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Helminth parasites prevalence and distribution among Sheep in Gudaya Bila District, East Wallaga, Ethiopia

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Abstract

Helminth parasite infections in sheep are of major veterinary importance in many agro-ecological zones and are a primary factor in the productivity of sheep. The main objective of this study was to determine helminth parasites prevalence and their economic loss caused on sheep with its control approach at the study area. A cross-sectional study using a simple random sampling procedure was used to study helminth parasite identification at Gudaya Bila district during 2022 in two seasons of the year: winter (January - March) and summer (June - August). Out of 384 sheep chosen at random sampling from five *Kebeles* in the Gudaya Bila district (Welenelemu, Harogodisa, Chalejima, Hagelogidami, and Bila) that underwent flotation and sedimentation procedures, about 149 were infected by ay helminth parasites, with an overall prevalence 38.8%. Regarding the distribution of helimenth parasites at the class level, the prevalence was 13.9%, 11.7%, and 3.9% in trematoda, nematode, and cestoda, respectively. The helminth species that had highest prevalence were *Fasciola* species (19.5%), *Haemonchus* species (14.76%), *Strongyloides* species (10.74%), and *Schistosoma* species (9.4%), and those that had the least prevalence were *Moniezia* species (6.04%), *Paramphistomum* species (5.4%), *Taenia* species (4.02%), *Nematodirus* species (3.3%) and *Trichostrongylus* species (1.34 %). The summer season was favorable for helminths parasite transmission.

The prevalence of helminths in the summer season was 98 (25.5%), and in the winter season it was 51 (13.3%). The study shows that the gastrointestinal helminth parasite was a major health problem and had an impact on the production of sheep in the study area. Therefore, a detailed study should be conducted to identify the parasite at the species level, and further investigation will be needed to study the association of the prevalence of helminth parasites within age, sex and the agroecology of sheep in the area. Then educating the people about the impacts of helminths is needed to control them.

Background of the study

Parasitic diseases are a major impediment to livestock production and development in developing countries (12). Domestic animals, like in many developing countries,

play an important role in Ethiopia, serving as a source of (animal performance) traction power, income, and milk and meat production (17). Ethiopian livestock production systems are broadly classified as low input, mixed crop-livestock, agro-pastoral, and pastoral systems, as well as medium input, peri-urban, and urban enterprises (1).

Helminthosis in domestic animals is primarily caused by nematodes, cestodes, and trematodes. It reduces fertility, work capacity, involuntary culling (25), food intake, weight, and milk production, and has a higher mortality rate (10). Helminth infections are one of the greatest causes of productive and reproductive loss in animals and man, and in some cases, it results in heavy mortalities (21) (Ola-Fadunsin et al., 2020). The main contributing elements that affect GI helminths infections include management factors like husbandry practices, climate, and host effects (33).

These parasites have a negative impact on animal health and cause massive economic losses to the livestock industry (25, 27). The productivity losses through reduced feed intake and decreased efficiency in feed utilization due to subclinical or chronic infections are also hindering profitable livestock industry (Akanda et al., 2014). But the effect of infestation by gastrointestinal (GI) helminths varies according to the parasite the degree of infestation and other risk factors such as 'species', age, season and intensity of worm burden (13). Helminth parasites of sheep are major causes of economic losses due to decreased productivity and increased mortality in all countries and areas around the world (23, 35). In many parts of the Eastern Wollega Zone, the gastrointestinal nematodes parasite remains an important disease problem of sheep in the area (4).

People do household remedies according to their limited knowledge. Anthelmintics, ethnoveterinary medicine, grazing management, nutritional supplementation, genetic approaches, biological techniques, vaccination, and other strategies all have been proposed to control the Helminths parasite(9) (Stearetal.,2007). Despite the fact that farmers and traditional healers have long used ethnoveterinary medicinal plants to treat parasitism, scientific evidence on the antiparasitic efficacy of most plant products is limited (9). However, there was no study carried out on helminth parasites and economic loss on sheep with its control in the study area. Therefore, the main objective of this study is to determine the types of helminth parasites and their economic impact on sheep with a control approach in the study area.

Materials and Methods

Description of study area

The study was conducted at the Gudaya Bila district in the East Wallaga zone, Oromia region, 330 km West of Addis Ababa, which located at 105 km North East of Nekemte which is the capital town of East Wallaga (Figure 1). It is situated at $9^0$17'23''S longitudinal and $37^0$01'28''N latitude. Altitudinal range of the district is from 500-3500 meter above sea level. The minimum temperature of the district is 11.3^0c, the maximum temperature is 23.36^0C and the mean average temperature is 16.82^0C. The annual rainfall of the district with its minimum rainfall is 1400 mm and maximum rainfall through the year is 2000 mm. The mean annual rainfall of the district is 1682.33 mm (GBDAO, 2021). The main rainy season extends from early May to the end of October. There are four seasons; autumn - short and moderate rainfall (from March to May), summer - a long wet season rainfall (June to August), spring - short dry season (September to October), and winter - a long dry season (December to February). The estimated animal population in the study area is about 81,586 cattle, 15,298 sheep, and 12,978 goats (GBAHO, 2021).

