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Causes of organ condemnation, its public health and financial significance in Nekemte municipal abattoir, Wollega, Western Ethiopia

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A cross-sectional study was conducted from October, 2013 to April, 2014 on cause of organ condemnation, its public health and financial significance in Nekemte municipal abattoir in East Wollega zone, Oromia regional state of Ethiopia. The overall objective was to determine the cause of organ condemnation, its public health and financial significance due to fasciolosis, hydatidosis, *Cysticercus bovis* and other causes. Accordingly, a total of 534 randomly selected slaughtered cattle were examined both during antemortem and postmortem. There were many physical abnormalities such as localized swelling 12(2.25%), laceration 2(0.37%), branding 21 (3.93%), lameness 11(2.06%), abrasion 4(0.74%), nasal discharge 7(1.31%), and lacrimation 5(0.94%). During postmorterm, inspection organs were condemned due to fasciolosis [liver 65(12.17%)], hydatid cyst [liver 94(17.6%), lung 65(12.17%)], *Corynebacterium bovis* [heart 8(1.49%) and carcass 2(0.37%)]. The chi^2 analysis of potential risk factors revealed that there was statistically insignificant difference in age, altitude and body condition between animals from different origin (*P* > 0.05). The total annual direct financial loss from organ condemnation due to hydatidosis, fasciolosis, *C. bovis* and other causes was estimated to be 1.056,155.05 Ethiopian Birr (ETB) annually = 52807 USD. The result of this study revealed that hydatidosis (12.73%) is the major disease causing direct economic losses significantly in the study area followed by fasciolosis (12.7%) and cysticercosis (2.4%).

Key words: Hydatidosis, fasciolosis, *Cysticercus bovis*, Nekemte.

INTRODUCTION

The livestock sector globally is highly dynamic, contributes 40% of the global value of agricultural output, and support the livelihoods and food security of almost a billion people (Thornton 2010). In Ethiopia, livestock production is an integral part of the agricultural system. The livestock sub sector accounts for 40% of the agricultural gross domestic product (GDP) and 20% of the total GDP without considering other contribution like

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traction power, fertilizers and mean of transport (Aklilu et al., 2003). The livestock population of Ethiopia is the largest in Africa and ranks ninth in the world. The livestock subsector accounts for about 45 percent of the agricultural GDP and about 18 percent of the total GDP (Blench et al., 2003).

Beyond their direct role in generating food and income, livestock are a valuable asset, serving as a store of wealth, collateral for credit and an essential safety net during times of crisis (MoA, 2006; FAO, 2009). Livestock and livestock products are the major foreign exchange earns. The only second to coffee with hides and skins contributing the most, however, currently the overall livestock production constraints in Ethiopia are feed shortages, livestock diseases, low genetic potential of indigenous livestock, and lack of marketing infrastructure and water shortages (Markos, 1999; Alemayehu, 2009). Additionally, each year a significant loss results from death of animals, inferior weight gain and condemnation of edible organs and carcass at slaughter during routine meat inspection. This production loss to the livestock industry is estimated at more than 900 million USD annually (Abebe and Yilma, 2012; Ezana, 2008).

Diseases cause extensive financial wastes as a result of direct and indirect economic losses, is the major concern to livestock industry. In abattoirs of various locations, researchers indicated that hydatidosis is widespread in Ethiopia with great economic and public health significance (Jobre et al*.,* 1996; Kebede et al*.,* 2009a to d; Kebede, 2010). Major parasitic disease such as fasciolosis, hydatid cyst, cysticercosis and other causes like abscessation and cirrhosis are of great public health concern and cause significant economic losses by lowering productivity of cattle and condemnation of edible organs (Biu and Adindu, 2004; Chhabra and Singla, 2009). Among the major causes of organ condemnation in the Ethiopia are hydatidosis as discussed by Yifat et al*. (*2011), Alemu et al*. (*2012), Alembrhan and Haylegebriel (2013), fasciolosis (Mulat et al*.,* 2012; Bekele et al*.,* 2014), cysticercosis (Bekele et al., 2010; Mesfin and Nuradddis, 2012) and other causes of organ condemnation (Alemayehu et al*.,* 2012; Alembrha and Haylegebrie, 2013). Studies conducted in different abattoirs of Ethiopia revealed that parasitic infection of livers, lungs (pneumonia), pericarditis and pyelonephritis are the major cause of organs condemnation (Asmare et al*.,* 2012). The activity also provides vital data and valuable information on the incidences and prevalence of animal diseases and conditions within the country (Edwards et al*.,* 1997; Ansari-Lari and Moazzeni, 2006; Phiri, 2006). Parasites in the tropics are responsible for far greater losses to meat industry than other diseases. Similarly like many other tropical countries of Africa, it is well known that parasitic diseases are among the major factors responsible for the low productivity of livestock in Ethiopia (Kidanu, 2011).

