

Research Article

Major Bovine Parasitic Zoonosis at Selected Municipal Abattoirs, North Shewa Zone, Oromia, Central Ethiopia

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Abstract

Bovine parasitic zoonoses have emerged from time to time and public health threat in developing countries where eating of raw meat and improper disposal of condemned are practiced. However, there is a limited prevention and control strategy of the diseases including North Shewa Zone, Oromia, Ethiopia because of negligence. Moreover, there is a paucity of information regarding Bovine parasitic zoonosis in the areas. Hence, the current study was designed from October, 2019 to July, 2020 to determine major Bovine parasitic zoonoses at selected Municipal Abattoirs (Fitcha, Kuyu and Shararo) of North Shewa zone, Oromia, Ethiopia. Purposive sampling technique was used to study Abattoirs whereas; simple random sampling was used to select study participants. Anti-mortem and post-mortem inspection were applied by using standard producers. Primary and qualitative data were used in this study. Out of 384 inspected cattle, 218 (56.8%) animals were condemned its organs during postmortem inspection. Among those 195 (50.8%), 402 (52.3%), 11 (2.9%) and 16 (2.1%) animals' liver, lungs, heart and kidneys were condemned, respectively. The prevalence of Fasciolosis, Hydatidiosis and bovis Cysticercosis were found to be 52.3%, 27.2% and 2.90%, respectively. Among associated risk factors, poor body conditioned animals were the most susceptible (95.4%) as compared to medium (86.9%) and good (35.3%) in which body condition animals with statistically significant ($p < 0.05$). The prevalence of bovine parasitic zoonoses among age groups young animals were the most susceptible compared with adults and also associated significantly ($p < 0.05$). In contrast, the presence of the diseases was found to be insignificantly associated with the breeds ($p > 0.05$). The study concluded that bovine parasitic zoonoses were the major public health problems in the study areas. Thus, community health education is urgently needed creation responsible bodies including Salale University. Moreover, further studies will be conducted in other municipal abattoirs in this zone.

Introduction

Zoonoses including bovine parasitic diseases have emerged from time to time and public health threat in developing countries. It has been defined as diseases and infections that are naturally transmitted between vertebrate animals and humans [1,2]. Most zoonosis is maintained in the animal reservoir but, can cross over to humans as a result of different risk factors and behavioral traits. It is caused by parasites has recently assumed an important role in public health which involved in opportunistic infections [3,4].

The transmission may occur through direct contact with the animal, through vectors (such as fleas or ticks), or indirect contact through food or water contamination (James, 2005). It is more common in areas, where dogs and domestic animals live in very close association [5]. In humans, the cyst may reside

and grow in liver, lung and other visceral organs. Occasional rupture of the cysts often leads to sudden death because of anaphylaxis, hemorrhage and metastasis [6].

The hydatid cyst infected viscera are deliberately left for home and stray dog's consumption. This type of unhygienic practice plays a major role in the maintenance and transmission of the disease in domestic ruminants and humans. This is particularly true in sub-Saharan Africa countries including Ethiopia [2,7].

Zoonosis accounts 60% of all infectious disease pathogens and 75% of all emerging pathogens world widely (WHO, 2004). Studies conducted so far at different districts of Ethiopia indicated the occurrence of zoonotic parasitic diseases which ranges from 2.93 to 4.4% [8,9]. Among zoonotic parasitic diseases, liver fluke causes Fasciolosis, Echinococcus granulosus causes hydatidiosis, T. Saginata causes Taeniosis



and *Cysticercus bovis* causes Cysticercosis are the major parasitic zoonosis which imposes public health and economic impact on livestock production particularly of cattle and sheep and public health impacts to humans [10,11].

Parasitic zoonoses expected to be high in tropical countries including Ethiopia where strategic and most effective disease prevention and control programs are limited [12]. However, there was a paucity of information regarding parasitic zoonoses and its public health implications in North Shoa zone, Oromia, Ethiopia. Such information would be useful for designing effective prevention and control better strategies that helps to improve public health in the study areas. The study was aimed to determine bovine parasitic zoonosis, and assess associated potential risk factors at Fitcha, Kuyu and Shararo Municipal Abattoirs.

