

Research Article

Major Gross Lesion of Lungs and Liver on Bovine and Associated Economic Loss at Hawassa Municipal Abattoir, Ethiopia

Geremew Bekele*

Department of Veterinary Medicine, Hawassa University, Hawassa, Ethiopia

Abstract

Different pathological lesion of an organ has a great influence of an economy of one country by condemnation in cattle slaughtered at municipal abattoir. The study was conducted from November, 2019 to February, 2020 at Hawassa municipal abattoir, Southern Ethiopia from ama zone with the aim of determining major causes of lung and liver condemnation and to estimate the direct financial losses attributed to the condemned lungs and liver. Standard ante mortem and post-mortem inspection procedures were performed throughout the study and abnormalities encountered were recorded. A total of 567 male cattle were measured for ante mortem and post-mortem examination by orderly random sampling technique by applying identification marker from the body. During ante mortem inspection the most common abnormalities were 3 (0.53%) lameness, 2 (0.35%) nasal discharge, 1 (0.18%) skin lesions and 4 (0.71%) rough hair coat, 5 (0.88%) pale mucous membrane was conducted. Up on post mortem inspection, 298 (52.55%) of lungs were condemned due to 176 (31.04%) hydatidosis, 45 (7.94%) CBPP, 32 (5.64%) emphysema, 12 (2.12%) marbling, 11 (1.94%) Atelectasis, 10 (1.76%) calcification, 7 (1.23%) adhesion, 5 (0.88%) pneumonia and 307 (54.14%) of livers were condemned due to 187 (32.98%) fasciolosis, 53 (9.35%) hydatidosis, 33 (5.82%) calcification, 18 (3.17%) hardening, 11 (1.94%) hepatitis and 5 (0.88%) cirrhosis. From these study hydatidosis (31.04%) for lung and fasciolosis (32.98%) for liver were the major cause of condemnation rate in Hawassa municipal abattoir respectively. There was a statistically significant difference observed between age and breed of lung and liver ($p>0.05$ and $p<0.05$) respectively. Commonly fasciolosis from the liver and hydatidosis from the lung were the familiar cases from this abattoir. Finally, established public health importance to avoid eating of raw meat or organ to control the encounter disease of the abattoir.

Keywords

Abattoir, Cattle, Condemnation, Hawassa, Liver, Lungs, Municipal, Economy, Zoonosis

1. Introduction

Ethiopia is naturally gifted with diverse agro ecological zones and environmental conditions suitable for livestock production. The country is considered to have numerous livestock population in Africa. The national herd comprises

57 million cattle, 30 million sheep, 23 million goats, and 57 million chickens as well as camels, equines, and small number of pigs. Most animals are raised in the high lands, where also most of the population was live, due to technical, economic,

*Correspondence: Geremew Bekele (geremewbekele21@gmail.com)