Study Design

A cross-sectional study was used to determine the prevalence of helminths parasites in sheep based on two seasons (winter and summer) of year examination.

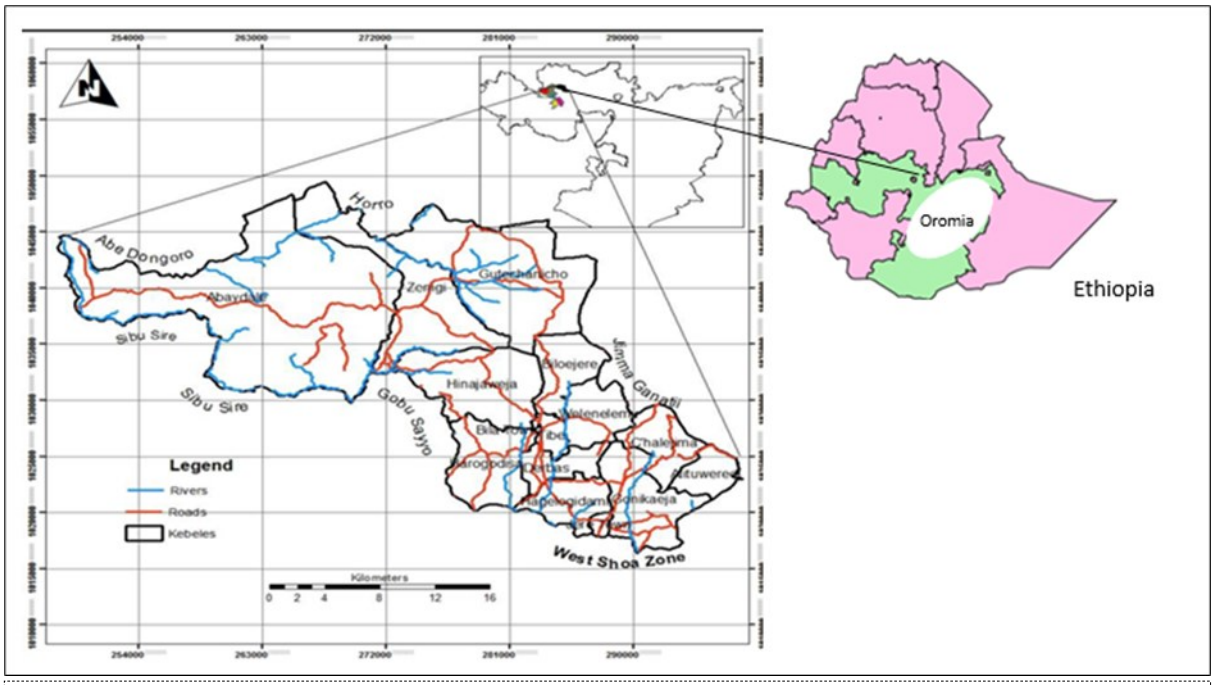

Figure 1. Map of the study area

Study Animals

A study was done on 384 sheep chosen at simple random sampling from five kebeles (Smalll administrative unit in Ethiopia) in the Gudaya Bila district (Welenelemu, Harogodisa, Chalejima, Hagelogidami, and Bila). Gudaya Bila district have 13 kebeles from those kebeles five kebeles were selected purposefully based on the sheep production.

Sample size

The sample size was determined using the simple random sampling formula given by Thrusfield **(**34).

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

Where, N = required sample size, P_{exp} = Expected prevalence (50%), d = desired absolute precision (0.05). P_{exp} = Expected prevalence (50%) is used since the other research concerned with the helminths parasites is not carried out at the study area. Accordingly, 384 samples are needed, so 384 sheep were sampled and examined.

For carrying out this research 80 people were purposively selected from the five study Kebeles. Those people selected from the study area are the sheep house holders.

Sample collection and parasite determination

A total of 384 faecal samples were collected from sheep in various locations around the districts from five designated kebeles. Faecal samples are carefully collected from the rectum of sheep using protective sterile disposable gloves into clean and placed in a sample collecting bottle and labelled (31) and then delivered to the veterinary laboratory in Gudaya Bila for the diagnosis of parasites. Approximately 3-6 gm of faecal sample was taken directly from the rectum of each individual sheep. However, freshly voided faecal samples are also taken into account, and the obtained samples are then preserved in plastic containers. All faecal samples are collected in separate cups. To prevent potential cross contamination between faecal samples, separate disposable gloves are worn for each collected sample. Faecal samples collected in the field are kept in refrigerated at 4°C, processed for the determination of parasite within 24

hours of collection (15), and laboratory examination was carried out to identify those helminths parasites that affect the health of sheep.

