's and adult cattle's were positive for GIT nematodes, respectively. In this relationship age has significant ($P<0.05$) association with parasitic infestation. As the age of animals increase prevalence of parasite also increase this may be due to increase contact with risk factor as animals get older and older.

Prevalence of gastro-intestinal nematodes in the current study was not sex dependent. That means, there is no any significant relation between sex of animals and occurrence of parasites (P= 0.71). This may be because of similar management under the same environmental condition of the two sexes in this district. Out of 384 animals examined 176 animals were male and the rest 208 animals were female from the (table 1) below. From 176 male animals examined 85(48%) animals were positive for GIT nematodes and out of 208 female animals examined 74(36%) animals were positive for GIT nematodes.

Table 1: Prevalence of GIT nematode infection of cattle based on age and sex of animals

Variables		**№. of examined**	**№. of Positive**	**Prevalence (%)**	**X^2**	**P-value**
Age	Calf	79	17	21.5		
	Young	122	54	44.2	7.5	0.023
	Adult	183	88	48		
Sex	Male	176	85	48	0.08	0.71
	Female	208	74	36		
Total		**384**	**159**	**41.4**		

4.2 Prevalence of Gastrointestinal Nematodes within Different Peasant Associations (PAs)

The prevalence of gastro-intestinal-nematodes within different kebeles in Horro district differ significantly (*P*=0.013) among the three kebele of Horro district the highest in Gatilo Horro (50.3%), followed by Loti Ano (37%) and the list infestation was seen in Didibe Kistina (33%). This difference among these kebeles may be due to difference in availability of communal grazing and watering areas in this kebele and difference in climatic condition. In Ebech keble about 41% animals have access to communal grazing and watering, followed by Loti Ano kebele with about 30% and 28% in Didiba Kistina kebele (Table 2).

Table 2: Prevalence of GIT nematode infections based on origin (PAs) of animals

PAs	Nº. of examined	Nº. of Positive	Prevalence (%)	X^2	P-value
Didibe kistana	109	36	33		
Loti Ano	116	43	37	15.32	0.013
Gitilo Horro	159	80	50.3		
Total	**384**	**159**	**41.4**		

As shown in the above table 2, 109,116 and 159 animals were examined from each of the three kebele, Didibe Kista, Loti Ano and Gatilo Horro from each and out of these animals 36 (33%) animals were positive from Loti Ano Kebele, 43 (37%) and 80 (50.3%) animals were positive for GIT parasites in Didibe Kistana and Gatilo Horro PA, respectively. The prevalence of gastrointestinal nematodes in these kebele differs significantly among the three kebele. This difference in the prevalence may be related to different management system in different PAs.

4.3 Prevalence of Gastrointestinal Nematodes within Body Conditions

As shown in the table 3 below body condition of the animals was also considered during examination and animals were divided in to three body condition scores. These are good, medium and poor. Out of 384 animals examined 118 animals were in good body condition, out of which 38 (32.2%) animals were positive for GIT nematodes, 170 animals were in medium body condition and out of these 65 (38.2%) animals were positive for GIT nematodes and the rest 96 animals were in poor body condition state and out of these 56(58.3%) animals were

positive for GIT nematodes. These result shows that body condition have a significant relation with body condition score (*P*= 0.001). That means body condition of animals have strong relation with presence of gastro intestinal parasites. This result might be seen due to blood sucking nature of gastro-intestinal parasites of cattle, most of the time they lids to decrease body condition of animals and this is why they have significant relation with body condition of animals.

Table 3: Infection of Gastro intestinal parasites within different body conditions

BCS	Nº. of examined	Nº. of Positive	Prevalence (%)	X^2	P-value
Good	118	38	32.2		
Medium	170	65	38.2	52.3	0.001
Poor	96	56	58.3		
Total	**384**	**159**	**41.4**		

Note: BCS = Body Condition Score

4.4 Rate of Gastro-Intestinal Nematodes Infection Identified

Among 384 animals sampled 159 animals were infected with gastrointestinal nematodes with total prevalence of 41.4%, these infections include *Ostertagia spp* 12(3.1%), *Oesophagostomum spp* 8(2.1%), strongloid spp 15(3.9%), *Trychostrongylus spp* 18(4.7%), *Hemonchus spp* 64(16.7%) and *Bunostamum spp* 27 (7%) and *Trichuris spp* 15(3.9) as shown in table 4 below. Among gastrointestinal nematode infestations observed in current study *hemonchus spp* are most dominant and the list number of gastrointestinal parasitic infestation was observed in *Oesophagostomum* species.