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and institutional constraints. Generally, the livestock sector is the major contributor of export earnings, mainly through the export of live cattle and small ruminants. It is estimated in Ethiopia livestock contribute about 10% total export earnings of which 69% accounted for by live animal export [9]. But this great live-stock potential is not properly used due to different factors such as traditional management system, limited genetic potential, lack of appropriate veterinary services. Each year a significant loss results from death of animals, inferior weight gain, condemnation of edible organs and carcass from slaughter. Though abattoir plays a vital role in screening animal products with in various abnormalities and disease [40]. The occurrences of disease in case of organ condemnation from abattoir, several studies have been conducted to determine the prevalence and economic losses due to organ condemnation in many abattoirs of Ethiopia [2]. Mostly the affected organs are liver and lungs due to fasciolosis for liver and hydatidosis for both organs [14]. One of the common parasitic causes of lung lesion up on postmortem inspection is hydatid cyst (Hydatidosis). Hydatidosis is the disease of lung caused by metacestode (larvae) stage of coccus solus. Although it has an important zoonotic diseases associated with a great economic losses and massive public health significance in worldwide. Mainly, cystic echinococcosis is one of an implicated causes of organ condemnation especially livers and lung and carcass weight loss in slaughtered animals in Ethiopia. Though Cystic echinococcosis in cattle has been documented from some parts of the country [6]. Hydatidosis mainly develop in the liver and lungs really develop in the kidneys, spleen, and heart, nerve tissue, bone and other organs [35]. The prevalence, economic and public health impact of cystic echinococcosis (hydatidosis) is higher in rural communities of developing countries where there is close contact between dogs, intermediate host species and man [28]. In Ethiopia, where home slaughtering of cattle, sheep, goats and camels is still adapted and wastes of raw or fresh offal and carcass are commonly given for dogs and cats, cystic echinococcosis is an endemic disease and great public health and economic importance. Merely show that cystic echinococcosis is one of the major causes of organ condemnation in the country [19]. In Ethiopian about 85% population are rural inhabitants and mostly practiced backyard slaughtering with improper disposal of affected organ with hydatid cyst. As a result, stray dog have a free accesses to infected organs of slaughtered animals. The absence of proper meat inspection procedures, presence of large population of stray dogs and lack of public awareness about the disease contribute significantly to the high prevalence of the disease in Ethiopia [36]. In Ethiopia only a few studies conducted about hydatidosis and the prevalence rates were changing between 13.7 to 72.44% in cattle and 9.9 to 35% in sheep in ale, Nazareth, rad, Bahir Dar and Dire Dawa abattoirs, respectively [18]. In addition to hydatidosis, suffocation of animals due to overcrowding in the graies, lack of enough rest before slaughter, and exposure to bacterial or viral infections

development of emphysema and pneumonia [11]. Pneumonia is an inflammation of the lung characterized by enlargement, hyperaemia, and sometimes oedema and most commonly caused by infectious or noninfectious agents. In addition atelectasis is one classes of lesion of lung that collapse of the alveoli or compression of the alveoli while emphysema occurs due to destruction of connective tissue of the lung, including the supporting and elastic tissue of pulmonary parenchyma. It also caused by an obstruction to the outflow of air or by extensive gasping respiration during slaughter procedures. The emphysema lesions on lung can be examined grossly by detecting pale, enlarged greyish-yellow, pearl like shiny, puffy, and crepitants feel upon observation and palpation of the lung [35]. Contagious bovine pleuropneumonia (CBPP) is referred to as lung sickness and also the most threatening infectious disease of cattle in Africa since rinderpest was eliminated [38]. Also highly contagious disease of cattle and water buffaloes [34]. All ages of cattle are susceptible, but young cattle develop joint swellings rather than lung infections [29]. Is characterized by the presence of seo-fibrinous, interstitial pneumonia, interlobular oedema and marbled appearance of the lung. The causative agent of CBPP is *Mycoplasma mycoides* subspecies *mycoides* small colony variant [10]. Generally, the total annual loss of hydatidosis in cattle slaughtered at Hawassa municipal abattoir is estimated at 674,093.038 ETB.

Bovine liver is one of the main visceral organs in the animal body which performs various functions and very reach sources of vitamins and minerals. The tissue is much wanted by consumers due to palatability and consumption. But, it is one of the most commonly condemned visceral organs up on meat inspection [14]. Among the abnormalities of liver from the farm animals, fascioliasis is a major disease, which imposes direct and indirect economic impact on livestock production, particularly of sheep and cattle [24]. The direct economic impact from the rejection of the liver by consumers within the effects due to acute infections is weight loss, reduced growth, and infertility. Whereas the chronic phase of the disease infections can decrease in production [20]. *F. hepatic* and *F. gigantica* were the major species of liver flukes that causes hepatobiliary scheme mainly infected with cattle and sheep those impacts of public health. Human fasciolosis is caused by *F. hepatic* as it recognized an emerging and re-emerging zoonotic diseases in several countries [13]. The presence of liver fluke or fasciolosis due to *F. hepatic* and *F. gigantica* in Ethiopia has long been known that prevalence and economic significance have been reported by several workers [33]. The economic losses due to fasciolosis are responsible for widespread morbidity in cattle characterized by weight loss, anaemia and hypoproteinemia in addition Fasciolosis can causes substantial weight reduction in milk yield, condemnation of affected liver, decline production and productive performances, exposure of animal to other diseases due to secondary complications and cost of treatment expenses [1]. Therefore, the objective current studies were: -