Data collection related with economic impacts of helminths and way of controlling them

Data was collected through questionnaires on how the local people can control the helminths parasite traditionally and the economic impacts of those helminths on the sheep. This questionnaire was prepared in English and translated in to Afan Oromo.

Examination of samples

Two different types of faecal qualitative testing are flotation and sedimentation were used for identification of nematodes, cestodes and trematodes. The flotation technique in saturated NaCl solution for nematodes and cestodes and sedimentation for trematode procedures are used to assess the faecal samples as a flotation agent, zinc sulphate solution was utilized (Foriet, 1999)(11) was employed, and the slides prepared were examined under microscope (x10).

Data Analysis

Data management and analyses were performed using Microsoft Excel and SPSS version 22. Data was subjected to descriptive statistical analysis using proportion with P-value for chi-square test in determining the study of different groups of helminths. Descriptive statistics such as percentage, frequency, mean and standard deviation were used. The relationships between the season of infection were determined using chi square (χ^2) and P value of < 0.05 was considered as statistically significant.

Ethical considerations

The livestock farmers whose animals were inspected verbally agreed to take part in the study. Informed consent was obtained from the owner of the selected sheep prior to inclusion in the study. Confidentiality of all information obtained from respondents was assured by safely and securely storing the questionnaires.

Results

General characteristics of the informant

In this study a total of 80 informants 71 (91.25%) male and 7 (8.5%) female informants were involved. The age of informants ranges from 40-75. But, the majority of the informants are ranges from 50-70.

Table 1. Socio-demographic characteristics of informants (n= 80) in Gudaya Bila District, East Wallaga Zone, 2022

Socio- demographic characteristics	Category	Number	Percentage
Age groups	40-50	16	20.0
	51-60	27	33.7
	61-70	33	41.3
	71-75	4	5.0
Sex	Male	73	91.3
	Female	7	8.7
Educational Background	Not able to read and write	59	73.8
	1-4	13	16.2
	5-8	8	10

Regarding the educational status, the majority of informants were not educated 59 (73.75 %) but only 21 (26.25%) are educated.

Prevalence of helminths parasites in sheep

A total of 384 sheep were sampled and examined for helminths parasites and about 149 (38.8%) were found infected with one and/or more parasites.

Table 2. The overall prevalence of helminths parasites in sheep (n=384) in Gudaya Bila District in 2022

Helminths Species identified	Number of infected	Percentage
Trematoda		
Fasciola species	29	7.6
Schistosoma species	14	3.6
Paramphistomum species	8	2.1
Total	**51**	**13.3**
Cestoda		
Taenia species	6	1.6
Moniezia species	9	2.3
Total	**15**	**3.9**
Nematoda		
Haemonchus species	22	5.7
Strongyloides species	16	4.2
Nematodirus species	5	1.3
Trichostrongylus species	2	0.5
Total	**45**	**11.7**
Mixed infections		
Haemonchus species and *Nematodirus* species	3	0.9
Taenia species and *Fasciola* species	8	2.1
Fasciola species and *Schistosoma* species	6	1.6
Moniezia species and *Nematodirus* species	5	1.3
Fasciola species and *Haemonchus* species	11	2.9
Paramphistomum species and *Moniezia* species	5	1.3
Total	**38**	**9.9**
Overall prevalence	**149**	**38.8**

The prevalence of helminths species that are exist at the study area in the male and female sheep from Nematoda, Trematoda and Cestoda by sex of sheep are shown in Table 2.

The frequency distribution of helminth species among sheep in the study area are shown by Table-3. The overall occurrence of helminths from the total of 384 sheep at the study area is about 149 (38.8%) are infected with one or more helminths. These include Trematodes: *Fasciola* species 29 (19.5%), *Schistosoma* species 14 (9.4%), *Paramphistomum* species 8 (5.4%) and, the prevalence of Cestodes:

Moniezia species 9 (6.04%) and *Taenia* species 6 (4.02%) (Table 3), and Nematodes including *Haemonchus* species 22 (14.76%) *Strongyloides* species16 (10.74%), *Nematodirus* species 5 (3.3 %), *Trichostrongylus* species 2 (1.34 %) table 3, andthe most prevalence species of helminths at the study area are *Fasciola* species 29 (19.5%), *Haemonchus* species (14.76%) and *Strongyloides* species (10.74%)and the least known species are *Trichostrongylus* species (1.34%) and *Nematodirus* species (3.3%) at the study area. Among the helminths parasites the trematoda had the highest frequency 51 (13.28%), followed by nematoda 45 (11.72%) and the least was recorded as Cestoda 15 (3.9%) (Table 3).