Table 4: Prevalence and identification of specific genera of nematodes

Genera	No. Positive animals	Prevalence (%)
Ostertagia spp	12	3.1
Oesophagostomum spp	8	2.1
Strongloid spps	15	3.9
Trychostrongylus spp	18	4.7
Hemonchus spp	64	16.7
Bunostomum spp	27	7
Trichuris spp	15	3.9
Total	**159**	**41.4**

DISCUSSIONS

The coprological examination done for this study using different techniques revealed an overall Gastrointestinal nematode infestation with prevalence of 41.4%. This finding agrees with previous studies by coprological examination in some areas of Ethiopia (Yimer *et al*., 2012*)* from Dire Dawa districts Eastern Ethiopia and (Cheru *et al*., 2013) from East Showa Zone who reported prevalence of 41.15% and 41% respectively. This might be due to similarity in the study methodology and agro ecology, season, management system and sample size taken.

The current prevalence was slightly lower when compared to various research outputs in Ethiopia (Bikila *et al*., 2013) in Gechi District, Southwest Ethiopia, (Yoseph, 1993) from Asella, (Genene, 1994) from four Awrajas of Eastern Showa, (Getachew, 1998) from Mekele and (Tefera *et al.,* 2011) in and around Bedelle who reported 84.3%, 92.2%, 93.2%, 90.2% and 91.3%, respectively. The higher prevalence observed in different parts of Ethiopia could be ascribed to over stocking, poor nutrition (starvation), poor management practice of the animals (lack of sanitation) and frequent exposure to the communal grazing lands that have been contaminated.

The current study is not in agreement with 11% reported in Bahirdar (Yehuelaeshet, 2005) and 33.3% reported in Gonder (Brhanu, 2011) which is lower than the prevalence determined in the present work. The prevalence difference in different study area could have resulted from difference in management system, topography, deworming practices, sample size taken, the study season variation and climatic condition that favor the survival of infective stage of the parasite. The relationship between different risk factors like age, sex, and origin and body condition score of animals has an important value in the study. Moreover, the significance of the nematodes was found to be higher in young and adults than in calves by floatation. This concomitant increase in the prevalence with age of animal could be due to increase in the frequency of contact with age and management factors.

In relation with sex, the prevalence of GIN has no significant difference (Wondimu, 2009) but agrees with prevalence in GIN in male (48%) greater than female (36%) explained in the

previous in finding of (Berihu, 2014) from West Arsi zone, due to males is mostly exposed to graze than female (Wondimu, 2009).

In relation to origin, the prevalence of GIN has a significant difference ($P<0.05$). However, among three PAs, highest prevalence was recorded in Gatilo Horro (50.3%) and then followed by Loti Ano (37%) and Didibe Kistana(33%). The difference may be due to awareness of people for their animal and related to different management system in different Kebele.

The study further revealed that body condition of the animal did show significant association with the prevalence of the parasites. Poor body condition animals have higher prevalence than medium and good body condition animals (58.3%, 38.2% and 32.2% respectively). In this study prevalence in body condition agrees with that of (Keyyu *et al*., 2003). Therefore, the change in body condition could be the possible indicator that the animals were infected by gastrointestinal nematode infections. Animal with poor body condition have low immunity for parasitic and another infectious diseases.

The proportion of the genera nematodes identified in the current study was different. In this *Haemonchus spp* (16.7%) was the most prevalent and followed by *Bunostomum spp* (7%) however, and *Oesophagostomum spp* accounts (2.1%). Apart from our finding, the order of prevalence reported (Berihu, 2014) from West Arsi zone, the most frequently encounter nematode were *Haemonchus* and *Bunostomum* and less frequently *Oesophagostomum*. Therefore it seems obvious that these similarities could be due to similarity of agro-ecology of the two areas and similarity in management system.

CONCLUSION AND RECOMMENDATIONS

The overall prevalence of gastrointestinal helminthes parasite in the study area indicated gastrointestinal helminthosis was found to be important health problem due to its high prevalence and occurrence of parasitism. The majority of cattle were infected with one type of parasitic infection. There is high prevalence of nematode infection in the study area as a result, stake holders should control and treat these animals. Therefore, the study area is prone to health problems related to gastrointestinal helminthosis which might subsequently reduce the economic output from cattle production. In view of these conclusions, the following recommendations are forwarded:-

- Minimizing pasture contamination through management of grazing land.