- 1) To estimate the magnitude of major gross lesions of the lung and liver in slaughter male cattle at Hawassa municipal abattoir.
- 2) To estimate the financial loss due to lung and liver rejection.

2. Materials and Methods

2.1. Description of the Study Area

The study was conducted in Hawassa town, Southern, Nation Nationalities and People Regional State (SNNPR), and ama Zone from November, 2019 to February, 2020. Hawassa is apportioning of both the capital city of Southern Nation, Nationalities and People Regional State and ama Regional State. It is located on the escarpment of the well-known East African rift valley and on the coast of one of the rift valley lakes, locally named 'Garbo' or 'FikirHaike' and common name 'Hawassa Lake' and also 'Tikur Wiha', at a distance of 275 km south of Addis Ababa. Hawassa is located at 07 degree 03 minute North and 30 degree 28 minute east with an average elevation of 1708m sea level and also an average temperature and precipitation of 20.8 degree Celsius and 993mm respectively. It is one of the major urban areas of Ethiopia; located inside the greater Ethiopia rift valley. However, it involvements uni modal rain full over a three month period from mid-June to mid-September and has wonna-dega agro ecological zone [16].

2.2. Study Animals (Male Cattle)

A total of 567 male cattle brought for slaughter were enrolled in the study from Hawassa municipal abattoir. All the animals were coming to the abattoir from different ade's and kebele's. Anti-mortem and postmortem inspection were performed after recruiting the animals up on systematic random sampling technique. Each of the study animals was given an identification number on their gluteal patch area with a color marker locally called chopstick during ant-mortem inspection. From 567 examined male cattle most of they were local breeds such as; Brena breeds and Arsi breeds.

2.3. Study Design

A descriptive cross sectional study was carried out from November, 2019 to February, 2020 at Hawassa municipal abattoir to determine major causes associated with liver and lung condemnation. The male cattle were selected using sub heading sample size and sampling technique by taking the age, body condition and origin of the animals into consideration [14].

2.3.1. Ante Mortem Examination

Ante mortem inspection was performed on individual animals, while the animals were allowed to enter into the gare according to various risk factors such as: age, body condition

score, breed and origin of each study animal being recorded simultaneously on specially designed data recording sheet. Cattle were inspected looking for their gait, structure, conformation and any disease abnormality detected by physical examination and the findings were registered according to the standard of ante mortem inspection procedure the standard of ante mortem examination procedures given by [17]. Ante mortem inspection should be done within 24 hours of slaughter and repeated when slaughter has been delayed over a day [14]. During visit the abattoir for ante mortem examination the breed, sex, age, origin, management system, and body condition score of each slaughtered male cattle were recorded on the data collected sheet after giving identification number for each study animals by using color marker (i.e. chopstick).

2.3.2. Post Mortem Examination

The post mortem examination was performed during visual inspection, palpation and systematic incisions for the presence of cysts, adult parasites and other abnormalities. The results were recorded and decisions were classified as fit for human consumption and then permitted totally condemned as unfit for human consumption or partially condemned as fit for human consumption, trimming of the organ or the muscle after processing and determined each part by looking at the percentage of lesions existing on the organ.

