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The Prevalence of Abattoir Diseases, Major Causes of Organ Condemnation and Associated Financial Loss in Cattle Slaughtered at Arbaminch Municipality Abattoir, Southern Ethiopia

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Abstruct: A cross-sectional abattoir surveillance study was undertaken from November-December 2017 to March-April 2018 on cattle slaughtered at municipal abattoirs of Arbaminch, with the aim to identify major pathological lesions and financial losses due to organ condemnation. Of the total 384 examined animal's abnormalities 181/384; (47.13 %) were animals from which organ condemned during post mortem examination and again from total positives (88/181; (48.61%) the lungs, (63/181; (34.8%) livers, (23/181; (12.7%) heart, (11/181; (6%) kidney, (4/181; (2.2%) spleens and tongues (2/181; (1.1%) were condemned due to various cases. Various diseases conditions were identified included the hyadatidosis (66/384; (17.18%), fasciolosis (30/384; (7.81%), lung emphysema (26/384; (6.77%), CBPP like lesions (20/384; (5.2%); Caudrosis (11/384; (2.86%), Hemorrhagic lesions in lung (10/384; (2.6%), Calcification (9/384 (2.34%), coagulation of blood in the heart (6/384; (1.56%), cysticercosis (5/384; (1.3%), fibrosis of liver 5/384 (1.3%) and nephritis1/384 (0.26%) were the major causes of organ condemnation. The total annual financial loss (Direct loss) due to organ condemnation was 946, 676.50 ETB. In conclusions results of the present study justify immediate need of prevention of various animal diseases that causes organ condemnation through development of awareness creation to the livestock keepers, strengthening animal health delivery method, enforcement of modern slaughter policy, strong deworming strategy of domestic animals including dogs, collaboration between human and animal health experts, training of farmers, pastoralists, meat inspectors on standard slaughter operations and control and prevention of animal diseases.

Key words: Abattoir · Condemnation · Financial loss

INTRODUCTION

The livestock sector generally contributes 40% of the global value of agricultural outputs and support the livelihood and food security of almost a billion of people [1]. In developing countries, cattle are main source of food, like milk and milk byproducts, meat and hide production. Ethiopia is believed to have the first largest livestock population in Africa and 10th in the world, with an estimated population of 59.50 million of heads of cattle, 30.70 million of sheep and 30.30million of goats [2]. In addition, there are about 2.16 million of horses, 8.44 million of donkeys, 0.41 million of mules and about 1.21 million of camels. Generally, this accounts for 40% of the total agricultural gross domestic product (GDP) and 20% of the total GDP without considering other contributions, like traction power, fertilizer and transportation by cattle [3].

Even though the livestock sub-sector contributes much to the national economy, its development is hampered by different constraints. These include rampant animal disease, poor nutrition, poor husbandry, poor infrastructures and shortage of trained man power and lack of government policies [4]. The significant economic losses incurred each year in different abattoirs in Ethiopia are due to mortality, inferior weight gain and condemnation of edible organs at slaughter [5, 6].

According to Jemal and Kebede [7] an abattoir as a building for butchering can be a source of valuable information on the incidence of animal disease and condition. Some of which may be zoonotic. Abattoir inspections might offer a useful tool for animal health

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monitoring and serve as a data source for epidemiological investigation. Abattoirs are used for the purposes of surveillance against animal and zoonotic diseases with a view to protect both man and animals from these diseases [8]. Abattoirs are also helpful in early detection of livestock and poultry diseases of economic and public health significance [9]. Surveillance at the abattoir allows for all animals passing into the human food chain to be examined for unusual signs, lesions or specific diseases [10].

The inspection of meat in Ethiopia had been started since 1910's with the aim to improve productivity and trading in live animals and animal byproducts and also to prevent general public health from zoonotic diseases. A few legislation and regulation of animal diseases in relation to strategic control methods and meat inspection were implemented [11]. Monitoring and evaluation at the slaughterhouse has been recognized as one way of assessing the disease status of herd; however, this source of information had not been fully documented in the country [12].