- ❖ The role of Veterinarians in giving professional advices regarding preventive and control measures taken against gastrointestinal helminthes should be prominent to prevent any infection.
- ❖ Management and feeding condition of the cattle should be improved in the area.
- ❖ Strategic treatment and awareness creation should be adopted as former livelihood relies on rearing of cattle production.
- ❖ Further investigations should be conducted in order to render more detail information about gastrointestinal parasites of cattle in the study area, so as to put appropriate control and prevention measures in place.

REFERENCES

Abebe T., Yobsan, T. and Debela, A. (2018): Prevalence of Major Gastrointestinal Nematode and Degree of Parasite Infestation in Sheep of Bako Agricultural Research Based Breeding Program P*roject Small Holder Farms at Horro District.*

Anderson, D. H., Oldham, J. D., Coop, R. L. and Jackson, F. (1996): Long-term subclinical infection with Trichostrongylus colubriformis: effects on food intake, diet selection and performance of growing lambs. Veterinary Parasitology, 61, 297-313.

Avramenko, R. W., Redman, E. M., Lewis, R., Yazwinski, T. A., Wasmuth, J. D. and Gilleard, J. S. (2015): Exploring the gastrointestinal "nemabiome": Deep amplicon sequencing to quantify the species composition of parasitic nematode communities. PloS One, **10**(12), e0143559.

Balic, A., Bowles, V. M., Meeusen, E. and Bowles, M. (2000): The immunobiology of gastrointestinal nematode infections in ruminants. Advances in Parasitology, Volume 45, 181-241.

Berihu, H. (2014): Study on Distribution of Gastrointestinal Nematodes and Coccidian Parasites of Cattle in West Arsi zone, Ormia Regional State, Ethiopia.

Bikila, E., Yeshitla, A., Worku, T., Teka, T. and Benti, D. (2013): Epidemiology of Gastrointestinal Parasites of Small Ruminants in Gechi District, Southwest Ethiopia. DVM thesis. Jimma University College of Agriculture and Veterinary Medicine and

Jigjiga University College of Veterinary Medicine, Ethiopia. Advanced Biology Research, 7 (5): 169-174.

Bowman, D.D. (1999): Georgis parasitology for Veterinarian's (7th edn), USA: W.B. Saunders company, pp. 144-220.

Brhanu, T. (2011): Study on the prevalence of Gastro intestinal nematodes infection of cattle in and around Gonder, North western Ethiopia.

Cheru, T., Birhanu, A., Diriba, L. and Eyob, E. (2013): Prevalence of gastrointestinal parasitism of cattle in East Showa Zone, Oromia Regional State, and Central Ethiopia. Pp. 55-62.

Ciordia, H. and Bizzell, W. E. (1963): The effects of various constant temperatures on the development of the free-living stages of some nematode parasites of cattle. The Journal of Parasitology, 49(1), 60-63.

Coyne, M. J. (1991). Fecundity of gastrointestinal trichostrongylid nematodes of sheep in the field. American Journal of Veterinary Research, 52(7), 1182-8.

CSA. (2018): Central Statistical Agency of the federal democratic republic of Ethiopia. Agricultural sample survey (2017/2018) Volume II. Report on livestock and livestock characteristics (private peasant holdings), Central Statistical Agency, Addis Ababa, Ethiopia. pp. 1-94.

Elsener, J., Villeneuve, A. and DesCôteaux, L. (2001): Evaluation of a strategic deworming program in dairy heifers in Quebec based on the use of moxidectin, an endectocide with a long persistency. The Canadian Veterinary Journal. La Revue Vétérinaire Canadienne, 42(1), 38-44.

Ento, S. (2005): Ticks in Ethiopia: http://www ento.csir,oau (research) rest gm/ Ethiopia. Htm.

Fiel, C. A., Fernández, A. S., Rodríguez, E. M., Fusé, L. A. and Steffan, P. E. (2012): Observations on the free-living stages of cattle gastrointestinal nematodes. Veterinary Parasitology, 187, 217-226.

Forbes, A. B., Huckle, C. A. and Gibb, M. J. (2004): Impact of inomectin on grazing behaviour and performance in dairy cattle with sub-clinical gastrointestinal nematode infections under continuous stocking management. Veterinary Parasitology, 125(3-4), 353-64.

Fox, M. T. (1993): Pathophysiology of infection with Ostertagia ostertagi in cattle. Veterinary Parasitology, 46, 143-158.

Frandson, R.D. (1992): Anatomy and physiology of farm animals. Associate professor, department of anatomy and neurobiology collage of veterinary medicine and bio medical sciences. 5th ed. Colorado State University, for Collins. Colorado. pp. 306-308.