2.3.3. Identification of Fluke Species on Liver (Liver Flukes)

In abattoirs cattle accessible for slaughter were local indigenous breed and male cattle. The liver of each study animal was carefully inspected through palpation and incision on each liver and bile duct for presence of lesions investigative of Fasciola infection externally and sliced for confirmation. Liver flukes were recovered for differential count by cutting the infected liver into fine, approximately 1 cm slices with a sharp knife. Commonly the two specious of fasciolosis for instance, Fasciola hepatic has a worldwide distribution but frequently in temperate zones, while F. gigantica is found on most continents, primarily in tropical regions [21]. Fasciola Species identification was demonstrated based on morphological features (including body length, body width and body area) of the parasite. Were classified either into F. hepatica or F. gigantica liver fluke species [26].

2.3.4. Economic Losses due to Lung and Liver Condemnation

Fasciolosis and hydatidosis were the major causes of liver and lung rejection that lead to massive economic losses [12]. Financial losses mainly in hydatidosis and fasciolosis due to condemnation of lung, liver respectively and other organs and cost due to carcass weight reduction (indirect loss) were carried out [25]. Hence, it would be essential to have comprehensive information on occurrence of various diseases/causes and their economic loss to establish

appropriate strategy for prevention and controls. Causes of organ condemnation were not extensively studied in Hawassa Municipal Abattoir [32].

To calculate economic loss due to lung and liver considered as;

$$EL = rx \cdot Acy \cdot cz$$

Where; EL=Estimated annual economic loss due to lung and liver condemnation from Hawassa municipal abattoir.

rx=Annual bovine slaughter rate at Hawassa municipal abattoir.

Acy=Average cost of each lung and liver at Hawassa municipal abattoir.

cz=Condemnation rate of bovine lung and liver at Hawassa municipal abattoir.

2.4. Sample Size Determination and Sampling Technique

The sample size for this study was determined by calculated the formula given by a research done in the area, an expected prevalence of 50% is assumed based on the rule of thumb [37]. With 95% confidence level and required 5% precision as shown below:

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

Where: -N is required sample size,

P exp is expected prevalence, and

d is required precision

By using the above formula, the required sample size was

calculated to be 384, but raising the accuracy because of additional male cattle were examined for estimated prevalence of the lung and liver lesions, thereby making the total sample size of 567; to obtained more accurate results with greater precision and power, but it cost more time and money. Eventually, provided the finding when increased the sample size to obtained grosser pathological lesion observed on cattle slaughtered at abattoir level.

2.5. Data Management and Data Analysis

The data which was –obtained from ante mortem and post mortem examination were entered in to Microsoft excel 2007 computer program and analyzed using STATA for window version 22.0 software. Descriptive statistical such as percentage was used to determine the level of lung and liver condemnation rate. The association between liver and lung based on an age group, sex, breed, body condition and origin assessed by Pearson chi-square (χ^2) and P-value <0.05 were considered significance.

3. Results

Abattoir survey: Anti-mortem inspection was conducted on 567 male bovine slaughtered for the detection of any abnormalities encountered in liver and lungs in Hawassa municipal abattoir. Total of 30 (15.91%) cattle were found to have the abnormalities listed below Table 1. While pale mucus membrane (0.88%) was the highest deviation contrasted to the rest one. Whereas, skin lesion (0.18%) had been the lowest effect.

Table 1. Abnormal conditions encountered during anti mortem inspection in Hawassa municipal abattoir. N=567.

Abnormality	Total NO. %	Young (n=28)	Adult (n=442)	Old (n=97)
Lameness	3 (0.53%)	0	2 (0.45%)	1 (1.03%)
Nasal discharge	2 (0.35%)	0	2 (0.45%)	0
Rough hair coat	4 (0.71%)	1 (3.6%)	1 (0.23%)	2 (2.06%)
Skin lesion	1 (0.18%)	0	1 (0.23%)	0
Pale mucus membrane	5 (0.88%)	1 (3.6%)	1 (1.03%)	3 (0.68%)
Total no.	15 (2.65%)	2 (7.1%)	4 (4.12%)	9 (2.04%)

Table 2. Distribution of gross lesions of lung in pulmonary lesion on age groups.