Infectious diseases of livestock accounted for 30-50% of the total annual losses from livestock sector in Ethiopia [13]. The level of condemnations of carcasses and organs affect the quality and monetary value of carcasses directly or indirectly. Studies done up to this day concentrated on condemnations of offal based on data collected at specific abattoirs [14-17]. Flukes in liver and hydatid cyst in lung, liver and kidney are mainly involved. Parasites in the tropics are responsible for far greater loss to meat industry than any other diseases [6, 18]. Similarly, like many other tropical countries in Africa, it is well known that parasitic diseases are the major factors responsible for low productivity in livestock in Ethiopia [5, 6]. Major parasitic disease such as fasciolosis, hydatidosis, 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 [6]. Disease causes extensive financial wastes as a result of direct and indirect economic losses, because disease is the major concern to livestock industry. Study conducted in different abattoirs of Ethiopia revealed that parasitic infection of livers, lungs (Pneumonia), pericarditis and pyelonephyritis were found to be the major causes of organs condemnation, with an approximate annual loss of 3, 522, 005 million ETB at Kombolicha ELFORA abattoir Dessie and Kedir [19] and 106, 788.18 ETB in Gondar municipal abattoir Mesele *et al*. [20].

Most of the abattoir studies undertaken in Ethiopia were on the prevalence of Fasciolosis, Cysticercus bovis and hydatidosis and the extent of losses from organs condemnation due to these reasons, Drug Administration and Control Authority (DACA) and Abebe [11, 21] but did not include other major problems of condemnations in different parts of the country. Hence, the present study was conducted to investigate the major causes of organ condemnation in cattle slaughtered in Arbaminch municipal abattoir, to estimate the annual economic losses encountered due to organs condemnation.

MATERIALS AND METHODS

Discription of the Study Area: The present study was conducted in Arba Minch municipal abattoir from November, 2016 to April, 2017. Arba Minch town is located in the Southern rift valley of Ethiopia, in between 5° 57'N latitude and 37° 32'E longitude. The area has a sub-humid climate with a moderate to hot temperature with 22°C on average and is located at elevation of 1285 meters above sea level (m.a.s.l). The area is covered with good vegetation and is dominantly occupied by wood-grass land especially along the sides of grazing areas and drainage lines. Acacia spp. is the most commonly available tree in the area. The city is located in the Gamo-Gofa Zone about 500 km far south of Addis Ababa. Its name refers to "springs" and it consists of the uptown administrative center of Shecha which is four km far away to the downtown commercial and residential areas of Sikela. On the Eastern part, Sikela bounds with Nechisar National park, Lake Abaya to the North and Lake Chamo to the South. Also, Kulfo River flows along the center of the town and drains into Lake Chamo.

Study Animals: The study animals were local (Zebu) breed cattle originated from different localities such as Gesuba, Kutcha, ArbaminchZuriya, DerasheKonso, Bena-Tsemay, Woyto, were included in the study. Animals were considered in the study irrespective of their origin, age and sex and body condition.

Sample Size and Sampling Method: Simple random sampling method was employed to select study animals for the study. The total number of cattle for the study was calculated based on the formula given by Thrusfield [22] with 95% confidence interval and at 5% absolute precision.