The mixed helminth species which can affect the health of sheep are shown in Table 4. The mixed infection of helminths at the study area accounts about 38 (9.9%) from the overall infection of helminths at the study area Table 4. *Fasciola* species and *Haemonchus* species 11 (2.86%), *Taenia* species and *Fasciola* species 8 (2.08%), *Fasciola* species and *Schistosoma* species 6 (1.6%), *Moniezia* species and *Nematodirus* species; however *Paramphistomum* species and *Moniezia* species both mixed species accounts about 5 (1.3%) and *Haemonchus* species and *Nematodirus* species accounts about 3 (0.78%) which is the least species from the mixed species.

Socio-demographic characteristics of Sheeps and prevalence of helminths parasites

Among the four nematodes species exist at the study area based on sex, *Haemonchus* species 14 (6.084) and 8 (5.195%) in females and males respectively. *Strongyloides* species have the second most common prevalence at the study area among the nematodes species which accounts for 9 (3.913%) in females and 7(4.54%) in males. Form the nematodes species that have the least prevalence are *Nematodirus* species that accounts for 3 (1.3%) in females and 2 (1.299%) in males and *Trichostrongylus* species that accounts for only 1 (0.65%) in male and 1 (0.43%) in female. In both male and female *Haemonchus* species have the highest prevalence rate among nematodes species at the study area in both sexes.

Among the three trematodes species prevalence rate based on the sex at the study area *Fasciola* species 18 (7.83%) and 11 (7.14%) in female and male respectively. *Schistosoma* species in female 8 (3.47%) and in male 6 (3.896%) and *Paramphistomum* species is the least common trematodes that affect sheep at the study area which account for 5 (2.174%) and 3 (1.95%) in female and male respectively. In both male and female *Fasciola* species have the highest prevalence rate among trematodes species.

Among the two species of Cestoda based on sex, the *Moniezia* species 5 (3.25%) in male and 4 (1.74%) in the female, and *Taenia* species accounts for 4 (1.74%) in female and 2 (1.299%) in male. The *Moniezia* species have high prevalence in male while *Taenia* species have high prevalence in female at the study area.

According to the result obtain from the veterinary laboratory from the five study kebele, the sheep is mostly affected by helminths in Hagelogidami which accounts for 57 (14.84%) from this the helminths are *Fasciola* species 14 (3.65%), *Haemonchus* species 8 (2.083%), *Schistosoma* species 7 (1.82%), *Strongyloides* species 4 (1.04%) and *Taenia* species 3 (0.78%) and the least species exist *Paramphistomum* species, *Moniezia* species and *Nematodirus* species are accounts about 2(0.52%) and mixed helminths 15(3.9%). Chalejima is the second most affected by helminths parasites which account about 37 (9.67%) *Fasciola* species 8 (2.083%), *Haemonchus* species 5 (1.3%), *Moniezia* species, *Strongyloides* species both accounts about 4 (1.04%), *Paramphistomum* species, *Taenia* species, *Schistosoma* species are accounts 3 (0.78%) and

Mixed helminths 7 (1.82%). At Chalejima the most prevalence species is Fasciola species. Welenelemu is the 3rd affected kebele 31(8.07%) from the study area. *Fasciola* species 7 (1.82%), *Haemonchus* species 6 (1.56%), *Strongyloides* species 5 (1.3%), *Schistosoma* species 3 (0.78%) and the other species like *Nematodirus* species, *Paramphistomum* species and *Trichostrongylus* species have the least prevalence of occurrence at the study kebele which are accounts about 1 (0.26%) and mixed helminths 7 (1.82%). The two kebeles which are affected with helminthes in small amount are Harogodisa and Bila which are account about 18 (4.69%) and 6 (1.56%) respectively. But they are different in the occurrence of species. In Harogodisa *Strongyloides* species and *Moniezia* species accounted for 3 (0.78%), *Paramphistomum* species and *Nematodirus* species accounted for 2 (0.52%), *Haemonchus* species and *Trichostrongylus* species accounts 1 (0.26%) and mixed helminths 6 (1.56%). From all study kebeles the prevalence of helminths species in Bila is very low. Such species exist in Bila are *Haemonchus* species 2(0.52 %), *Schistosoma* species1 (0.26 %) and mixed helminths 3 (0.78%). From all species of helminths parasites at study kebele *Fasciola* species, *Haemonchus* species, *Strongyloides* species and *Strongyloides* species have the highest number of prevalence. The helminths parasites that have the least prevalence at the study kebele are *Nematodirus* species and *Trichostrongylus* species.

