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Pre-slaughter coproscopic and abattoir prevalence of gittrematodes and associated risk factors in cattle slaughtered at WolaitaSodo municipal abattoir, Southern Ethiopia

Ephrem Tesema, Berhane Wakjira and Yacob Hailu Tolossa

Addis Ababa University, College of Veterinary Medicine and Agriculture, PO Box: 34, Bishoftu, Ethiopia, [2*] **Correspondence:**yamilaya2008@gmail.com

Abstract

A cross sectional study was done from November, 2022 to April, 2023 focusing on to determine the pre-slaughtercoproscopic and abattoir prevalence of GIT trematode, associated risk factors and economic losses due to liver condemnation in cattle slaughtered at WolaitaSodo municipal abattoir. A total of 384 cattle including 30 female and 354 male were picked at random, feces was collected for trematode eggs and the GIT was examined during post-mortem inspection for adult flukeswere conducted, with an overall prevalence of trematodes in cattle during study period was 10.16% and 14.32% in pre-slaughter coproscopic and abattoir examination. The *Fasciola*, *Dicrocoelium*and *Paramphistomum*were the identified trematode in the study area with prevalence of 7.29%, 0.78% and 2.08%, and 9.90%, 3.13% and 1.30% in fecal sedimentation technique and postmortem examination, respectively.For further evaluation of the data, Pearson's chi-square analysis was employed. There was statistically insignificant difference observed in prevalence of trematodes between male and female as well as among different age groups ($p>0.05$)in pre-slaughter coproscopic and abattoir examination.Meanwhile, the prevalence of bovine trematodes was strongly linked with origin and the cattle's body condition ($p<0.05$) in postmortem examination and also breed and body condition of cattle were risk factor of trematodiasis during pre-slaughter coproscopic examination. Total annual financial loss due to condemned liver and carcass weight loss from trematodes was 4,775,218.8 Ethiopian birr. The current study revealed that GIT trematodes are among parasites with animal health and financial impacts warranting implementation of strategic and integrated control in the study area.

Keywords: Abattoir;Cattle; Control; Coproscopy; Fasciolosis; Paramphistomosis; Prevalence;

1. Introduction

Trematode infections are one of the main financially major helminth diseases that lower domestic ruminant output worldwide(Dargie, 1987; Mage *et al.*, 2002; Njau*et al.*, 1988). The Digenea includes all trematode species that parasitize animals (Hansen & Perry, 1994). The Fasciolidae, Dicrocoeliidae, Paramphistomatidae, and Schistosomatidae are a group of parasites and major interest to veterinarians. (Andrews, 1999; Urquhart *et a*l., 1996).

Fasciolosis is parasitic disease that affects domestic animals, especially cattle and sheep, as well as rarely people. Fasciola*hepatica* and Fasciola*gigantica* are the two species that are most usually classified as the causes of fasciolosis(Andrews, 1999). Adult cattle with liver fluke's infections often don't show any symptoms, unless they have severe illnesses. Therefore, under normal circumstances, young cattle are the only ones who are subject to get clinical diarrhea (Love, 2017). To the contrary, even a little illness can have a major negative impact on weight growth, reproductive performance, and milk output and purity (Urquhart *et al*., 1996; Hope-Cawdery*et al*., 1977; Ross, 1970). In contrast to its impact on productivity, fasciolosis causes significant economic losses due to the condemnation of the liver at slaughter (Abebe*et al*., 2010, Abunna*et al*., 2010, Berhe*et al.*, 2009, Phiri *et al*., 2005).

There are various genera of paramphistomes, with Paramphistomum being the more common and frequent in cattle (Taylor & Wall, 2016). These genera include Cotylophoron, Calicophoron, Bothriophoron, Orthocoelium, and Gigantocotyle. According to Iglesias-Pieiro*et al*., (2016), Paramphistomes (also known as amphistomes) are conventionally thought to have little clinical importance. However, a severe illness that might even be fatal can be brought on by an infection with immature flukes that attach to the lining of the upper section of the small intestine (Lloyd *et al.*, 2007, Rolfe *et al.*, 1991). Reduced milk supply or ill-thrift due to mild infections with the immature fluke. However, the majority of cattle only have mild stomach fluke infections with adult fluke or tiny numbers of immature fluke, and they not show symptoms of illness (Lloyd *et al*., 2007).

The grazing ruminant disease dicrocoeliasis is less serious than fasciolosis. Although there are substantial financial losses mainly as a result of damaged liver condemnation (Ahmadi et al., 2010). (Ahmadi *et al.,* 2010). The growth of a parasite requires the presence of two intermediary hosts, an ant (Formica sp., Lasius sp.) and a land snail (Zebrina sp., Helicella sp., Cionella sp.). However, immature flukes can infect animals and lead to a serious illness that may even be fatal if they attach to the lining of the upper part of the small intestine (Le-Baillyand Bouchet, 2010).