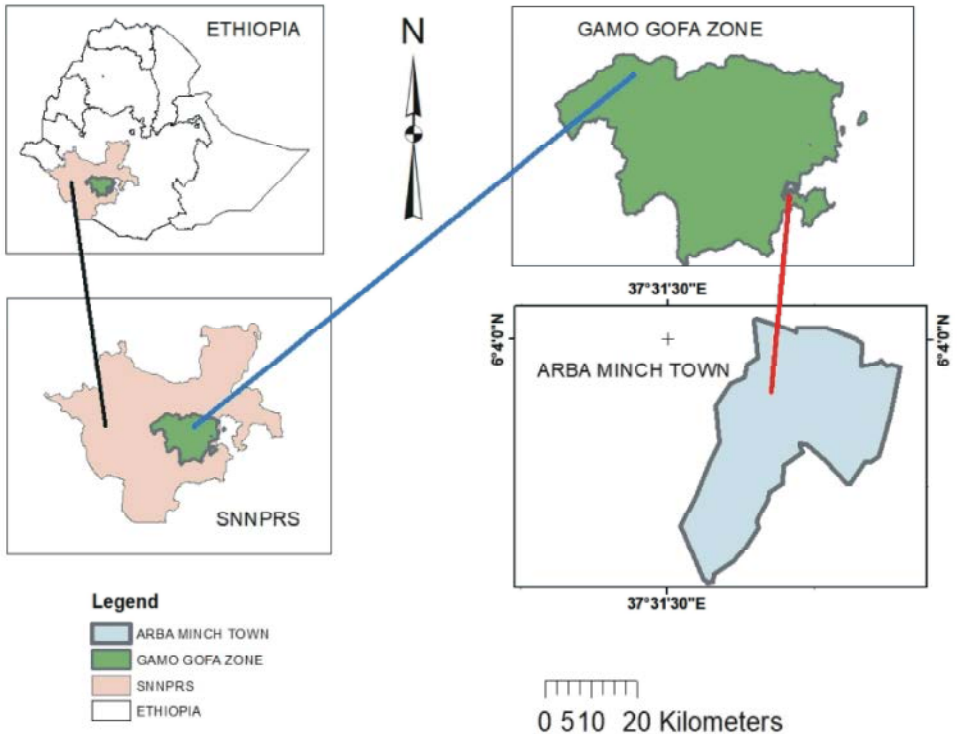

Fig. 1: Map of the study area

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

where N= sample size required, 1.96 = the value of z at 95% confidence level, Pexp = expected prevalence, d = desired absolute precision. Hence, the required sample size was 384 cattle examined during the study period.

Study Design and Methodology: A cross-sectional study design was conducted from November 2017 to April 2018 on cattle slaughtered at Arbaminchmunicipal abattoir. Data were collected by Ante-mortem inspection and Post-mortem examination of the selected animals at the abattoir.

Ante Mortem Examination: Ante-mortem inspections were conducted on individual animals, while the animals were entering into the lairage and after they entered into the lairage in mass. Both sides of the animals were inspected at rest and in motion. Moreover, the general behavior of the animals, gait, structure, conformation, body condition scoring and signs of disease and abnormalities of any type were registered according to the standard ante-mortem examination procedures following the judgments was passed based on FAO [23] animals fit for human consumption was allowed for slaughtering.

Postmortem Examination: During postmortem examination, liver, lungs, heart, kidney and carcass were thoroughly inspected by visualization, palpation and making systemic incisions where necessary for the presence of fasciola, cyst parasites and other gross abnormalities. Pathological lesions were differentiated and judged according to guidelines on meat inspection for developing countries and the results were recorded The decisions at postmortem inspection are classified into the following categories of judgment such as, approved as fit for human consumption, conditionally approved as fit for human consumption, totally condemned as unfit for human consumption and partially condemned as fit for human consumption according to FAO [23] guideline on meat inspection for developing countries.

Assessment of Direct Economic Loss: All affected organs and a carcass was rejected from international market. To evaluate the economic losses, only the direct monetary losses due to rejection of liver, heart, kidneys and carcass were considered. The analysis was based on annual slaughter capacity of the abattoir considering market demand, average market prices on international and the rejection rates of specific organs and carcasses. The annual slaughter rates were estimated from retrospective

data recorded in the past years. The economic loss due to condemnation was estimated by the formula set by Orgunrinade and Orunrinade [24] as follows:

EL = Σsrx X Coy X Roz

where:
EL = Annual economic loss estimated due to organ and carcass condemnation from International market.
Σsrk = Annual sheep/ goats slaughter rate of the abattoir
Coy = Average cost of each sheep or goats liver/ lung/ heart/ kidney/ brain and carcass
Roz = Condemnation rates of sheep/goats/liver/lung/ heart/kidney/brain and carcass.

Data Management and Statistical Analysis: Data generated from ante mortem and post mortem meat inspection was recorded in Microsoft EXCEL program. The collected data are analyzed using Stata14. Descriptive statistics were used to determine the level of organ/s condemnation rates defined as proportion of condemned organs to the total number of organs examined. Possible variation between rejection rates of specific organs, breeds, sex, age groups and body condition of animals were taken into consideration. Logistic regression was used to identify association between the outcome variable (Post mortem findings) and various potential risk factors possible variation between rejection rates of specific organs, age groups and differences was regarded statistically significant if the 95% confidence interval drawn do not overlap to each other and p-value less than 5%.