Gasbarre, L. (1997): Effects of gastrointestinal nematode infection on the ruminant immune system. Veterinary Parasitology, 72(3-4), 327-337-343.

Genene, R. (1994): A study of prevalence of ovine GI helminthes in and around Kombolcha. DVM Thesis, faculty of veterinary medicine, Addis Ababa University, Bishoftu. Ethiopia, Pp 24-25.

Getachew, G. (1998): Prevalence of ovine and caprine GI helminthes in Mekele and its surroundings. DVM Thesis, faculty of veterinary medicine, Addis Ababa University, Bishoftu. Ethiopia, Pp 260.

Habtamu, B., Melkamu, B., Yehenew A. and Zelalem, D.(2014): Efficacy of Chloroquine for the Treatment of Vivax malaria in Northwest Ethiopia.

Geurden, T., Chartier, C., Fanke, J., di Regalbono, A. F., Traversa, D., von Samson-Himmelstjerna, G. and Denwood, M. J. (2015): Anthelmintic resistance to ivermectin and moxidectin in gastrointestinal nematodes of cattle in Europe. International Journal for Parasitology: Drugs and Drug Resistance, 5(3), 163-171.

Gross, S. J., Ryan, W. G. and Ploeger, H. W. (1999): Anthelmintic treatment of dairy cows and its effect on milk production. The Veterinary Record, 144(21), 581-7.

Hendrix, C.M .(1998): Diagnostic veterinary parasitology (2nd edn), Mosby Inc, USA, 136: 108-116.

Jacobs, R.D., Hogsette, J.A. and Butcher, G.D (2003): Nematode parasites of poultry (and where to find them). Institute of Food and Agricultural Sciences, University of Florida, USA.

Johnson, E. G. and Edmonds, J. D. (2010): Anthelmintic resistance of Ostertagia ostertagi and Cooperia oncophora to macrocyclic lactones in cattle from the western United States. Veterinary Parasitology, 170, 224-229.

Kassai, T. (1999): Veterinary Helminthology. Butterworth-Heinemann. Reed Educational and Professional Publishing Ltd, Oxford, USA pp. 260.

Keyyu, J.D., Kssuku, A.A., Kyvsgaard, N.C. and Willingham, A.L. (2003): 3rd gastro intestinal nematodes in indigenous zebu cattle under pastoral and nomadic management systems in the lower plan of southern highlands of Tanzania. Veterinary Research Communication. **27**: 371-380.

Leathwick, D. M. (2011): Anthelmintic resistance in nematode parasites of cattle: a global issue? Trends in Parasitology, 27(4), 176-81.

Lebbie, S.H., B. Rey. and E.K., Irungu. (1994): Small Ruminant Research and development in Africa. Procedding of the second Biennial conference of the Africa small Ruminant Research network. ILCA.pp: 1-5.

Mavrot and Fabien. (2016): Livestock Nematode Infection in a Changing World: Investigating the European Situation.University of Zurich, Vetsuisse Faculty.

Morgan, E.R., Torgerson, P.R., Shaikenov, B.S., Usenbayev, A.E., Moore, A.B., Medley, G.F. and Milner-Gulland, E.J. (2006): Agricultural restructuring and gastrointestinal parasitism in domestic ruminants on the range lands of Kazakhstan. VeterinaryParasitology. **139**: 180-191.

NMSA. (2017): Monthly report on temperature and Rainfall. National Meteorological Services Agency, Wenbera, Ethiopia.

Rafiullah, A., S. Abdul, R. Sayyed Shabbir and S. Muhammed.(2011): Prevalence of Smith, B.P. Large Animal internal Medicine,4th ed. Moss by Elsevier, pp: 1632-1633.

Smith, H. J. (1972): On the persistence of infective Ostertagia ostertagi, Cooperia oncophora and Nematodirus helvetianus on pastures. Canadian Journal of Composite Medicine, 36, 333-338.

Smyth, J.D. (1994): Introduction Animal Parasitology. 3ed. Cambridge rd University press, pp: 136-138.

Soulsby, E.J.L. (1982): Helminthes, Arthropods and Protozoa of domesticated animals. 7thed. London: Bailliere Tindal. Pp. 213-245.

Sutherland, I. and Leathwick, D. M., (2010): Gastrointestinal Nematodes of Sheep and Cattle: Biology and Control (1st ed.). West Sussex: Wiley Blackwell.

Takelye, B. (1991): Epidemiology of endoparasites of small ruminants in sub-Saharan Africa. In: Proceedings of the 4th National livestock Improvement Conference, Addis Ababa, Ethiopia, p: 7-15.