In examinations of coproscopic and slaughterhouse surveys (Abebe*et al.*, 2010, Abunna*et al.*, 2010, Ameni*et al*., 2001, Fromsa*et al*., 2011, Yeneneh*et al*., 2012), the prevalence of liver and stomach flukes in cattle in Ethiopia is frequently documented. A reasonable and effective parasite control approach requires a detailed understanding of the epidemiology of parasites and their interactions with hosts in a specific environment and management system (Barger, 1999). The objectives of this study were [1] To determine the pre-slaughter and abattoir prevalence of GIT trematodes in cattle slaughtered at WoliataSodo municipal abattoir [2] To identify the main risk factors that contribute to the occurrence of trematodes [3] To determine financialimpact due to liver and other GIT organs condemnation

2. Materials and Methods

2.1. Study area

The study took place out in WolaitaSodo municipal abattoir, in the Wolaita zone of southern Ethiopia, 395 kilometers southwest of Addis Ababa, from November 2022 to May 2023. In the town of Sodo, there is an abattoir called WolaitaSodo municipal abattoir. It located between latitudes 6°51 and 7°35 north and longitudes 37°46 and 38°1, with an elevation between 1500 and 1800 meters above sea level. On average, it gets 1200 millimeters of rain annually. According to (NMA, 2012 and WZFEDO, 2013), the WoliataSodo has three distinct seasons: dry from November to February, mild rain from March to June, and heavy rain from July to October. The region's average annual maximum and minimum temperatures are 21 °C and 14 °C, respectively, during the entire year. The most popular agricultural practice is the production of mixed crops and animals.

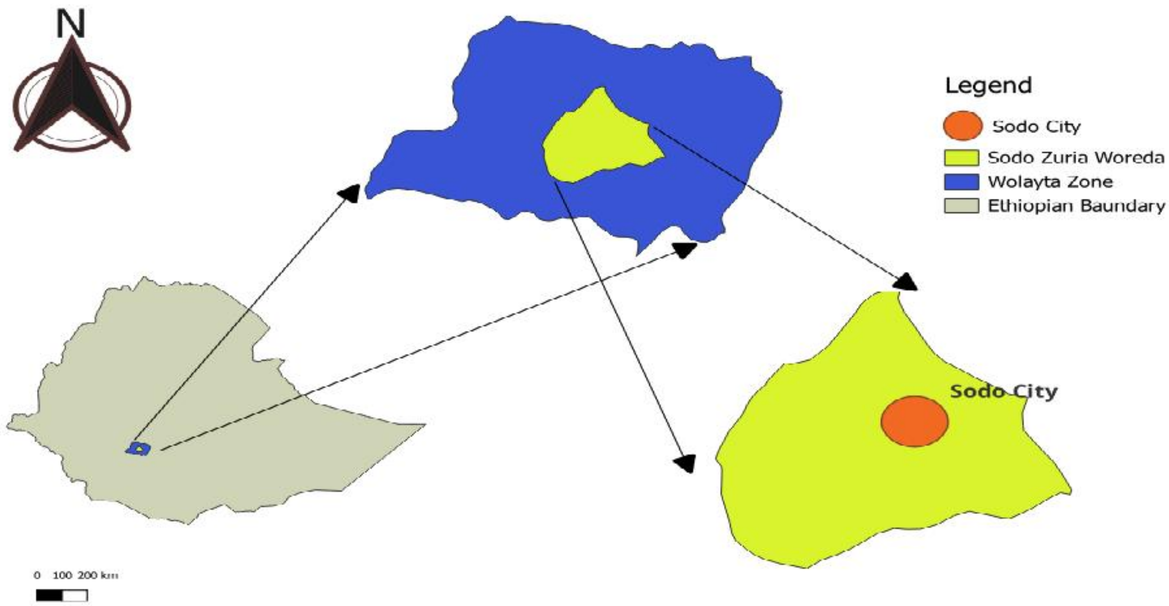

Figure 1: The Ethiopia map displaying the research area in the Wolaita Zone of the SNNPR State

2.2. Study Animals

Cattle delivered to the municipal slaughterhouse at WolaitaSodo are included in the research populations. In order to get the needed data, the study will use a cross-sectional study design with a variety of approaches and methodologies. Systematic random selection will be used to choose the target animals for the coproscopic and postmortem examination.All ages and both sexes of cattle, including cross and local breeds, were used as study subjects. Before samples were taken, basic details regarding the breed, sex, physical condition and age of the animals were noted. The description of teeth eruption and wear provided by DeLahunta and Habel, 1986) was used to determine the age of the investigational animals. The animals age groups as a result: young and adult. Animal body conditions were categorized as medium and good by observation of anatomy such as spinal column, ribs, muscle, neck and spines (Nicholson and Butterworth, 1986).

2.3. Determination of Sample Size

The research animal was chosen using a simple method of random sampling. Due to the lack of previous studies on the prevalence of trematode infections in cattle in the study area, A sample size was determined using a 50% predicted prevalence, a 95% confidence interval, and a 5% needed absolute precision. The sample size was calculated according to Thrusfield's, 2018) formula given below.

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

where n = the required sample size
Pexp = expected prevalence (P = 50%)
d = desired absolute precision (5%).
Z = 1.96 for a 95% confidence interval.

$$n = \frac{1.96^2\,(0.5)\,(1-0.5)}{(0.05)^2} = \frac{3.84 \times 0.25}{0.0025} = 384$$

(Overall, 384 cattle were selected and examined)

2.4. Study design

A cross-sectional study was carried out from November 2022 to May 2023 to determine the prevalence of trematode infections and risk factor associated with trematode occurrence in the study area.