Echinococcosis is a major public health problem in some countries, and it may be emerging or re-emerging in some areas. Approximately 2 to 3 million human cases are thought to occur worldwide (CFSPH, 2011). Cysts or lesions of Echinococcosis multilocularis occur primarily in the liver and grow slowly but with eventual serious liver pathology and high risk of mortality if untreated. As well, the cysts occasionally rupture and cause severe allergic reactions in humans (OIE, 2004). Cystic echinococcosis is clinically related to the presence of one or more well delineated spherical primary cysts most frequently formed in liver and then in the lungs and other organs such as kidney, spleen, heart, brain and bone. Tissue damage and organ dysfunction results mainly from this gradual process of space occupying displacement of vital host tissues, vessels or parts of organs. Accidental rupture of cysts can be followed by a massive release of cyst fluid and hematogenose or dissemination of protoscolices. Occasionally this results in anaphylactic reactions and multiple secondary cystic echinococcosis (Gottestein and Reichen, 1996).

Cysticercosis (formerly known as Beef Measles) causes small cysts in the muscles of cattle and their presence can lead to all or part of the carcass being condemned. Cattle get *Corynebacterium bovis* from ingesting foodstuffs contaminated with eggs passed from humans. Sometimes the tapeworm affects human health, but often it goes undetected. In rare cases the cystic intermediate stage can lodge in the brain of people and cause serious disease (Chowdhury et al., 2014). Factors that increase the risk of cattle being infected with *C. bovis* include grazing on land that has human faecal contamination, over flowing domestic sewage systems, irrigation with inadequately treated reclaimed sewage water, bird movements to and from a nearby sewage treatment works (Filmer, 1999).

Bovine cysticercosis has little effect on animal health, but it is economically important disease as it causes carcass condemnation arising from heavy infestation with the cysticerci of taenia saginata as well as the cost of inspecting meat, the necessity to freeze or boil infected meat and losses may also occur from restriction of exports of live animal and animal products. The presence of cysticerci in muscles is not associated with clinical signs; however, the adult tape worm in man produced diarrhea, hunger pain, abdominal discomfort, constipation and nausea (Mesfin and Nuradddis, 2012).

Fascioliosis is an important parasitic disease of domestic ruminants caused by two liver fluke species: Fasciola hepatica and fasciola gigantica (Trematoda). fasciola hepatica has a cosmopolitan distribution, mainly in temperate zones, while fasciola gigantica is found in tropical regions of Africa and Asia. The disease is responsible for considerable economic losses in the cattle industry, mainly through mortality, liver condemnation, reduced production of meat, milk, and wool, and expenditures for anthelmintics (Rahmeto et al*.,* 2008). The purpose of meat inspection is to protect public

health and to provide risk free products to the society. Also, it provides information that can be utilized for animal diseases control. Abattoir data is an excellent option for detecting diseases of both economic and public health importance (Arbabi and Hooshyr, 2006; Fufa et al*.,* 2010) especially in ascertaining the extent to which human is exposed to certain zoonotic diseases and estimating the financial implications of carcass condemnations (Jobre et al., 1996).

Recently, several modern abattoirs like Helimex, Elfora, Metehara, Modjo and Luna have been established in Ethiopia. This increase number of abattoirs shows increase in demand of carcass and organs supply, but the supply is decreasing due to disease and production problems. In view of this, proper evaluation of economic losses due to organ condemnation resulting from various diseases at abattoirs is needed (Ezana, 2008).

According to the information gained from Nekemte veterinary clinic and Nekemte municipal abattoir, there is no registered information on cause of organ condemnation, its public health and financial significance in the study area. Therefore, the objectives of these studies are; to identify the major cause of organ condemnation in Nekemte municipal abattoir; to estimate financial significance due to organ condemnation in the area; and to identify public health problem regarding organ condemnation.