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both accounted about 4 (1.04%), *Paramphistomum* species, *Taenia* species, *Schistosoma* species accounted for 3 (0.78%) and mixed helminths 7 (1.82%). At Chalejima the most prevalence species is *Fasciola* species. Welenelemu is the 3rd affected kebele 31 (8.07%) from the study area. *Fasciola* species 7 (1.82%), *Haemonchus* species 6 (1.56%), *Strongyloides* species 5(1.3%), *Schistosoma* species 3 (0.78%) and the other species like *Nematodirus* species, *Paramphistomum* species and Trichostrongylus species have the least prevalence of occurrence at the study kebele which are accounts about 1 (0.26%) and mixed helminths 7(1.82%).The two kebeles which are affected with helminths in small amount are Harogodisa and Bila which are account about 18 (4.69%) and 6 (1.56%) respectively. But they are different in the occurrence of species. In Harogodisa *Strongyloides* species and *Moniezia* species accounts 3(0.78%), *Paramphistomum* species and *Nematodirus* species accounted for 2 (0.52%), *Haemonchus* species and *Trichostrongylus* species accounts 1 (0.26%) and mixed helminths 6 (1.56%). From all study kebeles the prevalence of helminths species in Bila is very low. Such species exist in Bila are *Haemonchus* species 2 (0.52 %), *Schistosoma* species 1(0.26 %) and mixed helminths 3 (0.78%). The helminths parasites that have the least prevalence at the study kebele are *Nematodirus* species and *Trichostrongylus* species.

Table 3. Helminths parasites and season and prevalence of helminths parasites in each season

Season	**No. of examined**	**No. of infected**	**Number of infected and prevalence of with different group of parasites**			
			Helminths group	**Helminths species**	**Frequency of infection**	**Percentage of infection**
Winter (December, January and February)	384	51 (13.28%)	Trematoda	*Fasciola* species	6	11.8%
				Schistosoma species	5	9.8%
				Paramphistomum species	1	1.96%
				Total	12	23.56%
			Nematoda	*Haemonchus* species	12	23.53%
				Strongyloides species	7	1.72%
				Trichostrongylus species	-	-
				Nematodirus species	2	3.91%
				Total	21	41.18%
			Cestoda	*Moniezia* species	2	3.92%
				Taenia species	1	1.96%
				Total	3	5.88%
			Mixed infection		15	29.41%
Summer (June, July and August)		98 (25.52%)	Trematoda	*Fasciola* species	23	23.47 %
				Schistosoma species	9	9.2%
				Paramphistomum species	7	7.14%
				Total	39	39.78%
			Nematoda	*Haemonchus* species	10	10.2%
				Strongyloides species	9	9.18%
				Trichostrongylus species	2	2.14%
				Nematodirus species	3	3.06%
				Total	24	24.48%
			Cestoda	*Moniezia* species	7	7.14%
				Taenia species	5	5.1%
				Total	12	12.24%
			Mixed infection		23	23.47%
	Total	149 (38.8%)			149	38.8%

Season and helminths parasite of sheep

Helminths parasites of the sheep infection in two season of the year are shown by table 3. This table also shows helminths parasite type and season at which those helminths can mostly affect the sheep with their prevalence of helminths.

Based on the data on the overall prevalence of infection during the study two different seasons indicated maximum data is obtained during summer 25.52%and about 13.28%is obtained in winter season.There is a variations in seasonal prevalence among different parasite groups, with trematodes ,nematodes and cestodes showing highest prevalence of 39.78%,24.48% and 12.24% respectively during summer season, and mixed infections recording a about the prevalence of 23.5% during summer. But in the winter season the prevalence of such species of helminths infection is 41.18%, 23.535% and 5.88%, nematodes, trematodes and cestodes respectively; the mixed infection records about the prevalence of 29.41% during winter season. Except those mixed infection the infection of each parasites groups have high prevalence during the summer season.

The cross sectional study carried out in winter and summer season result indicates that helminths species parasite mostly affects the sheep in summer season. As stated on the above table-6 mostly helminthes species are common exist in the summer season than in winter season. From 384 sheep examined about 149 (38.8%) sheep are infected by helminths parasites. From this total over all infection of parasites about 98 (25.5%) are infected in summer season and about 51 (13.3%) are infected in the winter season. Helminths species that are mostly infect sheep at the summer season are *Fasciola* species 23 (23.47%), *Schistosoma* species 9 (9.2%), *Strongyloides* species 9 (9.18%), *Paramphistomum* species 7 (7.14%), *Moniezia* species 7(7.14%) the mixed infection accounts about 23(23.47%); and those affect in least amount are Taenia species 5 (5.1%), *Nematodirus* species, and *Trichostrongylus* species 2 (2.14%). The most common helminths the affect sheep in the winter season are *Haemonchus* species 12 (23.53 %), *Strongyloides* species 7 (13.73 %), *Fasciola* species 6 (11.8%) and the mixed infection accounts about 15 (29. 4%); and those species that affect in the least amount are *Nematodirus* species, and *Moniezia* species both accounts 2(3.92%), and *Paramphistomum* species and *Taenia* species accounted about 1 (1.915). Then this make that the sheep is mostly affected in the summer season than winter season by different species of helminths.