2.5. Sampling Techniques and Sample Collection

Each animal chosen for the study had its own special identification number that could be utilized for both pre-slaughter coproscopic and abattoir examination. The existence of the main trematodes of interest in the selected cattle was checked for presence of trematode. Each study animal's identification, origin, age, sex, body condition and breed were noted. Direct faecalsamples were taken from each rectum. Each faecal sample was placed in a plastic jar with a cover and labeled with the animal's age, breed, sex, and body condition (good or medium). After that, the samples were moved using an ice box to the WoliataSodo regional laboratory in Woliata, Sodo, where they were either immediately analyzed.

2.5.1. Pre-slaughter coproscopic examination

Animals picked for this study were given identification numberbefore faecal sample collected.These cattle's rectums were used to collect feces, which were then put in a plastic jar and hermetically closed. Animal ID labels were placed on collection containers before being transferred to the WolaitaSodoregional laboratory for examination.

In according to the fact that trematod`s eggs are heavier than the majority of faecal particles, this sedimentation approach was employed to identify their presence by diluting the fecal suspension and sedimenting the eggs (Palmer, 2013; VanWyk and Mayhew, 2013). To distinguish between different species' eggs, a drop of methylene blue solution compared to Fasciola species eggs, which were yellowish and with blue-black Dicrocoelium, Paramphistomum species eggs were translucent, gray(Urquhart *et al*., 2003).

2.5.2. Abattoir examination

Following evisceration, the livers and rumens of 384 cattle were thoroughly examined for the presence of trematodes (seeing, palpatory, and, if required, incisions were made based on the inspected organs). It is well known that adult and immature liver flukes and rumen flukes choose to live in these organs. According to (Soulsby, 1986), liver and rumen fluke recovery was done for identification.

2.5.3. Financial Loss Analysis Due to Liver Condemnation

The sum of yearly liver condemnation and indirect annual loss from reduced meat yield was used to assess the entire financial loss caused by trematode parasites in the WolaitaSodo municipal abattoir. The data was gathered, and the (Ogunrinade and Ogunrinade, 1980) algorithm was used to calculate the data.

Total annual liver condemnation (ALC) = NAL X CL X Prev

Where:

NAL = Average number of cattle slaughtered in WolaitaSodo municipal abattoir per year

CL= Mean cost of one liver in WoliataSodo town

Prev = Prevalence of totally condemned liver due to trematodesin WolaitaSodo municipal abattoir

Total annual liver condemnation (ALC) = NAL X CL X Prev

2.6. Data management and analysis

Theinformation was gathered in field have been entered on specially created forms and placed into a Microsoft Excel spreadsheet 2013. Using predesigned or pre-printed formats during the collection of faecalsamples and presence of adult fluke in organ from research animals, and then entered onto a computer using a Microsoft Excel spreadsheet 2013. The dataset was filtered for errors before analysis. The STATA software version 14 (STATA Corp., College Station, TX) was used to code and analyze the data. Using Pearson's chi-square (x^2) and P-value, the prevalence of trematode and the risk factors (body condition, breed, sex, age, management, and origin) were compared. The odds ratios (OR) and 95% confidence intervals (CI) for the outcome variables were determined. A p-value of 5% indicated the presence of a significant association with a 95% confidence level.