RESULTS

Over All Prevalence: The prevalence of abattoir diseases and pathological conditions in Arbaminch municipality abattoir during the study period was 181/384 (47.13%).

The findings of the current study also indicated that out of 384 cattle slaughtered have different abnormalities during postmortem inspection from which 88/384 (22.91%) lungs, 63/384(16.4 %) liver, 23/384 (5.98%) hearts, 11/384 (2.86%) kidney, 4/384 (1.04%) spleen and 2/384 (0.52%) tongues. From observed disease and pathological conditions during postmortem inspection 66/384 (17.18 %) hydatidosis caused by hydatid cysts in their different visceral organs from which lung hydatidosis32 (48.48%), liver hydatidosis 17 (25.75%), kidney hydatidosis 10 (15.15%), spleen hydatidosis 4 (6.06%) and hearthydatidosis 3 (3.03%), 32/384 30/384 (7.81%) harboring fasciola in the bile duct of the liver, 26 (6.77%) were bleeding problems/ imperfect bleeding, 20/384 (5.26%)CBPP like lesions/marbling of lung tissue, 11/384 (2.86%) due to heart water, 10/384 (2.6%) byhemorrhagic lesions in lung, 9/384 (2.34%) is by calcification, 6/384 (1.56%) by coagulation of blood, 5/384 (1.3%) by C. bovis, 5 (1.3%) fibrosis and 1(0.26%) is due to nephritis. From the total affected organs, parasitic diseases take higher proportion 101/181 (55.8%) (Fasciola, hydatid cyst, C.bovis) and all other 80/181 (44.2%) cases were caused by bacterial disease, heart water in case of yellowish fluid accumulation in pericardial sac, calcification due to various disease conditions in the liver, fibrosis of liver tissue, coagulation of blood in pericardial cavity during slaughtering and bleeding problems during slaughtering table (Table 3).

Out of the total 384 bovine cattle subjected for post mortem examination 374/384(97.39%) were local breeds from 172/374(45.98%) and 10/384 (2.6%) accounts cross breeds from 9/10 (90%) have different pathological conditions causing organ condemnation respectively. and There was statistically significance relation exists between breeds of cattle examined ($p<0.05$). 363/384 (94.53%) out of slaughtered cattle were males, (172/363 (47.38%) positive cases;and 21/384 (5.46%) were females; (9/21 (42.85%) positive but there was no statistically significance difference between both sexes ($p>0.05$). again. With regard to age groups 164/384(42.7%) of young animals 77/164 (47.95%) and 220/384(57.29%) adults 114/220 (51.81%) have different forms of abnormalities but statistically no significance relation between age groups but there was statistically significance relation between body condition for 59/384 (15.36%); 29/59(49.15% positives) poor, 184/384 (47.91%); 109/184 (59.23% positives) medium and 151/384 (39.32%); 53/151 (35.09% positives) good respectively (Table 1).

Assessment of Direct Economic (Financial) Loss Due to Condemnation of Liver, Kidney, Heart, Spleen, Lung and Tongue: The Present study showed significance economic losses associated with the prevalence of hydatidosis, fasciolosis, cysticercosis, heart water, congestion of lung, CBPP like lesions in the lung, calcification, fibrosis and coagulation of blood at Arbaminch municipality abattoir, SNNPR.

To evaluate the economic losses, only the direct monetary losses due to rejection of liver, Lung, spleen, heart, kidneys and tongue were considered. The analysis was based on annual slaughter capacity of the abattoir considering market demand, average market prices on

Table 1: Association of animal breed, sex, age and body condition with abattoir diseases

Variables	No. of examined animals	No of positive animals (%)	95% CI	X^2	p-value
Breed					
Local	374	172		11.47	0.001
Cross	10	9			
Sex					
Male	363	172		1.79	0.180
Female	21	9			
Age					
Young	164	77 (43.90)	54.44-64.30	3.47	0.062
Adult	220	114 (34.54)			
Body condition					
Poor	59	29 (49.15)	125-139	10.46	0.005
Medium	184	109 (42.93)			
Good	151	53 (26.49)			
Overall	384	181 (47.13)			