Those traditional medicines are used at the study area are *Albizzia aummifera*, *Phytolacca dedecandria*, *Ruta chalepensis*, *Cucuribita pipo*, *Alluium sativum*, *Nicotiana rustica*, *Nigella sativa*, *Vernolia amygdalina*, *Zingiber officinale*, *Hagenia abyssinica* and *Momordica fetida* are the medicinal plants which are used for the helminths treatments at the study area. Then such plants can use for control of helminths in sheep at the study area.

Impact of Helminths on Sheep Productivity

The livestock industry contributes significantly to the economy and has a great potential to help with economic growth by supplying meat, milk, other food products, cultivation power, transport, security in times of crop failure, and farm yard manure (fertility and energy), as well as playing a significant role in export commodities. But, if they can be affected by the disease there is the cause of economic loss on the product obtained from the livestock and the income obtained from them is also affected. Then the helminths disease can affect the health of the sheep by affecting product obtain from them and income through selling them.

Based on the laboratory results the helminths class that cause economic loss are Trematoda 51 (34.23 %), Nematode 45 (30.2 %), Cestoda 15 (10.07 %) and the combination of them are accounts about 38

(25.23%). Based on this Trematoda and Nematode are the highest helminths that cause economic loss, the next of them is the combination of all parasitic helminths and Cestoda is the least cause of economic loss at the study area.

Table 4. Respondents response on symptoms of the helminth infections in Gudaya Bila District, East Wallaga in 2022

Symptoms available	Number	Percentage
Diarrhoea	18	22.5
Gastroenteritis	13	16.5
gastrointestinal damage	17	21.25
abdominal distention	22	27.5
absorption of nutrients	15	18.5
Total	80	

Response of people how the helminths can affect the health of sheep

According to data obtained from the people at the study area way of the helminths can affect the health of sheep are abdominal distention 27.5%, Diarrhoea 22.5%, gastrointestinal damage 21.25%, absorption of nutrients 18.5% and Gastroenteritis 16.5% (Table 4).

Response of People Economic Loss Caused By Helminths

Table 5 shows the economic loss caused by to helminths parasite estimation based on the response of people at the study area. Based on the data obtained from table 5 the respondents the most economic loss caused by helminths are slow growth rate, meat production, morbidity, buying anthelminthic and death of sheep. Out of the 73,000 ETB cost lost due to helminths about 25,000 ETB and 20,000 ETB is lost through slow growth rate and meat production. Due to Morbidity and buying anthelminthic about 15,000ETB and 12,000ETB is lost. Death of the sheep can be cause

Table 5. Respondents response on economic loss caused by helminths from the sheep in Gudaya Bila District, East Wallaga in 2022

Value lost from sheep due to helminths parasites	Estimated losses per annual in ETB	Percentage
Meat production	20,000	27.4%
Buying anthelminthic	12,000	16.44%
Death of sheep	10,000	13.99%
Slow growth rate	25,000	34.25%
Morbidity	15,000	20.55%
Total	73,000	

ETB – Ethiopian Birr

economic loss about 10,000 per annual. This estimation is based on the response of the respondents. This indicate that helminths can affect the economy of the societies through affecting meat production which means decrease productivity, weight loss, buying anthelminthic, slow growth rate, death of sheep and morbidity.

Discussion

The overall occurrence of helminthes from the total of 384 sheep at the study area is about 149 (38.8 %) are infected with one or more helminths. However, higher prevalence was observed in the study conducted by Tesfaheywet Zeryehun (31) in and around Haramaya, 259 (67.45%). Among the helminthes parasites the Trematoda had the highest prevalence 51(13.28%) at the study area, followed by Nematoda 45 (11.72%) and the least was Cestoda 15 (3.9%). *Fasciola species* 29 (19.5%), *Schistosoma* species 14 (9.4%), *Paramphistomum* species 8 (5.4%) are the dominant species in our study area. Similarly lower prevalence Cestoda species like *Moniezia* species 9 (6.04%) and *Taenia* species was observed and Nematoda species including *Haemonchus* species 22 (14.76%) *Strongyloides* species 16 (10.74%), *Nematodirus* species 5 (3.3 %), *Trichostrongylus* species 2 (1.34 %), and the most prevalence species of helminths at the study area are *Fasciola* species 29 (19.5%), *Haemonchus* species (14.76%) and *Strongyloides* species (10.74%) and the least known species are *Trichostrongylus* species (1.34 %) and *Nematodirus* species (3.3%) at the study area. This is agree with the study conducted by Tesfaheywet Zeryehun (31) in and around Haramaya, state that overall prevalence of helminthes of sheep was about 259 (67.45%) sheep were infected at least by one helminths parasite species. Nematoda *Strongyle species* (39.84%), *Strongyloides species* (17.45%) *and Trichuris specie* (7.81%); Trematodes *Fasciola* species (1.82%) and *Paraphistomum* species (0.78%) and Cestoda *Moneizia species* (9.11 %) are identified.