3. Results

3.1. Per-slaughter Coproscopic Examination

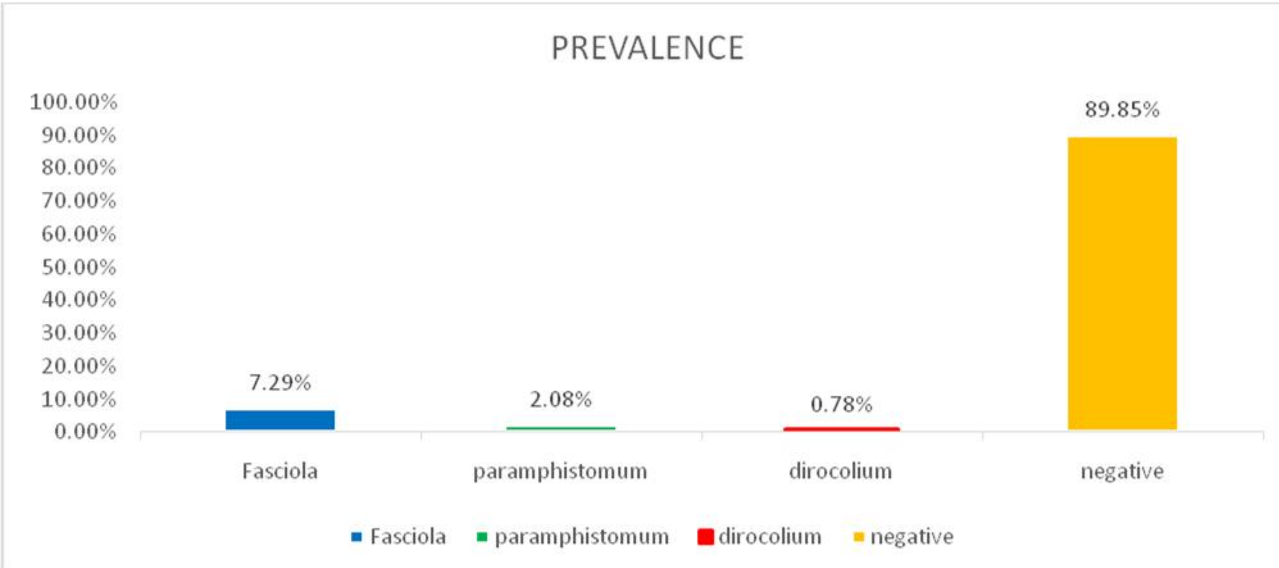

Figure 2: Pre-slaughter coprscopic prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis

From 384 cattle examined to see if there are any eggs with simple faecal sedimentation technique, 28 (7.29%), 3(0.78%) and 8(2.08%) were positive for *Fasciola, Dicrocoelum* and *Paramphistomes*eggs, respectively. There was no score for poor body condition in this study record. Between medium and good body condition scores, there was a statistically significant difference in the occurrence oftrematodes. Trematodes were more likely to affect with medium body conditions than those with good body conditions. The prevalence of *Fasciola, Dicrocoelium,* and *Paramphistomes*among the cattle bought from various origins/sites were differ in a statistically significant way. Humbo cattle, yet, showed the highest prevalence (11.72%), followed by Salabara (10.94%) and Gesuba (7.81%) cattle.

3.1.1. Risk Factors Associated with Bovine Fasciolosis, Dicrocoeliasis and Paramphistomosis

Table 1. Pre-slaughter coproscopic prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis based on body condition and age

Risk factor	Categories	Animal examined	Number of positive	Prevalence (%)	X^2	P-value
Body condition	Medium	58	13	22.41	11.249	0.001
	Good	326	26	7.98		

Age	Adult	312	35	11.22	2.0556	0.152
	Young	72	4	5.56		

Trematodes were more susceptible to infecting cattle with medium body condition scores than those with good body conditions and there was statistically significant (p<0.05). The adult Cattle (11.22%) were high susceptible to affected by trematode (*Fasciola*, *Dicrocoelium*and *Paramphistomes*) than young cattle (5.56%). However, there was statistically insignificant (p>0.05).

Table 2: Pre-slaughter coproscopic prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosisbased on sex.

Risk factor	Categories	Animal examined	Number of positive	Prevalence (%)	X^2	P value
Sex	Female	30	6	20	3.45558	0.063
	Male	354	33	9.32		

Thefemale cattle (20%) were highly affected by trematode(Fasciola, Dicrocoelium and Paramphistomum) than male cattle (9.32%). However, there was statistically insignificant (p>0.05).

Table 3: Pre-slaughter coproscopic prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosisbased on origin of animal, breed and management system.

Risk factors	Categories	Number of animals examined	Number of positive animals	Prevalence (%)	Chi-square(x^2)	P-value
Origin	Gesuba	128	10	7.81	1.1987	0.549
	Humbo	128	15	11.72		
	Salabara	128	14	10.94		
Breed	Exotic	14	4	28.57	5.3999	0.020
	Local	370	35	9.46		
Management	Extensive	31	2	6.45	0.5072	0.476
	Semi-Intensive	353	37	10.48		

The prevalence of trematode were cattle bought from various origins/sites. Statistically insignificantly. However, the cattle from Humbo (11.72%), Salabara (10.94%), and Gesuba (7.81%) had the highest occurrence of trematode. The exotic cattle breeds (28.57%) were more affected bytrematode(*Fasciola*, *Dicrocoelium*and*Paramphistomes*) than local cattle breed (9.46%) and statistically significant (P<0.05) difference between breeds. The semi-intensive management systems (10.48%) were more likely affected by trematode than extensive management system (6.45%). yet, there was statistically insignificant (P>0.05).