Table 2: The rejection rate of individual organs and average price of organs condemned from Arbaminch town Municipality abattoir

Condemned organs	Condemnation rate (%)	Average annual slaughtered animals from retrospective Data	Average price of the organ (ETB)	Annual loss estimation (ETB)
Liver	= 34.8%		300	730, 800
Lung	= 48.61%		45	153, 121.5
Spleen	= 2.2%		50	7700
Heart	= 12.7%	7000	40	35, 560
Kidney	= 6 %		40	16, 800
Tongue	= 1.1 %		35	2695
Total				946, 676.50 ETB

international and the rejection rates of specific organs. The annual slaughter rates were estimated from retrospective data recorded in the past years four years. The economic loss due to condemnation was estimated by the formula set by Orgunrinade and Orunrinade [24] as above:

- Annual slaughter rate of Arbaminch Municipality Abattoir = 7000 bovine cattle per year
- Average price of each organ in the study area (Liver=300birr, lung=45 birr, spleen=50birr, heart=35birr, kidney=40birr, tongue=35 birr based on the questionnaires provided for salers, consumers, abattoir workers, butcher man).
- Condemnation rate of each organ in Arbaminch Municipality Abattoir Lung= 48.61%, liver=34.8, kidney=6%, heart=12.7%, spleen=2.2%, tongue=1.1.%

(Loss by liver) + (Loss by spleen) + (Loss by lung) + (Loss by heart) + (Loss by kidney) + (Loss by tongue).
(Nps×Ili×Cli) + (Ns×Isp×Csp) + (Nps×Ilu×CLU) + (+(Nps×Ihe×Che) + (Nps×Iki×Cki) + (Nps×IToC×To)
= (7000×0.348×300) + (7000×0.022×50) + (7000×0.4861×45) (7000×0.127×35) + (7000×0.06×40) + (7000×0.011×30)
= (730, 800 birr by liver) + (7700 birr by spleen) + (153, 121.5birr by lung)
(35, 560 by heart) + (16, 800 birr by kidney) + (2695 birr by tongue)

Total economic loss = 946, 676.50 ETB annual loss

Information collected from Butchers, Residents or Households and Meat Inspectors on the mean current price of visceral organs at Arbaminch town for liver, lung, heart, spleen and tongue 300, 45, 40, 40 and 35 Ethiopian Birr, respectively. The abattoir record from 2017 to 2018 revealed that the mean annual slaughter was 7000. Accordingly total annual direct financial loss incurred due to rejection of visceral organs was 946, 676.50 ETB (Table 2).

Out of the total livers condemned, the principal causes of condemnation were fasciolosis 30/63 (47.61%), hydatidosis 17/63 (26.98%), Calcification 9/63 (14.28%), fibrosis 5/63 (7.93%), voca2/63 (3.17%) and hydatid cyst 18(8.45%) Liver condemnation due to parasitic causes alone as contributed to 47/63 (74.6%).

A total of 88 lungs were also condemned as they were affected byhydatidosis 32/88 (36.36%), bleeding problems 26/88 (29.54%), marbling lesion 20/88 (22.72%) and haemorrhagic lesions in thelung 10/88(11.36%).

Out of a total of 23 hearts condemned hydrothorax recorded as major causes contributing 11/23 (47.82%), followed by coagulation of blood 6 (26.08%), c.bovis 3/23 (13.04%) and hydatidosis 3/23(13.04%).

Renal problems were observed in 11 kidney examined and 10/11(90.90%) found to be condemned by hydatidosis where as the remaining 1/11 (9.09) were due to nephritis and there was no other pathological condition observed in the kidney.