Method and materials

Description of study areas

The study was conducted from October, 2019 to July, 2020 at Fitcha, Kuyu and Shararo Municipal Abattoirs in North Shewa Zone, Oromia, Ethiopia. The zone has an area of 8990 km² accounts for about 2.5% of the total area of Oromiya. It is located between 9°05' and 10°23'N latitude and 37°05' and 39°28'E longitude. It is bordered by Amhara National Regional State, West Shewa zone, Finfinne Surrounding Special zone and East Shewa zone. About 20.7, 42.6 and 36.7% of the total area of the zone is covered by tropical (Kolla), Sub-tropical (Woina Dega) and temperate (Dega) agro-climatic zones respectively. Temperate climate prevails in areas having elevation ranging from 1750–3500 masl.

There is total population of over 1,388,617 (1,238,406 rural and 150,211 urban population) in 2013 (2005 E.C). Similarly, North Shewa zone had a total population of 1,427,525 (1,271,027 rural and 156,498 urban populations). The female population accounted for about 51.36% of the urban and 49.76% of the rural population. According to 2007 population and housing census result, average family size of North Shewa zone was 4.6 persons per house hold (3.4 for urban and 4.7 for rural). The age groups 0–14, 15–64 and 65 and above years constituted 43.5%, 51.9% and 4.6% of the total population in the zone respectively. Crude population density of the zone in 2014 was about 159 persons per km².

Livestock production is the major production practices in the zone which accounts 1,429,058 cattle, 860,413 sheep, 330,515 goats, 96,014 horses, 8,017 mules, 238,846 donkeys, 374,720 poultry and 159,655 beehives (147,268 cultural, 9,101 intermediate and 3,286 modern) in the zone in 2006. There are different livestock diseases in the areas which include Anthrax, blackleg, pasteurellosis, sheep and goat pox, African horse sickness, internal and external parasites, coccidiosis of poultry, traditional method of animal rearing and shortage of feeds are major constraints of livestock production in the zone. However; there is a limited veterinary service in the areas. Moreover; there is high habit of raw meat eating practices in the three selected districts of the zone [13] (Figure 1).

Study participants

In this study, the study participants were volunteer three municipal administration officers and six meat inspectors who varied with age, sex, marital status, occupation, educational level in Fitcha, Kuyu and Shararo towns.

Study animals

Animal population for this study were cattle brought to the three abattoirs from different areas mainly from Degam, Fitcha, Kuyu, W/Jarso, Shararo and other nearby districts to the study abattoirs to be subjected for slaughter which varies species, age, sex and body condition score were considered for active abattoir survey.

Study design and sampling methods

A cross sectional study design was conducted from October, 2019 to July, 2020. Purposive sampling technique was used to select study abattoirs and study participants whereas systematic random sampling technique was used to select study animals during the period.

Questionnaire survey

In this study, open and close ended questionnaires were used to interview the study respondents about bovine parasitic zoonoses.

Abattoir survey

During anti-mortem examination, each study animal was given an identification number and then their breed, sex, age and body condition scores were recorded. The body condition score is determined in accordance with Pilliner (1999) and then classified into three groups as poor, medium and good. Therefore, each recorded animal was inspected at postmortem paying attention to organs where the parasites localize (liver, lungs, kidneys and heart). In order to determine the presence of bovine parasitic zoonoses major organs inspection was conducted using visualization, palpation and incision.

Anti-mortem examination

The study animals were selected purposively based on the anti-mortem examination results. All necessary physiological parameters (temperature, heart rate, respiratory rate and rumen motility) were taken before slaughter.

Post-mortem examination

Detail postmortem inspections of the slaughtered cattle were carried out on prediction sites (organs) of the bovine parasitic zoonoses. The intensity of the parasites and lesions was checked. The abattoir data were collected for three months during the study abattoirs.