3.2. Abattoir examination

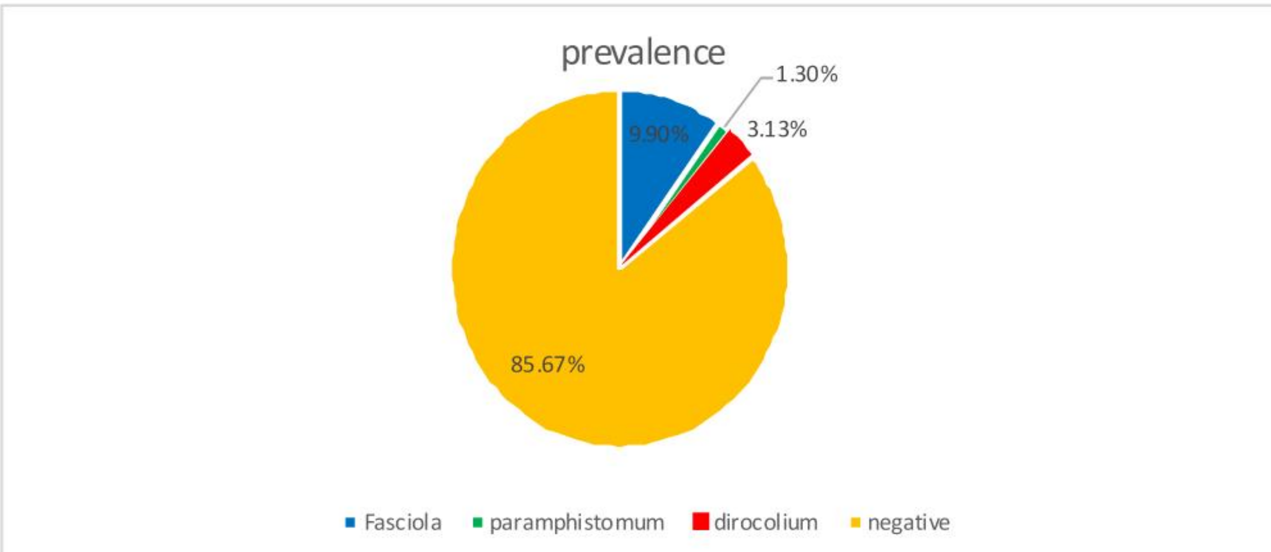

Figure 3: Abattoir prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis

In regarding to the results, among 384 cattle slaughtered at WoliataSodo municipal abattior, 38(9.90%), 5(1.30%) and 12(3.13%) were infected by *Fasciola*, *Dicrocoelium*and *Paramphistomes.*There was no record of a low body condition score in this study. However, there was a statistically significant difference between body condition scores of medium and good in the occurrence of trematodes.

Cattle with medium body condition were more affected by *Fasciola*, *Dicrocoelium* and *Paramphistomes* compering with cattle with good body condition. Also, there was statistically significant (P<0.05) difference in the prevalence of trematodes between the cattle transported from various origins/sites. Cattle transported from Humbo were high prevalence (24.22%) followed bySalabara (10.94%), and Gesuba (7.81%). Therewas sex- related difference in the prevalence oftrematodes in male and female cattle. However, there was statistically insignificant (p>0.05).

3.2.1. Risk Factors Associated with Bovine Fasciolosis, Dicrocoeliasis and Paramphistomosis

Table 4: Abattoir prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis based on body condition

Risk factor	Categories	Animal examined	Number of positive	Prevalence (%)	X^2	P value
Body condition	Medium	57	16	28.07	10.3085	0.001
	Good	327	39	11.93		

Medium body condition score of cattle(28.07%) were highly affected by trematode (Fasciola, Dicrocoelium and Paramphistomum) compering with cattle with good body condition(11.93%) and there was statistically significant ($p<0.05$)

Table 5: Abattoir prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis based on age.

Risk factor	Categories	Animal examined	Number of positive	Prevalence (%)	X^2	P value
Age	Adult	316	45	14.24	0.0099	0.921
	Young	68	10	14.71		

The young cattle (14.71%) and adult Cattle (14.24%) on their prevalence were almost equal to be affected by trematode (*Fasciola*, *Dicrocoelium* and *Paramphistomes*) and also there was statistically insignificant ($p>0.05$).

Table 6: Abattoir prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis based on sex

Risk factor	Categories	Animal examined	Number of positive	Prevalence (%)	X^2	P value
Sex	Female	30	6	20	0.8537	0.355
	Male	354	49	13.84		

The female cattle (20%) were highly affected by trematode(Fasciola, Dicrocoelium and Paramphistomum) than male cattle (13.84%) on their prevalence. But, there was statistically insignificant ($p>0.05$).

Table 7: Abattoir prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis based on origin.

Risk factor	Categories	Animal examined	Number of positive	Prevalence (%)	X^2	P value
Origin	Gesuba	128	10	7.81	15.8311	0.000
	Humbo	128	31	24.22		
	Salabara	128	14	10.94		

Though, there statistically significant difference in the prevalence of trematodes between the cattle come from various origins/sites. But, cattle come from Humbo (24.22%) were having the highest prevalence oftrematode (*Fasciola*, *Dicrocoelium*and*Paramphistomes*) followed by those from Salabara (10.94%) and Gesuba (7.81%).

Table 8: Abattoir prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis based on breed.

Risk factor	Categories	Animal examined	Number of positive	Prevalence (%)	X^2	P value
Sex	Exotic	14	4	28.57	2.4038	0.1201
	Local	370	51	13.78		

The exotic cattle breeds (28.57%) were more affected by trematode than local cattle breed (13.78%). There was statistically insignificant (P>0.05).

Table 9: Abattoir prevalence of Fasciolosis, Dicrocoeliasis and Paramphistomosis based on management system.

Risk factor	Categories	Animal examined	Number of +ve	Prevalence (%)	X^2	P value
Management	Extensive	31	6	19.35	0.6958	0.404
	Semi-intensive	353	49	13.88		

The extensive management systems (19.35%) were more likely affected by trematode than semi-intensive management system (13.88%). Yet, there was statistically insignificant (P>0.05).