Table 3: Proportion of postmortem findings in organs with their rejection rate

Condemned organ	Number of Organs	Disease Condition	Condemnation rate (%)	Proportion (%)
Liver	30	Fasciolosis	7.81	47.62
	17	Hydatidosis	4.42	26.98
	9	Calcification	2.34	14.28
	2	Voca	0.52	3.17
	5	Fibrosis	1.3	7.9
Lung	32	Hydatidosis	8.33	36.36
	20	CBPP like lesions	5.22	22.72
	26	Emphysema	6.77	29.54
	10	Haemorrhagiclung	2.6	11.36
Heart	11	Hydropericardium	2.86	47.82
	6	Coagulation of blood	1.56	26.08
	3	C.bovis	0.78	13
	3	Hydatidosis	0.78	13
Kidney	10	Hydatidosis	2.6	90.90
	1	Nephritis	0.26	9.09
Spleen	4	Hydatidosis	1.04	100
Tongue	2	C.bovis	0.52	100
Total	181		47.13	47.13

Out of the total condemned spleen tissue during post mortem examiantin 4/4 (100%) were condemned due to hydatidosis which is the major cause for condemnation .Whereas, c.bovis 2/2/ (100%) out of total examined tongue tissue was the major pathological condition for tongue condemnation.

DISCUSSION

The overall cause of organ condemnation and financial Loss obtained from Arbaminch Municipallity abattoir in the present study was (47.13%) was relatively higher than the previous reports of40.5% from Addis Ababa abattoirs enterprise, 24.7% from Gondar Elfora Abattoir and 29.69% from Ambo municipality abattoir respectively. Dessie and Kedir [19], Mesele *et al.* [20] and Dechasa *et al.* [25] and almost similar with the study findings of Efrem *et al.* [18] from Nekemte Municipality abattoir 47.94% but it is lower than the findings of 55.99% by Zewdu *et al.* [26] from Dessie Municipality abattoir and 69.2% by Dessie and Kedir [19] from Kombolcha ELFORA abattoir. The present findings revealed 22.91% of lungs, 16.4% of liver, 5.98% of heart, 2.86% of kidney, 1.04% of spleen and 0.52% of tongues were condemned by various pathological conditions. The rejection rate of lung and liver is lower than the results from Wolaita sodo municipality abattoir by Fufa and Debele [6] who reported 25.61% lungs and 39.68% liver but heart condemnation 5.98% is higher than that of Fatuma [27] which is 4.09%. Again the condemnation rate of liver (34.08%) is compared to Nekmte Municipallity abattoir is higher but for the other organs; lung (16.47%), hearts (1.68%), kidneys (0.56%) and tongues (0.56%) is lower than the present finding. Similarly rejection rate of all organs during post mortem examination was lower than that of Yalew *et al*. [28] from Bahir-Dar and Dechasa *et al.* [25] from Debrezeit abattoirs.

The present study had shown that Hydatidatidosis, Fasciolosis, heart water, CBPP like lesions, lung Emphysema, Cysticercosis, fibrosis, nephritis and calcification and were the major causes of organ condemnation in cattle slaughtered at Arba Minch municipal abattoir. Among the causes of organ condemnation hydatidosis in the lung, kidney and spleen; fasciolosis in the liver, hydropericardium in the heart and c.bovis in the tongue muscle accounts higher proportion. Besides, organs condemnation due to parasitic diseases alone by hydatidosis, fasciolosis and cysticercosiswas (55.8%) ishigher compared to other pathological conditions which is in agreement with those reported by Fatuma [27], Yalew *et al.* [28] and Kumbe [29] from municipal abattoirs of Assella, Kombolicha ELFORA and Dessie respectively. 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 [30].

In the present study, organs condemnation rate showed that liver and lung were the most frequently affected organs with the highest condemnation rate followed by heart and kidney. This finding is in agreement with reports of Jemal and Kebede [7] who recorded that lung (45.7%) and the liver (32.9%) were the most affected

organs with the kidney (0.02%) and the heart (0.01%) being the least. Similar findings were also reported within Ethiopia in Gondar Mesele *et al*. and Yifat *et al*. [20, 31] and outside Ethiopia in Nigeria [32]. These differences in abattoir diseases particularly of parasitic causes of organ condemnation might be due to different geographical location, climatic conditions that may favor different disease conditions, differences in livestock management system etc.