Tefera, M., Batu G. and Bitew, M., (2011): Prevalence of gastrointestinal parasites of sheep and goats in and around Bedelle, South-Western Ethiopia. International Journal of Veterinary Medicine, 8 (2).

Thrusfield, M., (2005): Veterinary Epidemiology. 3rd Ed., Blackwell Science Ltd., Oxford, UK, pp: 233-261.

Tibbo, M., Mukasa-Mugerwa, E., Woldemeskel, M. and Rege JEO. (2003): Risk factors for mortality associated with respiratory disease among menz and Horro sheep in Ethiopia. The Veterinary Journal, ***165****: 276-287.*

Urquhart, G.M., Armour, J., Duncan, J.L., Dunn, A.M. and Jennings, F.W. (1996): Veterinary Parasitology, (2nd edn), Blackwell Science, United Kingdom, pp. 307.

Van Wyk, J., Cabaret, J. and Michael, L. (2004): Morphological identification of nematode larvae of small ruminants and cattle simplified. Veterinary Parasitology 119: 277-306.

Vanderstichel, R., Dohoo, I., Sanchez, J., Sithole, F., Keefe, G. and Stryhn, H. (2013): Predicting the effect of anthelmintic treatment on milk production of dairy cattle in Canada using an Ostertagia ostertagi ELISA from individual milk samples. Preventive Veterinary Medicine, **111**(1-2), 63-75.

Waruiru, R. M., Thamsborg, S. M., Nansen, P. Kyvsgaard, N. C., Bogh H. O., Munyua W. K. and Gathuma, J. M., (2001): The epidemiology of gastrointestinal nematodes of dairy cattle in Central Kenya. Trop. Anim. Hlth. Prod. **33**: 173-187.

Wondimu, A. (2009): Study on prevalence of Gastro intestinal nematodes in Dairy cattle at Haramaya university dairy farm. DVM thesis.

WWAO., (2012): Wenbera Woreda Agriculture Office kebele Survey.

Yehuelaeshet, D. (2005): The Study on Endoparasite of Dairy Cattle in Bahir Dar and its surrounding. DVM Thesis, Faculty of Veterinary Medicine, Addis Abeba University. Debzeit, Ethiopia.

Yimer, M., Dinaol, B., Mesfin, A., Solomon, S. and Hassen, B. (2012): Prevalence of Gastrointestinal Nematode of Cattle in Selected Kebeles of Dire Dawa Districts Eastern Ethiopia.

Yoseph, A. (1993): Prevalence of Ovine Gastrointestinal helminthes in and around Asella. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Bishoftu. Ethiopia, Pp170.

Zajac, A. M. and Conboy, G. A. (2012): Veterinary Clinical Parasitology (8thed).Wiley Blackwell.

ANNEX

Annex 1. Body condition scoring system

BCS	Description	Condition
2	Animal is still somewhat emaciated but the tail head and ribs are less prominent, individual spinous is still sharp to touch.	Poor
4	Individual ribs may not be visually obvious; some fat cover is present over the ribs transverse process and hooks.	Medium
5	Overall appearance is generally good, fat cover over ribs feels spongy palpable fat cover is present on either side of the tail head.	Good

BCS: Body Condition Score

Source: (Morgan *et al*., 2006)

Annex 2. Age determination up on dentition pattern

No.	Teeth Pattern	Month or year of teeth eruption takes place	Age estimation/Age group/
1.	All the teeth are in place	<12months/<1year	Calf

2.	Center perm ant incisors showing some wear. First intermediates up and six broad incisors up.	18-36months/1-3year	Young
3.	Corner teeth up and eight broad incisors showing wear.	18-36months/1-3year	Adult

Source: (Frandson, 1992)

Annex 3. Research protocol

Fecal Examination (by using floatation technique)

Materials and equipment used

- Digital balance
- Microscope
- Microscopic slide
- Cover slip
- Plastic beaker
- Measuring cylinder
- Pistol and Mortar
- Test tube
- Pasteur pipette
- Test tube rank
- Sieve or tea strainer
- Flotation fluid(saturated salt solution)

Procedures

- Weigh three gram of feces by digital balance and it was grinded by using mortar and pistol.
- Then add 42 ml of flotation fluid and it was poured in to plastic beaker by a tea strainer (sieve) to remove fecal debris.

- Then the suspension was filled up to ¾ of the test tube and centrifuged at a speed of 1500 rpm for two minutes.
- Then the sample was removed from centrifuged machine and top layer from each sample was taken using fine pasteure pipette.
- Put 2-3 drops from each sample apply cover slip and examined under microscope ten times objective lenses.