MATERIALS AND METHODS

Study area

The study was conducted in eastern Wollega zone, western parts of Ethiopia at Nekemte municipal abattoir. Nekemte town is located in Oromia regional state of Ethiopia, which about 33 km far from Addis Ababa. It is located at altitudinal ranges from 2100 to 2250 meters above sea level and geographically it located 09°04'957 N latitude and 36° 32' 928 E longitude. It has different agro-ecological areas namely sub moist, sub moist cool and sub dega. The annual rain fall ranges from 1560 to 2200 mm and the minimum and maximum temperature ranges from 14 to 26°C. Its maximum rainfall occurs from May up to September. Most part of Oromia enjoys excellent climate condition in terms of both temperature and precipitation. This includes cool highlands and warm lowlands. The most prevalent agro-climatic condition varies from locality to locality is tepid to cool in temperature and moist to sub-humid in moisture. The climate of the region is governed by the global air circulation system which is locally conditioned by the topographic condition and the altitude of the location (Hassena and Taa, 1997).

Study animals

The study animal was a cattle brought to the abattoir for slaughter from different distinct around Nekemte town such as Bendira, Diga, Arjo gudetu, Arjo,Uke, Wayu Tuka, Sasiga, Getema and others which was selected with simple random sampling method irrespective of age and sex. The study population constitutes of local and cross cattle breed originating from different localities and markets of the east Wollega zone.

Sample size determination

The total number of cattle for the study was calculated based on the formula given by Thrusfield (2005) with 95% confidence interval and at 5% absolute precision by using simple random sampling method. In this study, 50% prevalence was considered to calculate the sample size using the following formula. For this particular study the sample size determined at 95% confidence level, 5% precision, and 50% expected prevalence is 384.

$$N = \frac{1.96^2 (p) (1-p)}{D^2}$$

Where, n = sample size, P = expected prevalence, D = desired level of precision (5%).

Therefore:

$$n = \frac{1.96^2(0.5) (1- 05)}{0.0025} = 384 \text{ samples}$$

Where n = sample size required, 1.96 = the value of z at 95% confidence level, P exp = expected prevalence, d = desired absolute precision. Hence, the required sample size was 384 cattle presented for slaughter. Even though, the required sample size was 384, additional 150 samples were included to increase the precision and a total of 534 animals were included in the study.

Study design

A cross sectional study was conducted through abattoir survey from October, 2013 to April, 2014 to identify the cause of organ condemnation, its public health and direct financial loss due to organ condemnation in cattle slaughtered at Nekemte municipal abattoir. A total of 534 cattle have been examined by ante mortem and post mortem examination using standard examination procedures.

Study methodology

Antemortem examination

Regular visits were made four (4) days per week to Nekemte municipal abattoirs during the period from October, 2013 to April, 2014. Each week, four days visit was made for antemortem inspection on individual animals for assessment of animals' origins, age and body conditions before the animals were slaughtered. During every visit, each animal were identified based on enumerated code given to the butcher shops before slaughter. The average numbers of animal's slaughtered at Nekemte municipal abattoir were 45 cattle per day and annually around 9360 cattle per annual. Ante mortem inspection was conducted on individual animals while they enter individually and in mass before they entered into the lairage. For the ante mortem inspection, records of age breed and body conditions were done.

Abattoir survey

The cross sectional study, which was based on the abattoir survey, was conducted during detail meat inspection on randomly selected 534 cattle slaughtered at Nekemte municipal abattoir. In this study animals were selected during *antemortem* inspection (AMI) and the related risk factors such as sex, origin, breed and body condition

were recorded before slaughtering. The codes of study animal were properly recoded during AMI that given to the slaughter house.

Questionnaire survey

Questionnaire survey on the cause of organ condemnation, its public health and direct financial loss were administered on 7 volunteer respondents from whom pre-informed consents were obtained. The risk factors of hydatidosis, *C. bovis* and fasciolosis were such as personal character, religion; occupation and the like were requested. Occupationally high risk groups were those who had a strong relationship with meat, meat products and animals, such as, abattoir workers, butcher men, meat inspectors and farmers; whereas, the low risk groups were arbitrarily selected as those who do not have such a strong relationship such as other government and private workers, but all are at risk because of meat consumption.