3.3. Financialloss Analysis due to Organ Condemnation and indirect body losses in Wolaita Sodo Municipal Abattoir

The abattoir did not frequently condemn the liver in partial condemnation. The direct yearly loss from liver condemnation was helped by considering the overall prevalence of the disease, the total yearly slaughtered animals in the abattoir and the retail market of price liver. The average retail market price of liver was obtained from the butchers in Sodo town, and the annual number of animals slaughtered was extrapolated using effective abattoir records of the previous four years.

The average current price of one liver and one Kilogram of beef in WolaitaSodo town was taken as 1200 Ethiopian birr and 500 Ethiopian birr respectively. The average numbers of cattle slaughtered in WolaitaSodo municipal abattoir were 27500 cattle per year based on two year recorded data.

Direct loss Total annual liver condemnation (ALC)

Total annual liver condemnation (ALC) = NAL X CL X Prev
Where:
NAL = Average number of cattle slaughtered in WolaitaSodo municipal abattoir per year = 27500 cattle
CL= Mean cost of one liver in WolaitaSodo town=1200 birr
Prev = Prevalence of totally condemned liver due to Trematode parasite in WolaitaSodo municipal abattoir= 14.32 %(0.432)
Total annual liver condemnation (ALC) = NAL X CL X Prev= 27500*1200*0.1432=4,725,600 birr/year

Indirect annual financial loss due to reduction of meat

Indirect annual economic loss due to reduction of meat (IAL) =NAL X CL PA X Prev
Where:
NAL = Average number of cattle slaughtered per year a WolaitaSodo abattoir=27500
CL = Carcass weight loss in individual cattle due totrematode parasites (10%) and an average weight of local zebu is 126 kg is reported by ILCA
PA = Average price of one kilogram of beef in WolaitaSodo town
Prev = Prevalence rate of trematode parasites at WolaitaSodo municipal abattoir=14.32%

Indirect annual economic loss due to reduction of meat (IAL) =NAL X CL PA X Prev=27500*12.6*0.1432=49,618.8 Birr/year

The total annual financialloss due to trematode parasites at WolaitaSodo municipal abattoir is equal to Total annual liver condemnation plus indirect annual economic loss due to reduction of meat (IAL)= 4,775,218.8 birr/year.

4. Discussion

4.1. Overall prevalence

In current, overall prevalence of trematodes in cattle during study period was 10.16% and 14.32% in pre-slaughter coprscopic and abattoir examination respectively; is much lower than the previous reports from numerous of sources in various parts of the country.Accordingly, 90.65% at Gondar abattoir (Yilma and Mesfin, 2000), 88.57% at Debre-Brehan abattoir (Tsegaye, 1995), 80% at DebreBerhan abattoir (Dagne, 1994), 56.6% at Ziway abattoir (Adem, 1994), 47% at Sodo abattoir (Abdul, 1992), 46.58% at Jimma abattoir (Tadele and Workue, 2007) and 28.63% at Hawassa abattoir (Abebe*et al.*, 2010). Such a significant variation may be related to community beliefs about treating animal care and the accessibility of veterinary services close to cattle farmers. The majority of people were not served by the early and midnight veterinarian services because the antihelmenthics that were employed did not work as well as they had in previous years.

4.2. Pre-slaughter coproscopic prevalence of GIT trematodes

During pre-slaughter coproscopicsedimentation in this investigation, fasciolosis was prevalent with 7.29%. This result was lower than 16.6% (Zewde*et al.*, 2019), 23.7% (Alemu, 2019), 19.4% (Alemu and Belay, 2015), 16.75% (Moje et al., 2015), and 23.7% (Alemu, 2019) coprological prevalence reported elsewhere in Ethiopia; 54.2% in Eastern Shoa (Mohammed et al., 2018), 23.7% in kellemwollega zone (Kebede*et al.*, 2017), 50.79% in and around Inchini town (Assefa et al., 2015), 41% in and around Woreta (Tsegaye*et al.*, 2012), and 33.42% in North Gondar (YilmaandMesfin, 2000); Hawassa at 11.5% (Mariam et al., 2014) and from East Wollega Zone at 15.90% (Tilahun*et al.*, 2014). This difference may be explained by differences in ecological and climatic conditions, the low accuracy of diagnostic procedures, different in sample size, study area, and livestock management systems. Over time, there have been reports of variations in *Fasciola* prevalence, primarily as a result of variations in rain and pattern.

The current prevalence of *Paramphistomes* (2.08%) was lower than previous reports of coprological studies, which found that the prevalence was 10.2% at the Holeta Agricultural Research Centre Dairy Farm (Getahun*et al*., 2017), 45.83% in northwest Ethiopia (Yeneneh*et al*., 2012), and 5.21% in Damot Sore District, Wolaita Zone, Southern Ethiopia (Isayas, 2022). The study period's variability, the lack of swampy regions, the impact of deworming, and variations in the livestock management system could all be contributing factors to this variation.

The prevalence of *Dicrocoelium* in current study (0.78%) was comparatively lower than Shinggu*et al*. (2019) 80.5% in Wukari, southern Taraba State, Nigeria; Khan*et al*. (2023) 8.66% in the Himalayan ranges, 39.0% Iyaji*et al*. (2018) in Anyigba, Kogi State, Nigeria. There could be several reasons why the prevalence of *Dicrocoelium*parasites is lower in a current study compared to a previous study. It is possible that the environment has changed, affecting the population of intermediate host or the behavior of definitive host. Additionally, changes in human behavior such as improved hygiene practices or access to clean water in management of cattle could also impact the prevalence of trematode parasites.