The study conducted by Shimelis Dagnachew *et al.,* (26), the dominant helminths parasite species found during the study period were *Strongyloid* species (37.63%) followed by *Fasciola* species (6.99%) and the lowest was *Paraphistomum* species (0.72%). But the main difference in the prevalence of helminths is may be due to the differences in geographical locations, climates, management systems, number of sheep examined and nutritional conditions of the sheep.

From the Nematoda species *Haemonchus* species 22 (14.76%) and *Strongyloides* species 16 (10.74%) have the most common prevalence of occurrence than the other like *Nematodirus* species (11.11%), *Trichostrongylus* species (4.44 %) and the *Trichostrongylus* species have the least prevalence of occurrence. This study result is in agreement with species reported by Anteneh Wondimu and Sagni Gutu in Guto Gida district *Haemonchus* species (21.87%) *Trichostrongylus* species (14%), *Strongyloides* species (7.29%) except one species which is *Nematodirus* species is exist at the study area. But the prevalence of their occurrence might be different due to the differences in geographical locations, climates, management systems and nutritional conditions of the animals, immunity of the sheep to resist the parasites, the sample size considered, types of techniques utilized, and lack of intervention with anthelmintic.

The overall prevalence of infection during the study two different seasons indicated maximum data is obtained during summer (25.52%) and about (13.28%) is obtained in winter season. This indicates that summer season is favorable for the helminths transmission than in the winter season. The study conducted by Rajakaruna and Warnakulasooriya (24), support this idea since it say that the Rainfall and moisture makes the larvae easy to move. In addition, heavy rains can sweep larvae from the ground into water bodies, where they can infect drinking animals like sheep. Larvae on vegetation move up and down in response to the amount of moisture in the grass. The likelihood of being consumed by ruminants is very great, although in dry conditions the larvae travel to the base or occasionally to the soil. Another study conducted by Ummey *et al*

(36), in the India is also indicate that overall prevalence of sheep infection during the summer seasons is (29.65%) and the winter season is (25.26 %) which means infection of sheep by helminths parasites is maximum during the summer season than winter season.

There is a variation in seasonal prevalence among different parasite groups, with trematodes, nematodes and cestodes showing highest prevalence of 39.78%, 24.48% and 12.24% respectively during summer season, and mixed infections recording about the prevalence of 23.5% during summer. But in the winter season the prevalence of such species of helminths infection is 41.18%, 23.535% and 5.88%, nematodes, trematodes and cestodes respectively; the mixed infection records about the prevalence of 29.41% during winter season. Except those mixed infection the infection of each parasites groups have high prevalence during the summer season. According to the research conducted Ummey *et al* (36) slight variations were obtained in seasonal prevalence among different parasite groups, with nematodes, trematodes and cestodes were showing highest prevalence of 14.745%, 6.74% and 1.47% respectively during winter season, and mixed infections recording a prevalence of 2.73% during winter season. But in the summer season the prevalence of each group of helminths parasites are 18.14%, 5.97% and 1.77% and the mixed infection records the prevalence of 3.75% during the summer season.

The infections of the group of parasites have high prevalence during the summer season but there is slight difference with my obtaining data. This difference may be due to climatic factor of the study area, geographic location, immunity of the sheep to resist the parasites in different season, the sample size considered, types of techniques utilized, and lack of intervention with anthelmintic.

The cross sectional study carried out in winter and summer season result indicates that helminths species parasite mostly affects the sheep in summer season. From 384 sheep examined about 149 (38.8%) sheep are infected by helminths parasites. From this total over all infection of parasites about 98 (25.5%) are infected in summer season and about 51 (13.3%) are infected in the winter season. Then this make that the sheep is mostly affected in the summer season than winter season by different species of helminths. This is agree with research conducted by Debela (7), the favorable environment for larvae development of helminths parasites is ranged at temperature about 10–36°C and humidity proportion of 85%. This indicates that the summer is favorable for the larval development. The abdominal distention, Diarrhoea and gastrointestinal damage are the most common way through which the helminths can affect the health of sheep and absorption of nutrients and absorption of nutrients are also the next way of helminths can affect the sheep.