Postmortem examination

The organs of randomly selected cattle were examined by visual inspection, palpation and incision. Organs of each slaughtered animals infected with hydatid cyst, fasciolosis, cysticercosis and other causes were identified systematically following the standard routine post mortem inspections procedure. The inspected organs were collected for close examination and then registered. Incision was made when necessary to confirm doubtful cases.

Direct financial loss assessment

Annual cost of the condemned organs due to bovine hydatidosis, cysticercosis, fasciolosis and other causes were assessed using the following formula set by (Ogunirnade, 1980). The mean retail market price of condemned organs due to hydatidosis such as liver (80 ETB)), lung (20 ETB), heart (65 ETB), kidney (45 ETB), tongue (25 ETB) and carcass 1 kg (140 ETB) were the parameters considered. To assess the economic losses due to fasciolosis, hydatidosis andcysticercosis, only direct economic losses were considered and the calculation was based on condemned organs like liver, lungs, heart, kidney, tongue and carcasses. To calculate cost of condemned edible organs, 7 different butchers, 1 meat inspectors and 12 residents or households in the Nekemte town were interviewed randomly to establish the price per unit organ and the average organ price was determined and this price index was used to calculate the loss (Yifat et al, 2011). The analysis was based on annual slaughter capacity of the abattoir considered, market demand, average market price of each organ in Nekemte town and the rejection rate of specific organ. Information obtaining is subjected to mathematical computation by modifying the formula of Ogunrinade and Ogunrinade (1980).

Annual economic loss due to organ condemnation = (PI1 × Tk × C1) + (PI2 × Tk × C2) + (PI3 × Tk × C3) + (PI4 × Tk × C4) + (PI5 × Tk × C5) + (PI6 × Tk × C6)

Where, PI1 = Percent involvement of liver out of the total examined. PI2 = Percent involvement of lung out of the total examined. PI3 = Percent involvement of heart out of the total examined. PI4 = Percent involvement of kidney out of the total examined. PI5 = Percent involvement of Carcass out of the total examined. PI6 = percent of involvement of tongue out of the total examined. C1 = Average market price of liver. C2 = Average market price of lung. C3 = Average market price of heart. C4 = Average market price of kidney. C5 = Average market price of carcass (1 kg) and C6 = Average market price of tongue. Tk = Average annual kill of bovine.

EL= Sr × Coy × Roz

Where: EL= Estimated annual economic loss due to organs condemnation. Sr = Annual cattle slaughter of the abattoir. Coy = Average cost of each cattle liver/lung/heart/kidney/carcass. Roz = Condemnation rate of cattle liver/lung/ heart/kidney/carcass.

Data management and statistical analysis

Data generated from ante mortem and postmortem meat inspection were recorded in microsoft excel 2010 and statistical analysis was done using STATA 2010 Info version 11 and SPSS version 16.00 program. Descriptive statistics was used to determine the level of organs and carcass condemnation rates defined as proportion of condemned organs and carcass to the total number of organs and carcasses examined. The data obtained during the study was subjected to 95% confidence interval statistical analysis for possible variation between rejection rates of specific organs, origin of animals, body condition, sex of animals and breeds of animals and differences were regarded statistically insignificant; when the 95% confidence interval drawn do not overlap to each other.

RESULTS

Over all prevalence

Out of 534 cattle examined at Nekemte Municipal abattoir 62 (11.61%) had various types of abnormalities during antemortem inspection and the detail of the lists are shown in Table 1.

Majority of breed slaughtered were local breeds however relatively few cross breeds were also slaughtered (Table 2). According to the information obtained from abattoir, averagely 45 cattle's were slaughtered per day and the ages of all animals presented for slaughter were old age which means above 7years old.

Common causes of organ condemnation and financial significance

From the total cattle slaughtered 182(34.08%) liver, 88(16.47%) lungs, 9(1.68%) hearts, 3(0.56%) kidneys, 3(0.56%) tongue and 2 (0.37%) carcasses (Whole carcass) were totally condemned and 12kg of muscle was partially condemned due to pus formation at injection site. The detail of common causes of visceral organs condemnation and the percentage of the condemnation due to the pathological conditions are presented in Table 3. Information collected from Abattoir Butchers, Residents or Households and Meat Inspectors on the mean current price of visceral organs at Nekemte town for liver, lung, heart, kidney and carcass (kg) were 80, 20, 45, 60 and 140 Ethiopian Birr, respectively. The abattoir record from 2011 to 2013 revealed that the mean annual slaughter were 9360 cattle. The total annual direct financial loss incurred due to rejection of visceral organs

Table 1. Disease condition or abnormalities encountered during ante mortem inspection (n = 534).