Key informants

A total of six key informants were selected and face to face interview in the study abattoirs. The informants were including volunteer animal health professionals and heads

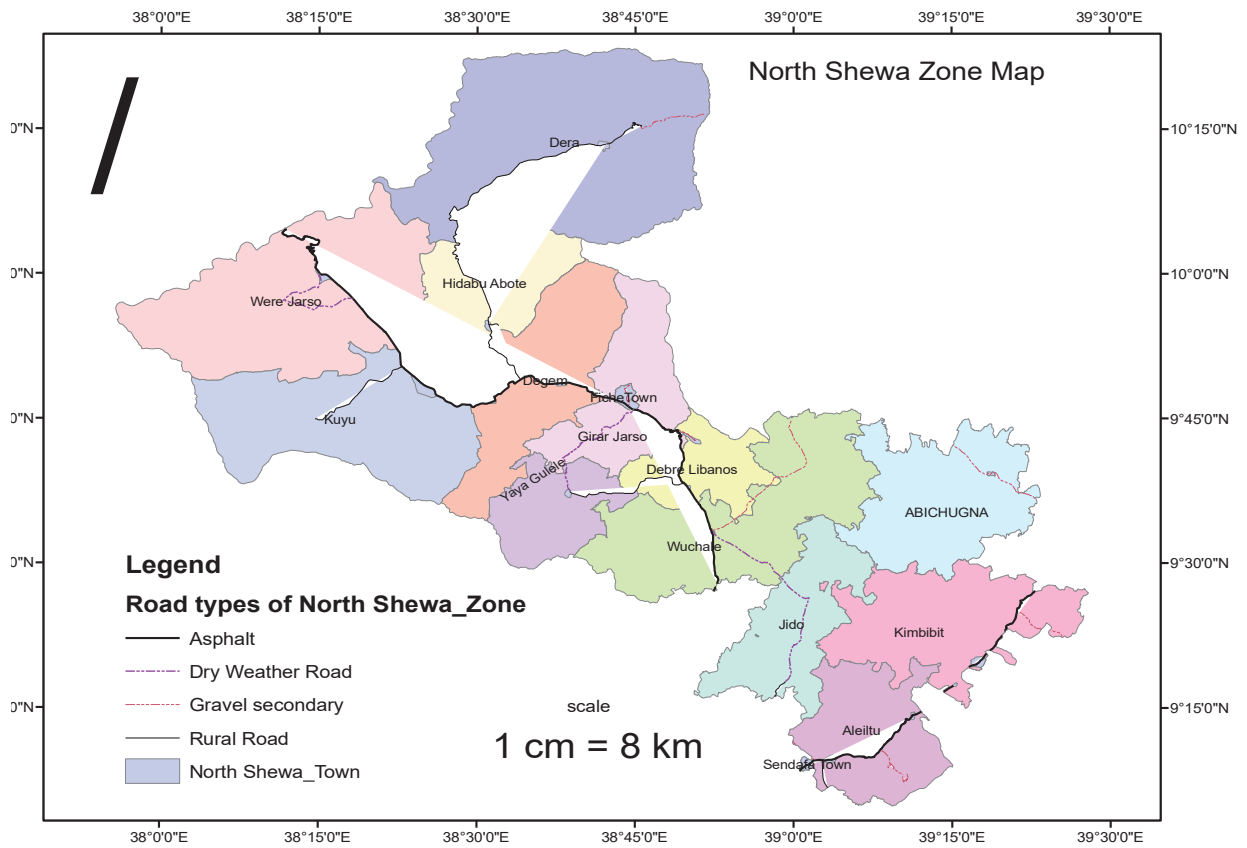


Figure 1: North Shewa Zone Map [13].

of the abattoirs that are found in the study areas. This was being done to clarify the purpose and build confidence of the respondents to provide reliable information without suspicion.

Data analysis

The data collected were entered and analyzed by using SPSS software version 23. Descriptive statistics called person chi-square test was used to determine the statistical significance for categorical data analyzed, confidence level was held at 95%. P-value < 0.05 was considered for significance.

Ethical approval

This study was approved by the Research Review Ethical Board of Salale University. The confidentiality of the study participants and recorded data were completely maintained during processing of the data. Moreover, all the collected data from this study shouldn't be shared with third party out of researchers. Informed consent and permission was also obtained from the study participants and North Shewa Zone, respectively.