At the study area peoples can have their own way of controlling the helminths through medicinal plants. At the study area the knowledge of using medicinal plant is practice like Bonga communities as state by Solomon Shiferaw (28). So, Bonga communities have maintained good knowledge of using medicinal plants for control of gastrointestinal parasites of sheep and traditional knowledge, practice and validation methods of activity of medicinal plants against helminthes of animal are used by Ethiopian community (3).

The tobacco or *Nicotiana rustica* is used by the community of Gudaya Bila like used in developing countries, like India, anthelmintic effect of tobacco extract on parasitic nematode, *Marshallagia marshalli*, was found to be as effective as a standard anthelmintic levamisole (20). Similarly, Iqbal *et al.,* (14) found the effectiveness of the extracts of leaves of tobacco against nematodes in traditional medicine system of Pakistan.

Based on the data table 8 obtained from the respondents the most economic loss caused by helminths are slow growth rate, meat production, Morbidity, buying anthelminthic and death of sheep. Out of the

73,000 Ethiopian Birr (ETB) cost lost due to helminths about 25,000 ETB and 20,000 ETB is lost through slow growth rate and meat production. Due to Morbidity and buying anthelminthic about 15,000 ETB and 12,000 ETB is lost. Death of the sheep can be cause economic loss about 10,000 ETB per annual. This estimation is based on the response of the respondent's sheep householder. This indicate that helminths can affect the economy of the societies through affecting meat production which means decrease productivity, weight loss, buying anthelminthic, slow growth rate, death of sheep and morbidity. In general, helminths can cause economic loss through reduced productivity and increased mortality. The study is in agreement with the research conducted by Perry *et al.* (23) and Getachew *et al.,* (10). And also the study conducted by Pedreira *et al.,* (22); Odoie *et al.,* (21) and Chaudhary *et al.* (6) says the loss through reduced productivity is related to reduction of food intake, slow growth rate, cost of treatment and control of helminthosis; Mcleod (16) says reduced weight gain is also the impact of helminths on the economy. Study in Germany Severe morbidity and mortality; decreased body weight gains; decreased fertility; decreased birth weight; decreased meat and wool production; and increased expenditures on anthelmintics and veterinary care can causes economic loss (8).

From data obtained from the study area helminths class based laboratory examination that cause economic loss from the total of 149 helminths species were Trematoda 51 (34.23%), Nematode 45 (30.2%), Cestoda 15 (10.07%) and the combination of them were accounts about 38 (25.23%). Based on this Trematoda and Nematode were the highest helminths that cause economic loss, the next of them is the combination of all parasitic helminths and Cestoda was the least cause of economic loss at the study area. This study agreed with study conducted by Tesfaye (32), at Metema woreda that says, the most important helminths parasites that cause economic loss are nematodes, trematodes, and cestodes. These parasites are a worldwide problem for both small and large-scale farmers, but there is a greater instance in sub-Saharan Africa in general and Ethiopia in particular due to the availability of a wide range of agro-ecological factors suitable for diversified hosts and parasite species.

Sheep represent an important source of income in many countries (19) and although the effects of parasitism on production have been recognized (5) there is still a need to quantify these losses. Anthelmintic resistance and climate change is likely to alter the geographical distribution of parasites and their impact on production animals, thus increasing the need for a clear understanding of the cost of parasitism in order to develop sustainable control strategies (18).At the study area people can control helminths parasite by their own method of controlling through traditional way. Mostly they use traditional medicine to control helminthes.

Conclusions

Helminthosis is a major constraint to animal health and productivity, causing significant and insidious economic losses. The helminths infections with trematode and nematode parasites are high prevalence of infection, whereas the Cestoda parasites are least prevalence of infection are identified. Based on their species trematodes species that are *Fasciola* species*, Schistosoma* species and *Paramphistomum* species are identified; nematodes species *Haemonchus species, Strongyloides* species*, Nematodirus* species and *Trichostrongylus* species and the cestodes species are *Moniezia* species and *Taenia* species are identified. The species that have high prevalence are *Fasciola* species*, Haemonchus* species and *Strongyloides* species, while *Nematodirus* species and *Trichostrongylus* species have the least prevalence. From the five study kebele, the sheep is mostly affected by helminths in Hagelogidami, Chalejima and Welenelemu kebele, whereas Bila and Harogodisa are the two kebeles which are least affected. The prevalence of helminths during the season helminths have high prevalence during the

summer season than winter season. Due to these adverse effects associated with the use of commercial anthelminthic, the community is trying to search the other alternative of helminth control strategies which is the use of medicinal plants to control helminths. As a result traditional anthelmintic medicinal plants could contribute a lot to the treatment to control parasitic helminths in animals, and from the five kebeles of the study area 11 plant species identified were used as to control helminths parasites.

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