Conditionor or abnormalities	No. of cattle affected (%)	Judgment
Localized swelling	12 (2.25)	Judgment passed for slaughter but they need special attentions during PME
Laceration	2 (0.37)	
Brand	21 (3.93)	
Lameness	11 (2.06)	
Abrasion	4 (0.74)	
Nasal discharge	7 (1.31)	
Lacrimation	5 (0.94)	
Total	62 (11.61)	

Table 2. Association of animal origin, breed, sex, body condition, and rejection rate of specific organs (n = 534).

Risk factor	No. of observation	Prevalence (%)	95% CI	X^2	Pv
Sex					
Male	301	132 (24.72)	38.21-49.66		
Female	233	124 (23.22)	46.59-59.76	4.61	0.032
Total	534	256 (47.94)	--		
Origin					
Lowland	120	57 (47.5)	38.31-56.81		
Midland	370	174 (32.58)	41.84-52.25	1.52	0.467
Highland	44	25 (56.81)	41.03-71.65		
Breed					
Local	519	252 (48.55)	44.18-52.94	2.79	0.094
Cross	15	4 (26.67)	7.78-55.1		
Body condition					
Very good	456	220 (48.24)	43.57-52.94		
Good	72	33 (45.83)	34.02-57.99	0.15	0.925
Poor	6	3 (50)	11.81-88.18		

is estimated to be 1,011,020.22 Ethiopian Birr/year. The financial loss due to fasciolosis, hydatidosis, *C. bovis* and other causes are 5200, 8820, 43,095 and 3140 Ethiopian Birr, respectively (Table 4). The total number of organ/carcass condemned at Nekemte municipal abattoir were listed (Table 5) and major postmortem findings during the study are indicated in the work (Figures 1 to 3).

Public health significance

In this study the infected groups for cysticercosis include those who do not eat raw meat and under cooked meat and those who eat raw meat and under cooked meat. The response indicated that groups who eat raw and undercooked meat show high infection rate. The disposal way of infected condemned organ is also on field that predisposes dogs to hydatidosis and creates the life cycle of parasites to continue.

DISCUSSION

During the study, examinations before slaughtering (antemortem examination) and after slaughtering (postmortem examination) were carried out. Out of 534 cattle physically examined during antemortem inspection in Nekemte municipal abattoir, different abnormalities were found in 62(11.61%) head of cattle. These abnormalities include abrasion 4(0.74%), nasal discharge 7(1.31%), lameness 11 (2.06%), branding 21 (3.93%), lacrimation 5(0.94%), laceration 2(0.37%) and localized swelling 12(2.25%). However, these animals were passed for slaughter with great caution with thorough postmortem examination because some of these different

Table 3. Causes, percentage of organ condemnation and financial losses analysis at Nekemte municipal abattoir (n=534).

Condemned organ	Cause	No. (%) organ condemned	Loss money (Ethiopian birr)
Liver	Fasciolosis	65 (12.17)	5200
	Hydatidosis	94 (17.6)	7520
	Abscessation	4 (0.74)	320
	Cirrhosis	17 (3.18)	680
	Fibrosis	3 (0.56)	120
	Total	183	13840.00
Lung	Hydatidosis	65 (12.17)	1300
	Emphysema	7 (1.31)	140
	abcessation	5 (0.93)	100
	Fibrosis	11 (2.05)	110
	Total	88	1650.00
Heart	*C. bovis*	1 (0.18)	65
	Hydatidosis	8 (1.49)	520
	Total	9	585.00
Kidney	Fibrosis	3 (0.56)	135
Tongue	*C. bovis*	3 (0.56)	75
Muscle	Pus	5 kg	700
	Bruise	7 kg	980
	Total	12 kg	1680.00
Carcass	*C. bovis*	2 (0.37)	42500.00
Total		60,255.00	

Table 4. Findings of the study used in the direct financial loss assessment (n=534).