In this study 16.4% of livers were condemned because of various abnormalities found during postmortem examination. Among the major causes of liver rejection, 7.81% prevalence of fasciolosis observed in this study is lower when compared with the prevalence of 16.5%, 17.8% by Kumbe [29] and Solomon and Alemu [33] respectively. The present findings coincides with that of Demissie *et al.* [34] who reported 7% prevalence from same municipal abattoir Hydatidosis alone caused the rejection of 26.98% of liver and it was higher than 17.92% report by Mesele *et al.* [20] from Gonder 2.34% of liver condemned because of calcification in this study result is higher than 0.2% by Dessie and Kedir [19] and lower than 11.5% by Yalew *et al.* [28]. The difference in the rejection rate of liver in this study and the above reports can be mainly attributed to the variation in the climatic and ecological conditions such as altitude, rainfall and temperature as well as the livestock management system among the study areas [35].

Among parasitic diseases that accounts for higher percentage of organ condemnation the prevalence of hydatidosis was 17.18% which coincides with reports from Kombolcha ELFORA (17%), Abunna *et al.* [36] But the current findings are lower than that of 24.6% from Bahir-Dar [37]. It is higher than 12.73% from Nekemte by Efrem *et al.* [18]. Lung condemnation due to congestion according to the present finding was 2.6 % which is relatively lower than the rate reported by Fufa and Debele [6] they reported 10.65% from wolaita soddo municipality abattoir. The rejection rate of lung due to emphysema was 6.77 % is higher than the rate reported by 3.7% by Kumbe [29] from Assela but lower than the rate reported by 13.5% prevalence from by Solomon and Alemu [33] in Hawassa. In the present study, condemned lung by CBPP was 5.2 % was lower than 17.2% by Demissie *et al.* [34] from same area and much lower than 28.5% from Ghana [38]. Congestion was mostly attributed to improper stunning and bleeding methods. Emphysema and pneumonia could be due to exposure of cattle to bacterial or viral origin infections, stressor factors including exposure to dust and starvation. Moreover, penetration of lung by foreign body, adverse weather condition or accidental inhalation of liquid may cause pneumonia [32]. Factors like differences in culture, social activity, systems of animal husbandry, lack of proper removal of infected organ and attitude to dogs in various regions might have accounted for variation of the prevalence in different areas of a country. In this study, pneumonia was also responsible for the lung condemnation in cattle. It may be observed that animals suffer from transportation stress and might be also a result of endemic diseases of cattle such as pasteurellosis, which is triggered by stress. Lung congestion is associated with improper stunning and bleeding and it is a common finding in abattoirs.

From the totally inspected hearts for the presence of disease and other pathological conditions during post mortem examination 5.98% was higher than [29] 4% of hearts totally condemned as unfit for human consumption because of various types of parasitological (Hydatid cysts and C.bovis) and pathological abnormalities (Coagulation of blood). Those causes are in agreement with previous studies by Yifat *et al.* [31] from Gondar abattoir. These, hydatidosis accounted for 0.78% the rejected heart and 0.78% by C. *bovis*. It was comparable with the works of Jatenie *et al.* [39] who reported a prevalence of 0.9% for C. *bovis* on heart from Adama but lower than [28] than in Dessie. Efrem *et al*. [18] from Nekmte abattoir reported 1.49% of heart was condemned by hydatid cysts which is higher but 0.25% by Abunna *et al.* [36] from Wolaita sodo abattoir. The difference in the rejection rate of organs with related to different causes may be due to the difference in the prevalence of the disease and variationin animal management system at different study site.

The rate of kidney condemnation (2.86%) of current finding was closer lower than 5.77% by Shegaw *et al*. [40] in Mekelle. The most common abnormalities that cause kidney rejection were hydatidosis(2.6%) and nephritis (0.26%). The results of this finding were in agreement with the study done by Jatenie *et al.* [39] reported that *C. bovis* and hydatidosis were the main cause of kidney rejection. The rate of kidney rejection due to nephritis was lower than the rate reported by Fatuma [27] who reported 4.2% prevalence in the Hawassa abattoir but it is higher than the study findings of Demissie *et al*. [34] who reported 1.8% from same abattoirs. Kidney condemnation by hydtid cyst accounted was lower than Samuel *et al*. [41] who reported 4.65 % from Wolaita Sodo abattoir but higher than 0.05% from Adama by Jatenie *et al.* [39].