Results

Prevalence of bovine parasitic zoonoses in study abattoirs

In this study, a total of 384 cattle were slaughtered and thoroughly examined using the standard anti-mortem and post-mortem inspection procedure during the study period.

Out of 384 examined animals, 218 (56.8%) was found to be at least single organ was condemned due to the parasitic diseases of major viscera. The overall prevalence of bovine parasitic zoonoses was 56.8 which were recorded high Shararo, 78 (60.9%); Fitcha, 75 (58.6%); and Kuyu, 65 (50.8%), respectively (Table 1).

Prevalence of bovine parasitic zoonoses on condemned organs

In the present study, the prevalence of Bovine Parasitic Zoonoses were found to be 418 (27.2%), 195 (50.8%) and 11 (2.90%) for Bovine hydatidiosis, Bovine fasciolosis and *Cysticercus bovis*, respectively. The organs were partially or totally rejected as a result of parasitic infection (Table 2).

Proportion of condemned organs zoonotic parasitic diseases

In this study, out of 384 were slaughtered cattle, 2304 organs/viscera were thoroughly inspected by using the

Table 1: Bovine parasitic zoonoses variations among study abattoirs.

Study Abattoirs	No of Inspected	No of Affected	Percent (%)
Fitcha	128	75	58.6
Kuyu	128	65	50.8
Shararo	128	78	60.9
Total	384	218	56.8



standard postmortem inspection procedure during the study period. Among 2304 inspected organs, 624 (27.1%) organs were condemned due to these diseases. The proportion of condemned organs were 402 (52.3%), 195 (50.8%), 11 (2.90%) and 16 (2.10%) lungs, liver, hearts and kidneys, respectively (Table 3).

Associated potential risk factors

In this study, associated potential risk factors were assessed during the study period. The highest prevalence was recorded on indigenous local breed cattle, 325 (63.1%); and the lowest prevalence was found in exotic breed, 12 (8.3%). The finding of study was also showed poor body conditioned animals more prone to these diseases as compared to other breeds which accounts, (95.4%) prevalence in animals with poor body condition scores and the lowest prevalence (35.3 %) was found in good body conditioned animals and it was statistically significant ($P < 0.05$). In addition, young animals (59.3%) were more susceptible to Bovine Parasitic Diseases compared to others age groups. In this study, a statistical insignificant difference was observed between Bovine Parasitic Diseases and breeds ($P > 0.05$). A statistical significant difference was also observed between Bovine Parasitic Diseases and age ($P < 0.05$) (Table 4).

Discussion

In the present study, the overall prevalence of Bovine hydatidiosis in the study municipal abattoirs was recorded 27.2%. The result of this study was higher than the findings

of Kebede [14] which has been observed (7.5%) in slaughtered cattle at Tigray abattoir, northern part of Ethiopia. The result of this study also lower than the finding of Nigatu [15] which was observed (34.1%) in slaughtered cattle at Bahir Dar. The finding of the study was in line with the study of Birhanu, et al. [16] that was conducted in Nekemte Municipal Abattoir, Western Ethiopia. The variation in prevalence of Hydatidosis in different areas of a country might be attributed mainly to the differences in animal husbandry system, backyard slaughtering of animals, lack of proper disposal of infected carcass and presence of stray dog could attribute for the variation in prevalence [17].

The overall prevalence of Bovine fasciolosis in the study municipal abattoirs was recorded 50.8%. The result of this study was higher than the findings of Abunna, et al. [18] which has been observed (14.0%) in slaughtered cattle at Wolaita Soddo abattoir, southern part of Ethiopia. Yilma and Mesfin [19] reported 90.7% prevalence of fasciolosis in cattle slaughtered at Gondar abattoir which was higher prevalence than this study. The finding of the study was also in line with the study of Birhanu, et al. [16] that was conducted in Nekemte Municipal Abattoir, Western Ethiopia. This might be due to the difference in climatic and ecological conditions such as altitude, rainfall and temperature, and management system also the number of intermediate host found around the area (Spithill, 1999).