Organ/carcass	Average rejection rate of organs and carcass (%)	Average of annual Cattle slaughtered	Average price of organ and carcass
Liver	183 (34.26)		80 birr
Lung	88 (16.47)		20 birr
heart	9 (1.68)		65 birr
kidney	3 (0.56)	9360	45 birr
muscle	3 (0.56)		140/kg birr
tongue	3 (0.56)		25 birr
Total carcass	2 (0.37)		140/kg birr

abnormalities either might be symptom of diseases or resulted from the long journey from market area to the abattoir as animals derived on their foot.

The postmortem examination of all organs should be examined for the presence of abnormalities or diseases. From the total of 534 head of cattle slaughtered, organs of 256(47.94%) animals were infected with different parasites or other diseases involving in one or different visceral organs; that is 65(12.17%) of liver due to only liver fluke and 94(17.6%) of liver due to hydatid cyst, 4(0.74%) of liver due to abscess, 17(3.18%) of liver due to cirrhosis. Similarly, 65(12.17%) of lung due to hydatid cyst, 5(0.93 %) of lung due to abscess, 7(1.31%) of lung due to emphysema and 11(2.05%) of lung due to fibrosis and 8(1.49%) of heart due to *C. bovis* and 1(0.18%) of heart due to hydatid cyst and 3(0.56%) of tongue due to

Table 5. Common causes of visceral organs condemnation and the percentage of the condemnation due to the pathological conditions (n=534).

Organ	No. of cond. organ	Hydt	Fasci	*C. bovis*	Abscess	Empm	Cirrhosis	Fibrosis	Total
Liver	183	94	65	-	4	-	17	3	183
Lung	88	65	-	-	5	7	-	11	88
heart	9	1	-	8	-	-	-	-	9
tongue	3	-	-	3	-	-	--	-	3
kidney	3	-	-	-	-	-	--	-	3
muscle	3	-	-	-	3	-	-	-	3
carcass	2	-	-	2	-	-	-	-	2

Hydt = Hydatid cyst, fasci = fasciolosis, *Empm = emphysema.

Figure 1. Hydatid cyst lung.

Figure 2. Hepatization of cattle lung.

C. bovis and 2(0.37%) of total carcass due to *C. bovis* were rejected because of fasciolosis, hydatidosis, *C. bovis* and others. This might be due to the frequent contact between the infected animals, backyard slaughtering, poor public awareness and factors like difference in culture, social activity and attitude to dogs.

The result of present study recorded is lower than those reported from Addis Ababa abattoirs enterprise by Dechassa et al. (2012) which is 40.5% and also 34.15% prevalence rate has been reviewed and summarized from abattoir survey over a period of 15 years from Ethiopia (Abebe and Yilma, 2011). The prevalence of the disease in cattle slaughtered at Ambo municipal abattoir was also high (29.69%) (Endrias et al., 2010) and high prevalence of hydatidosis was reported (22.1%) in cattle slaughtered at Tigray region (Weldegiorgis et al., 2008). The variation

Figure 3. Pussation of lung and liver

in prevalence between different countries and regions may be attributed mainly to strains difference in *E. granulosus* that exist in different geographical situations (Arene, 1995).

The finding is similar with the prevalence of disease reported from Burdur (Turkey) 13.5% (Umur, 2003) and from Thrace (Turkey) 11.6% (Esatgil and Tuzer, 2007). This might be due to the abundance and frequent contact between the infected intermediate and final hosts. It could also be associated to slaughtering of aged cattle which have had considerable chance of exposure to the parasitic ova, backyard slaughtering of small ruminants and provision of infected offal's to pet animals around homesteads (locally 'kircha'). Other factors like difference in culture, social activity and attitude to dog in different regions might have contributed to this variation (Macpherson, 1985). Many people slaughter animals at home and allow dogs to eat condemned meat or offals. This Poor public awareness about the disease and presence of few slaughter houses could have contributed to such a higher prevalence rate (annex).

The overall cause of organ condemnation, its public health and financial significance obtained from abattoir in the present study (47.94%) was relatively high and almost higher than the previous reports or findings from Gondar Elfora Abattoir (24.7%) (Yifat et al., 2011). However, the prevalence of hydatidosis was 12.73% which is much lower when compared with several reports from different abattoirs of the country like at Adigrat Municipal Abattoir (18.61%) (Alembrhan and Haylegebriel, 2013), at Southern Wollo abattoir (17.4%) (Alemu et al., 2012). These differences within the country are attributed mainly to variations in the ecological and climatic conditions such as altitude, rainfall, and temperature, although differences in livestock management system and the ability of the inspector to detect the infection may play a part.