Lung Lesion	Total no.	Young (n=28)	Adult (n=442)	Old (n=97)	X2 (P-value)
Hydatid cyst	176 (31.04%)	11 (39.29%)	133 (30.09%)	32 (32.99%)	1.26 (0.045)
CBPP	45 (7.94%)	6 (21.43%)	27 (6.11%)	12 (12.37%)	11.87 (0.117)

Lung Lesion	Total no.	Young (n=28)	Adult (n=442)	Old (n=97)	X2 (P-value)
Emphysema	32 (5.64%)	4 (14.29%)	23 (5.20%)	5 (5.15%)	4.09 (0.084)
Marbling	12 (2.12%)	0	5 (1.13%)	7 (7.22%)	
Atelectasis	11 (1.94%)	2 (7.14%)	6 (1.36%)	3 (3.09%)	6.78 (0.230)
Calcification	10 (1.76%)	3 (10.71%)	7 (1.58%)	0	
Adhesion	7 (1.23%)	0	6 (1.36%)	1 (1.03%)	
Pneumonia	5 (0.88%)	0	2 (0.45%)	3 (3.09%)	

Of the current study most of pathological lesion of lung occurred on young aged group compared to other aged groups of male cattle slaughtered at this abattoir, from this finding

hydatid cyst was most part of lesion present on the lung, but it's found on an other organs such as liver and rarely obtained from the brain, kidney and nerve tissues.

Table 3. Distribution of gross lesions of liver in Hepatic lesion on age groups.

Liver Lesion	Total no.	Young (n=28)	Adult (n=442)	Old (n=97)	X2 (P-value)
Fasciolosis	182 (32.18%)	24 (85.71%)	150 (33.93%)	8 (8.25%)	63.7 (0.032)
Hydatid cyst	53 (9.35%)	15 (53.57%)	35 (7.92%)	3 (3.09%)	73.39 (0.128)
Calcification	33 (5.82%)	7 (25%)	24 (5.43%)	2 (2.06%)	24.7 (0.057)
Hardening	18 (3.17%)	1 (3.57%)	17 (3.85%)	0	
Hepatitis	11 (1.94%)	2 (7.14%)	8 (1.81%)	1 (1.03%)	4.28 (0.0342)
Cirrhosis	5 (0.88%)	0	5 (1.13%)	0	
Total no.	307 (54.14%)	49 (1.75%)	244 (55.20%)	14 (14.43%)	1.08 (0.0572)

From the above Table 3 the major gross pathological lesion of liver such as, fasciolosis and others are commonly prominent to young age groups contrast to the other age groups. Because of fasciolosis in young age have chronic in

nature and causes risk infections for instance, inflammation, biliary obstruction and destruction of the bile duct even the liver totally damaged as the founder of adult parasite (liver fluke) in the bile duct.

Table 4. Distribution of Pulmonary lesion on the lung regard to the breed.

Lung lesion	Total no_(%)	Local (n=472)	Cross (n=95)	X2	P-value
Hydatid cyst	176 (31.04%)	147 (31.14%)	29 (30.53%)	0.01	0.9055
CBPP	45 (7.94%)	36 (7.63%)	9 (9.47%)	0.37	0.5435
Emphysema	32 (5.64%)	27 (5.72%)	5 (5.26%)	0.03	0.8602
Marbling	12 (2.12%)	10 (2.12%)	2 (2.11%)	0.00*	0.9934
Atelectasis	11 (1.94%)	11 (2.33%)	0		
Calcification	10 (1.76%)	7 (1.48%)	3 (3.16%)	1.28*	0.2578
Adhesion	7 (1.23%)	7 (1.48%)	0		
Pneumonia	5 (0.88%)	4 (.85%)	1 (1.05%)	0.06*	0.8019

Lung lesion	Total no_(%)	Local (n=472)	Cross (n=95)	X2	P-value
Total no_	298 (52.55%)	249 (52.75%)	49 (51.58%)	0.04	0.8342

Hydatidosis is the most common major causes of lung and liver condemnation rate on cattle slaughtered at the abattoir, in current study from the major finding in Hawassa municipal abattoir; hydatid cyst was the most gross lesion on the lung of

cattle during post mortem examination of local breeds such as Arsi breeds and Borena breeds were the highest rejection rate than cross breeds due to poor management and climatic conditions from cattle across different areas to the abattoir.