The present study revealed Hydatid cyst is the only causes for the condemnation of 1.04% of the spleen which in agreement with other authors from different parts of the country as 0.25% from by Abunna *et al.* [36] and 0.94% prevalence from Wolaita Sodo and 1.4% by Demissie *et al*. [34] from Debre-Zeit abattoir. 0.52 % of tongues were totally condemned during the study coincides with that of 0.56 [18] and 0.78% findings of Solomon and Alemu [33] the main cause of tongue condemnation was *C. bovis* which is in agreement with other study reported by Efrem *et al*. [18] from Wollega.

The result of the present study shows no significant difference observed between the two age categories and frequency of organs/carcasses rejected but different authors discussed as the age of the animal increase, the exposure to different diseases increases [20, 37]. In addition, most cattle were slaughtered at their older age, because they reduce their physical capacity during farming and are more prone to a variety of diseases and supported by Da Silva *et al.* [42].

High number of Local breeds of cattle were slaughtered in the municipal abattoir than the cross breed of cattle. This might be because of due to the available of cattle at the local market and/or the farmer's preference. Other possible reason for this could be due to the need for genetic upgrade of the breed as local cattle are known for being hardy and resistance to tick and other diseases. These results were in agreement with those reported by EEA [43]. Comparison made among breeds of animals included in the study shows the prevalence rate of parasitic diseases was higher in cross breeds than local breed but this result is contradictory to Efrem *et al.* [18].

The total economic loss incurred due to organ condemnation in Arbaminch municipal abattoir was 946, 676.50 Ethiopian birr annually. The current finding was nearly similar to the annual loss of 1, 056, 155.06 Ethiopian Birr reported from Nekemte municipal abattoir by Efrem *et al.* [18] but it is lower than the annual loss of 2, 587, 807.75 Ethiopian Birr/year reported by Solomon and Alemu [34] from Hawassa abattoir and 3, 522, 005 Ethiopian Birr reported by Dessie and Kedir [19] from Kombolcha ELFORA abattoir 122, 617.70 ETB from Dessie by Yalew *et al.* [28] was lower than the present economic loss due to organ condemnation observed in other parts of the country. The economic losses variation observed in different parts of the country might be due to differences in animal management systems, disease prevalence, slaughtering capacity of the abattoir, rejection rates of organs and local market prices of organs in the respective study areas.

CONCLUSIONS

Parasitic diseases and other multiple source pathological conditions resulted in the condemnation of liver, spleen, heart, lung, kidney and tongue from local market. Besides to this, loss of precious organs in slaughter house because of prevalent diseases in livestock has negative impact on the food chain value system. Among major causes of offal rejection parasitic diseases of fascoilosis and hydatidosis were the leading ones during post mortem inspection which causes considerable annual economic loss incurred due to organ condemnation in Arbaminch municipal abattoir was 946, 676.50 Ethiopian birr to the slaughtering abattoir. Based on the above conclusions the following recommendations were forwarded;

Proper handling of abattoir information, routine follow up and daily registration of all anti and post mortem findings, tracing back of livestock origin were necessary steps to asses epidemiological situation of animal disease from abattoirs thereby making decision for disease control and prevention.

Capacity building and Provision of trainings for meat inspectors based on inspection guidelines on the basis of country perspectives.

Collaboration and coordination between public health experts, veterinarians, environmental health officers, municipality abattoirs and other responsible bodies to make abattoirs safe and sound food chain value systems as well as the environment.

Animal diseases will be of great challenge for human survival unless efficient and effective awareness creation is not in place for the livestock keeping community for disease control and prevention.

Municipal abattoirs should be modernized to improve meat inspection, for appropriate waste disposal, easy access of safe and wholesome meat for consumers and handling of all necessary abattoir information.

Anti and post mortem meat inspection should get improved technically to minimize the risk and fear of zoonosis.

Regular de-worming and treatment of cattle should be done to minimize the rate of spread of parasitic diseases.

There should Proper disposal of all abattoir wastes and condemned offal's to avoid environmental condemnation as well further livestock disease dissemination.

Further surveillance study should carry out to for future improvements in slaughtering house.

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