Even though the study shows statistically insignificant variation ($p > 0.05$) with origin, high prevalence rate of major parasites (Liver fluke, hydatid cyst and *C. bovis*) were seen in lowland (2.2%, 6.2 and 0.6%) than the highland (1.7, 2.1 and 0%; and midland (8.8, 15.0 and 1.9%). This might be most of the slaughtered animals originated from midland area, were most likely graze on the field due to decreasing labour and to overcome inefficiency during draught period. And next to midland, lowland animals are likely to have a higher possibility of acquiring infection due to their longer exposure to infection and to lower immunity to combat infection. Additionally, the reason for lower prevalence in highland cattle may be due to lack of free grazing because of human density around highland area.

As reported by Jembere (2002) and Asmare et al. (2012), animals with poor body condition were highly infected with hydatidosis. But the result of the present study of the disease was not in agreement with previous studies. Based on the comparison made among body condition, high infection rate of hydatid cyst were 23.02, 25 and 16.66% from animals with very good, good and poor body conditions respectively. However, the result of study indicated that infection rate has no statistical significance ($p>0.05$) among the animals with poor (thin), good (medium) or very good body conditions scores.

Comparison made among breeds of animals included in the study shows the prevalence rate of parasites (liver fluke, hydatid cyst and cysticercus bovis) was higher in local (12.5, 74.3 and 2.4%) than cross breed (0.2, 2.4 and 0%), respectively. Similarly, comparison for animals those came from midland (8.8, 15.0 and 1.9%), lowland (2.2, 6.2 and.6% and highland (1.7, 2.1 and 0%) for fasciolosis, hydatidosis and *C. bovis*, respectively indicates midland animals were highly attacked by the parasites than lowland and highland, respectively. However, there was no significant variation in prevalence between the three-agro climates at individual level ($p>0.05$). The direct financial loss incurred during this

study as a result of condemnation of different organs of cattle was estimated about 1,011,020.22 ETB per annual. Therefore, the total annual financial loss due to major parasites in the study abattoir is the summation of losses from organ and carcass condemnation. This finding is by far higher than the result reported by Alemayehu et al. (2012), Alembrhan and Haylegebriel (2013), Shegaw et al. (2009) and Bekele et al. (2014) a total financial loss of about 110,584.046, 19,910.0, 233,501.94 and 88,806.85 Ethiopian birr per annum in cattle due to major cause of organ condemnation at Luna Export Abattoir, Adigrat, Mekelle and Hossana municipal slaughterhouses, respectively. This is probably due to the ecological and climatic difference between those localities.

Conclusion

The study highlights need for investigation to obtain appropriate and more accurate information on the cause of organ condemnation, its public health and financial significance in East Wollega, Nekemte municipal abattoir. The prevalence of hydatidosis/echinoccosis, fasciolosis, *C. bovis* and other abnormalities in cattle presented to Nekemte municipal abattoir, determines the scope and type of relevant control options. The result of this study revealed that hydatidosis and fasciolosis were the most prevalent and major causes of lung and liver condemnation, respectively, whereas *C. bovis* causes condemnation of muscles and carcass. Factors considered including body condition, origin and breed of animals did not show significant association with the rate of organ condemnation. The annual financial loss from east Wollega zone and local market organ condemnation was also estimated high.

RECOMMENDATIONS

In view of the present findings and available information, the following recommendations are forwarded:

1. Awareness generating programs should be given for the meat inspectors, butchers, abattoir workers, and dog owners to the dangers of hydatidosis to human and animal health and appropriate control measure should be taken to stop the sale of infected offals for pet animals' consumption.
2. Government should give attention and build abattoirs with good facilities and control back yard slaughtering and at the center of any control method, is the need to gradually upgrade the traditional husbandry practices to semi or intensive husbandry system and establishment of control programs on helminthosis.
3. The veterinary authority should be carrying out surveillance for hydatidosis, fasciolosis, *C. bovis* and other infection in livestock species in slaughter houses/ abattoirs. When hydatidosis, fasciolosis, *C. bovis* infection is detected an investigation should be carried out by the veterinary authority to identify the origin of the infection and appropriate remedial actions to be implemented.
4. Meat inspection practices should be improved with adequately equipped staff.

Conflict of interest

Authors have none to declare.

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