Table 5. Distribution of Hepatic lesion on the liver regard to the breed.

Liver lesion	Total no. (%)	Local (n=472)	Cross (n=95)	X2	p-value
Fasciolosis	187 (32.98%)	153 (32.42%)	34 (35.79%)	0.41	0.5233
Hydatid cyst	53 (9.35%)	41 (8.69%)	12 (12.63%)	1.45	0.2281
Calcification	33 (5.82%)	27 (5.72%)	6 (6.32%)	0.049	0.8211
Hardening	18 (3.17%)	16 (3.39%)	2 (2.11%)	0.42*	0.5147
Hepatitis	11 (1.94%)	10 (2.12%)	1 (1.05%)	0.47*	0.4919
Cirrhosis	5 (0.88%)	5 (1.06%)	0		
Total no.	307 (54.14%)	252 (53.39%)	55 (57.9%)	0.65	0.4214

Fasciolosis is one of the parasitic worm infection caused by the common liver fluke such as fasciola hepatica as well as fasciola gigantica. The disease is zoonotic important and is classified as a neglected tropical diseases (NTD) and affected human, but its main host is ruminants such as cattle and sheep.

From current study the major finding during post mortem examination of liver of cattle slaughtered at Hawassa municipal abattoir; the major gross pathological lesion were obtained in cross breeds that recorded from the above table.

Table 6. Gross pathological lesions of lung and liver within the origin and body condition score of bovine slaughter at Hawassa municipal abattoir.

Organ Examined	Risk Factors	Variables	No. of Animal Examined	No. (%) Animal Positive	Prevalence rate (%)
Lung	Origin*	Lowland	63	33	(52.38%)
		Midland	235	122	(51.92%)
		Highland	269	143	(53.16%)
	Body Condition*	Poor	40	27	(67.50%)
		Medium	256	134	(52.34%)
		Good	271	137	(50.55%)
Liver	Origin*	Lowland	63	40	(63.49%)
		Midland	235	128	(54.67%)
		Highland	269	139	(51.67%)
	Body Condition*	Poor	40	26	(65%)
		Medium	256	137	(53.52%)

Organ Examined	Risk Factors	Variables	No. of Animal Examined	No. (%) Animal Positive	Prevalence rate (%)
		Good	271	144	(53.14%)

On the current study most of slaughtered cattle come across from different areas such as lowland, midland and high land areas to Hawassa municipal abattoir; and that scored different body conditions (poor, medium and good), but most of the gross pathological lesion was found on the cattle that score poor body conditions and the cattle that located the highland area from the lung and the lowland area from the liver respectively.

4. Discussion

Up on this study, ante mortem and post mortem inspection was conducted to detect abnormalities come across in Hawassa Municipal Abattoir. The most common abnormalities during ante mortem inspection were 3 (0.53%) lameness, 2 (0.35%) nasal discharge, 1 (0.18%) skin lesions, 4 (0.71%) rough hair coats, and 5 (0.88%) pale mucus membranes respectively. From the expected abnormalities, pale mucus membrane was the highest encountered ante mortem difficulties followed by rough hair coat, lameness, nasal discharge and skin lesion followed. The most of this ante-mortem abnormality mainly happened on stress during transport, tick infestation area arisen like rough hair coat and traumatic causes of transport vehicles. This current finding is highly probably similar with that of [27] who reported *Global Journal of Veterinary Medicine and Research*.