In this study, the overall prevalence of *Cysticercus bovis* in the study municipal abattoirs was recorded (2.9%). The result was slightly agreed with the findings of Tembo [20] in central Ethiopia which was (3.1%). However, the present study showed lower prevalence than the findings of Nigatu [21] from Addis Ababa (7.5%), Hailu from East Shewa (17.5%); Abunna [22] from Hawassa (26.3%); Birhanu and Abda [16] from Adama; and Kifle and Shiret [23] from Debre Berhan. The result of this study was higher than the findings of developed countries, such as (1.1%) in Germany [24] and (0.9%) in Cuba [25]. Thus, the prevalence differences associated with poor sanitary infrastructure, low awareness and improper disposal of sewage are major factors for higher prevalence of *Cysticercosis* in developing countries. Improper removal and treatment of sewage, fecal contamination of feed and/or water by farm employees are possible sources of infection in developed countries.

In the present study 2,304 organs obtained from 384 animals out of these 195 livers, 402 lungs, 11 hearts and 16 kidneys were rejected from the total local market. The rejected organs which were found unfit for human consumption and as pet animal food were incinerated in the abattoir to break the life cycle of the disease transmission.

The result of the current study showed that age was significant effect on the prevalence of bovine parasitic zoonoses being higher in young animals than the adult. There was a decrease in infection rate (prevalence) as age increased. This may be due to the result of acquired immunity with age which is manifested by humoral immune response and tissue reaction in bovine organs due to previous challenge. The results of the present study indicated that body condition of the animal has

Table 2: Distribution and prevalence of helminthes on postmortem inspections.

Major Parasitic Zoonosis	No of Inspected Organs	Condemned Organs	No of Condemned Organs	Percent (%)
<i>Bovine hydatidiosis</i>	1536	Lungs (402) and Kidneys (16)	418	27.2
<i>Bovine fasciolosis</i>	384	Liver	195	50.8
<i>Cysticercus bovis</i>	384	Heart	11	2.90

Table 3: Proportion of Condemned Organs Zoonotic Parasitic Diseases.

Organs	Number of Animals		Percent (%)
	No of Inspected Organs	No of Condemned Organs	
Lungs	768	402	52.3
Liver	384	195	50.8
Heart	384	11	2.90
Kidneys	768	16	2.10

Table 4: Associated Risk factors in the study areas.

S.No	Variables	No of Inspected Animals	No of Positive Animals	Percent (%)	χ^2 -value	P-value	
1.	Breed	Exotic	12	1	8.3	0.4356	0.512
		Cross	47	12	25.5		
		Local	325	205	63.1		
2.	Body Condition Score	Good	235	83	35.3	115.631	0.000
		Medium	84	73	86.9		
		Poor	65	62	95.4		
3.	Age	< 2 years	86	51	59.3	108.711	0.000
		2-5 years	253	147	58.1		
		>5 years	45	20	44.4		



significant association with the occurrence of major bovine parasitic. The prevalence was higher in poor body conditioned animals than that of medium and good body conditioned animals. The prevalence of major bovine parasitic was higher in the animals with poor body condition because this body condition in cattle is manifested when parasitic reaches at its chronic stage [26–30]. According to breed categories indigenous local breeds were more susceptible than cross and exotic breeds and it was statistically insignificant because it could be related to the amount of sample taken from within breeds or most of the animals slaughtered in the abattoirs were indigenous local breeds [3].

Conclusion and Recommendations

The present study revealed that Fasciolosis, Hydatidiosis and *Cysticercus bovis* were found to be the major Bovine parasitic zoonoses in Fitcha, Kuyu and Sharara abattoirs. Among parasitic zoonoses, Hydatidiosis was the most prevalent parasitic disease followed by Fascioliasis in the examined slaughtered animals in within the study period of investigation. In this study, poor body conditioned and young animals more prone to the disease in which there were statistical significant differences. However, there was no statistical significant difference between the prevalence of Bovine parasitic zoonoses and the breeds of animals. The study concluded that Bovine Parasitic Zoonoses were the major public health problems in the study areas. Therefore, community health education should be given about effective prevention and control of Bovine Parasitic Zoonoses by responsible bodies including Salale University. Moreover, capacity building should be done for meat inspectors on inspection standardized procedures, animal attendants, customers and abattoir workers about the public health significance in the study areas.

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