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4.3. Abattoir prevalence of GIT trematodes

The current finding showed that prevalence of Fasciolosis was 9.90% during post mortem examination. This result was aligned to Nebi*et al*. (2018) who reported 8.53% in Hirna municipal Abattoir, Ethiopia. This result was lower than finding of Abdul (1992) who reported 47% prevalence of bovine fasciolosis in WolaitaSodo municipal abattoir; Edilawit et al. (2012) who reported 25.33% in WolaitaSodo Town, Ethiopia.Moreover, it was lower than 53.5% in Kombolcha abattoir by Mulugeta (1993), 46.15% in Jimma by Tadele and Worku (2007), 56.6% prevalence of cattle fasciolosis reported in Zeway abattoir by Adem (1994), 54.5% prevalence of fasciolosis in Jimma municipal abattoir reported by Abie *et al*. (2012), Mihrete*et al*. (2010) at Adwa Municipal abattoir (32%), Equar*et al*. (2012) at Mekelle Municipal abattoir (35.2%) Daksa*et al*. (2016) at Guduru and ChommanAbay Abattoirs (32.6%), Gojam and Dereje, (2018) at Ambo municipal Abattoir (39.1%), Yitayal and Taddie, (2020) at Bahirdar Municipal abattoir (56.4%).This could be attributed to ecological and climatic condition difference from where the animals were brought to the abattoir. Management system practice could also be the probable reason for the variations.

The prevalence of *Paramphistomes*in the present study (3.13%)was comparable to Agosti*et al*. (1980) in Kozakiewiez, Poland (3.06%). It comparatively lower thanNebi*et al*. (2018) who found 5.43% in Hirna municipal abattoir andAbebe*et al*. (2011) who reported a prevalence of 57.52% in cattle in and around Jimma; Sintayehu and Mekonnen (2012) 40.1% at DebreZeit industrial abattoir, Ethiopia; 20% found by Haridy*et al*. (2006) from Egypt; 16.6% Jithendran (2000) from India; 23.8% by Juyal*et al*. (2003). The difference could be the result of many environmental factors and variations in geography. A multifactorial system made up of hosts, parasite agents, the transmission process, and environmental influences affects the prevalence of Paramphistomosis in a region (Radostits*et al*., 2000).

The prevalence of Dicrocoeliasis in the present study (0.78%) was aligned to Chougar*et al*. (2019) 0.52% in Northern Algerian slaughterhouses; Aqib*et al*. (2017) 1.32% in North Kashmir. On other hand, it was lower than findings of Shamsi*et al*. (2020)who reported 5.68% in Sabzevar abattoir, Iran; Kruchynenko*et al*. (2021) 18.9% in Ukraine; Elelu*et al*. (2016) who reported 7.3 % in Edu Local Government Area, Kwara State, north-central Nigeria. The least prevalence of Dicrocoeliasis in cattle in current study may be attributed to the fact that in order to complete the life cycle, parasite requires two intermediate hosts (Snail and ant) and one definitive host (Cattle) and there are very less chances to get all the hosts so are very rare chances for parasite to complete life cycle (Aqib*et al*., 2017).

Regarding the prevalence of bovine Paramphistomosis in Ethiopia, particularly at the current study area abattoir examination, there was no report that was precisely described. The fact that adult *Paramphistomes*are considered non-pathogenic and researchers may not be interested in expanding resources for such non-pathogenic types of cases may be the main reason for the lack of information on the prevalence and geographic distribution of the fluke.

4.4. Risk factors associated with prevalence of GIT trematodes

Fasciola, Paramphistomes, and*Dicrocoelium*, three trematode parasites, were found in cattle and were associated with the body conditions of the cattle. The prevalence of trematode parasites varied significantly ($p>0.05$) across the cattle body condition. This result is consistent with reports by (Hagos, 2007) at the municipal abattoir in (Mekelle and Yitayal and Taddie, 2020) at the municipal abattoir in Bahirdar. This is due to the reality that animals with medium body conditions are more vulnerable to trematode parasites for a number of reasons. Animals with a medium body condition may have weakened immune systems, which make them more susceptible to infections. Also, undernourished animals are more prone to graze in places with contaminated water sources, increasing their exposure to trematode parasites.

In the abattoir examination, there were statistically significant differences ($p<0.05$) in the prevalence of trematode parasites among the cattle transported from various origins/sites, but these differences were not statistically significant ($P > 0.05$) in the pre-slaughter coproscopicexamination. As a result, the prevalence of the cattle was a potential risk factor for trematode parasite incidence. Contrary to Nebi*et al*. (2018)'s findings in Hirna, Ethiopia, who claimed that there was no statistically significant difference between the prevalence of *Fasciola*and*Paramphistomes i*n relation to origins, this conclusion was different. This could be a result of differences in the study area's selected sites' expansion of veterinary services, as well as relative variations in agroecology.