Occasionally 567 male cattle slaughtered and examined in Hawassa municipal abattoir, from this inspected 298 (52.55%) of lung lesion and 307 (54.14%) of liver lesion were detected and recorded, finally rejected from local market due to their post mortem inspection Table 2 and Table 3. Up on the post mortem examination of lung lesion showed hydatidosis (31.04%), CBPP (7.94%), emphysema (5.64%), marbling (2.12%), atelectasis (1.94%), calcification (1.76%), adhesion (1.23%) and pneumonia (0.88%) respectively, from the current finding hydatidosis was the major gross lesion from the other judgments of the lung lesion; while pneumonia was the minor causal effect.

Whereas disease come across during postmortem examination of liver indicated that, fasciolosis (32.18%), hydatidosis (9.35%), calcification (5.82%), hardening (3.17%), hepatitis (1.94%) and cirrhosis (0.88%) among this current finding fasciolosis was the major condemnation rate and highly causal difference when compared with the rejection rate of 8.6% by [23] who reported at Tanzania, but some difference of 20.8% by [14] who reported from ale Arsi respectively, but this finding expressively difference with that of 68.7% by [15] in Kombolcha and highly difference than of 86.4% by [39] in Gondar. This causes of condemnation varies in the degree of different factors may be related with difference in the

prevalence of these conditions from different geographic areas and in different animals in animals from the same geographic area and applied different manage mental practices.

Lung rejected rate in this current study from Hawassa municipal abattoir revealed (52.55%) has similar with that of [17] who reported 56.1% at Hawassa municipal abattoir, but highly difference with that of [3] who reported the rate of 46.22% in Jimmy municipal abattoir. Whereas, the current finding show that the prevalence of bovine hydatidosis 31.04% present in the lung is merely similar with that of [5] who reported 35.7% at Bahia Dar municipal abattoir and [30] who reported 32.8% from Ambo municipal abattoir, but highly difference with that of [22] she reported 22.7% in Sebeta municipal abattoir. Of the current finding from this study the prevalence rate of hydatidosis present in the lung 31.04% and found in the liver 9.35% at list similar judgments comparable to [27] who reported 35.5% from the lung and 17.2% from the liver at wolaitasodo respectively.

The indication of recent study showed that increased rejection rates of liver (54.14%) on postmortem examination compared to earlier study conducted by [5, 31, 4], and [7]; those reported the rejection rate of 23.7%, 43.7%, 36%, and 35% of liver condemned at Bahia Dar, Mekele, Kombolcha and Addis Ababa, respectively. Mainly performed pulmonary lesions where male cattle coming from lowland area with a rate of 52.38% and with poor body condition 67.50% in Table 6, highly comparable with [8] who reported pulmonary lesion at a rate of 56.52% and poor body condition 60.50% at wolaita sods respectively.

5. Conclusion and Recommendations

The recent study showed that fasciolosis and hydatidosis are the major causes of gross pathological lesion of liver and lung rejected rate at Hawassa municipal abattoir. In this abattoir mainly facilitated proper disposal way of activities performed such as dipping of condemned carcass and organs, burring, more over; good quality meat inspection technique are conducted. Even an essential attention are given to the owner of slaughtered cattle based on the source of infections and risk factors regarding with better live stocks regarding to the causative agent of liver and lung lesions. Based up on the conclusions, the following recommendations are forwarded;

- 1) To promote public awareness given to avoid eating of fresh meat or organs to control an effective disease.
- 2) To establish an activity for carcass and organ inspectors and abattoir workers should be well trained on handling condemned carcass and organs.
- 3) promote proper disposal of condemned carcass and organs in a good manner.

- 4) To promote the customer to get carcass and organs on functional time.
- 5) To maximize carcass and organ marketing to the user.

Abbreviations

FAO Food and Agricultural Organization
CSA Central Statistical Agency

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Author Contributions

Geremew Bekele Girgibo: Writing – original draft

Conflicts of Interest

The authors declare no conflicts of interest.

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