In terms of trematode parasite prevalence, there was statistically insignificant difference ($P>0.05$) between the cattle management systems. Cattle management practices do not increase the likelihood of trematode parasite infestation. The high prevalence of trematode parasite in extended management may be caused by eating grass that has been contaminated with parasites. Additionally, rivers are used for watering by the majority of comprehensive management systems.

Cattle of foreign breeds had a larger prevalence (28.57%) than cattle of local breeds (13.78%). This conclusion was lower than that of Isayas (2022), who found that the frequency of trematode in the WolaitaSodo municipal abattoir was exotic (35%) and local (25%) in nature. Due to frequent natural exposure to the disease over a longer length of time, local breeds may have developed a high level of immunity, which could account in part for this large discrepancy. The decrease of worm fecundity was the primary indication of immunization. Additionally, it was claimed that naturally infected local cattle have the ability to decrease egg output. Additionally, native and crossbred cattle had different levels of natural or innate immunity (Aylate*et al*., 2017). However, there was no significance difference ($p > 0.05$) between bovine fluke infections and breeds in postmortem examination. These results support the fact that there is no statistically significant difference between trematode diseases and breeds from (Yeneneh et al., 2012). However, there was a significant difference ($p<0.05$) between breeds and bovine fluke infection in pre-slaughter coprscopicexamination.

The current studies found statistically insignificant difference ($p>0.05$) among the age groups, which contradicts the findings of Yilma*et al*., 2000 and is the same to the report by Yeneneh*et al*., 2012. Therefore, the age of cattle is not a risk factor for being affected by trematode parasites, but there is a small variation in prevalence between adult and young cattle, and in the current study, mature animals had a slightly higher frequency than young cattle.

Trematodes were more prevalent in female calves (20%) compared to male cattle (13.84%). This explains why many people still feed their milking cows by gathering the grasses that grow along rivers and in marshy areas during the dry season in order to increase the cows' milk yield. This also explains why cows are less resistant to fasciolosis infection because of the lactation period's decreased milk production, which may predispose them to componentization of their immunity (Gracy*et al*., 1999).The current study's findings, however, indicated that the animal's sex had no significant impact on the incidence of concurrent trematodiasis ($p > 0.05$). This shows that the likelihood of infection is unaffected by gender and that both male and female animals were exposed to the illness. This could be as a result of both sexes being exposed to the same pasture fields and watering locations, eventually contracting the disease equally. This result was agree with research reports from Ethiopia (Tilahun*et al*., 2014), Bangladesh (Saha*et al*., 2016), and other countries (Yenenehe*t al*., 2012).

5. Conclusions and Recommendations

The trematodes are less common in the study area than in other regions of the nation, especially when compared to places with heavy rainfall and climates that are good for intermediate snail hosts. Fasciolosis, Dicrocoeliasis, and Paramphistomosis are currently common which cause significant economic loss due to liver damage, poor weight gain and productivity, expensive treatment, a propensity for infectious necrotic hepatitis, and death in severely affected animals. The origin, breed and body condition of the animals were found to be risk factors for bovine trematodiasis in this investigation. Higher prevalence of bovine trematodiasis was recorded in female cattle than male, in extensive than semi-intensive, and in older cattle than younger cattle.

Based on above conclusion, the following recommendations are forwarded;

-
- Public education on ways of transmission, animal health and financial impacts of these diseases is crucially important
- Strategic deworming and preventing animals from grazing in water reservoir areas should be implemented
- Further study should be conducted on epidemiology of GIT trematodes and their vectors should be conducted in different agro-ecologies

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7. ANNEXES

ANNEXES 1:Methods for Simple Sedimentation

Procedure:

1. Weigh or measure approximately 3 grams of faces into the container.
2. Pour 40-50 ml of tap water into the container.
3. Mix or stir thoroughly with a stirring device (fork, tongue blade).
4. Filter the faecal suspension through a tea strainer or double layer of cheesecloth into another (container 2).
5. The filtered material was poured into a test tube.
6. The samples were allowed to stand (sediment) for 5 minutes or centrifuged at 1500 rpm for two minutes if the material was available.
7. Remove (pipette, decant) the supernatant very carefully.
8. Resuspend the sediment in 5 ml of water.
9. Allow the sediment for 5 minutes.
10. Discard (pipette, decant) the supernatant very carefully.
11. The sediment was stained by adding one drop of methylene blue.
12. Transfer the sediment to a slide by pipette.
13. Cover with a cover slip.
14. Examine under a microscope at 4x, 10x, or 40x objective magnification.

Source: (Van-Wyk, and Mayhew, 2013)

ANNEXES 2: Gathering Data Template for All Sample

	Animal identification								**Coprological examination**			**Organ examination**		
SN0	Animal ID	Address	AEZ	Sex	Age	Spp of animal	Body condition	Presence of parasites	Fasiola	dirocelium	Pharaph	Fasciola	dicrocelium	Pharap
1.														
2.														
3.														
4.														
5.														
6.														
7.														

<u>Key:</u> Address (Kebele):
Sex: M- Male, F-Female
Age: A-Adults, Y-Young
Body condition: G-Good, M-Medium, P-Poor
Presence of parasites: mark '√' if present, mark 'X' if not present
Tick, lice, mites, and fleas, sheepked: - mark '√' if present, mark 'X' if not present

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