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Prevalence of gross pathological lesion in lung and liver of cattle slaughtered at Gondar Elfora Abattoir, North West, Ethiopia

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Abstract
A cross-sectional study was conducted from November 2015 to April 2016 on male cattle slaughtered at Gondar ELFORA abattoir, Northern west Ethiopia, to examine the major gross lesion and its prevalence among different risk factors in lung and livers. The pulmonary hepatic lesions were diagnosed on the basis of pathological findings. During the post mortem examination, out of the total 740 male cattle destined for slaughter (648, 87.5%) of cases were found positive for different pathological lesions (lung and liver). Out of this (397, 53.6%) of lung and (251, 33.9%) of liver were found to have lesions. Among major gross pulmonary lesion encounterd in lung were Hydatidosis (50, 6.8%), emphysema (70, 9.5%), congestions (65, 8.8%), hemorrhage (47, 6.4%), Athelectasis (38, 5.1%), calcified nodules (50, 6.8%) and more than two lesions 48(6.5%). Among these lesions emphysema (70, 9.5%) and congestion (65, 8.8%) were the most frequently observed lesion and abscesses were the least frequently encountered lesion (29, 3.9%). This study also investigates the major gross hepatic lesion in the study area. Accordingly, Fasciolosis (90, 12.2%), Calcification, (69, 9.3%), Hydatidosis (24, 3.2%), Abscess (25, 3.4%) and two and above lesions (24, 3.2%) were the major hepatic lesion observed during the study. The statistical analysis showed that there was statistical significance (P<0.05) between the prevalence of pulmonary lesion among age and body conditions. The prevalence of hepatic lesion was also found to be significant with the origin and body condition of the study animals (P<0.05). The results of this study showed that pulmonary emphysema and hepatic fasciolosis were more pronounced recorded lesion in lung and liver respectively. Therefore, better livestock management system, good meat inspection and creating awareness on butchers and cattle trader should go in a long way to reduce the problem in the abattoir.

Keywords: Abattoir, cattle, lesions, epidemiological, ELFORA, Gondar

1. Introduction
In sub Saharan Africa countries, livestock plays a significant role in both national economy and livelihood of rural communities. It contribute milk, meat eggs, food crop production, soil fertility, hide and skin, drought power, cash income and means of social integration especially in non market exchange area [1].

Ethiopia owns a huge livestock population in Africa, which is estimated to be around 34-40 million TLU (Tropical livestock unit) out of which 17% and 12% cattle and small ruminants, respectively, are found in Ethiopia [2]. Although, the economic contribution of livestock will fluctuate from year to year, livestock contributed 45% of agricultural Gross Domestic Product (GDP) in 2008/09 in Ethiopia [3]. However, this great potential is not properly exploited due to different constraints. These includes endemic animal disease, poor husbandry practice, inferior genetic makeup, poor nutrition, lack of effective government policy, shortage of trained man power and absence of well-developed market infrastructure [4]. Abattoirs and slaughterhouses are good sources of valuable information on the incidence of animal diseases and conditions. An abattoir is a focal point to detect diseases of public health importance such as TB, pneumonia, cysticercosis, hydatidosis and faciola [5]. Pulmonary diseases like tuberculosis, pneumonia, hydatid cyst, and lung worms are among the most important notifiable disease conditions that cause rejection of organs and public health problems [6, 7].

As a result, if such information had been assessed, it will aid in developing strategies to control disease of animal and human in a country. It is also necessary to know the extent to which the public is exposed to zoonotic diseases as observed in abattoirs [8].

The level of lesion observed in lung and liver of cattle affects the quality, monetary and esthetic value of organ and carcasses directly or indirectly. Studies done up to this day concentrated on gross lesion observed in lung and liver based on data collected at Gondar Elfora [9, 16]. Although various study have been conducted through abattoir survey to investigate the major cause of organ condemnation in Ethiopia, the prevalence of major gross lesions in lungs and liver of cattle in Gondar ELFORA abattoir in particular were not intensively assessed.

In addition to many municipal abattoir in Ethiopia; currently, different modern export abattoir like Ashiraf, Helmix, Elfora, Organic, Metehara, Mojo, Luna, and Akaki have been established in different part of the country. This increment of the number of export abattoir indicates that there is an increase in demand and supply of carcass and organ consumption but the production capacity become decreasing due to the presence of endemic disease and pathological conditions, production factor, poor infrastructure and other constraints. Moreover, cattle from those areas which are severely affected by drought exclusively require special attention while they are oriented for slaughter in this abattoir. Considering this, the principal objectives of this study were:

- ✓ To examine major gross lesion in lung and liver of cattle slaughtered at Gondar ELFORA abattoir.
- ✓ To assess the prevalence of gross lesions in lung and liver of cattle slaughtered at Gondar ELFORA abattoir.

2. Material and Methods

2.1 Study Area

A cross-sectional study was carried out on cattle slaughtered at Gondar ELFORA abattoir; Amhara regional state, North Western Ethiopia, from November 2015 to April 2016 to investigate the major gross pulmonary lesion in lungs and livers of cattle slaughtered at Gondar ELFORA abattoir. The area includes highland, midland and lowland agro-ecologies. These diverse agro-ecological zones are attributable to the high range of altitudinal differences, which varies from 4620 m at the Simen Mountains in the North to 550 m in the West. The mean minimum and maximum temperatures vary with altitude. In the highlands, temperature varies from 11 to 32 °C, whereas in the lowlands, temperature may reach 44.5 °C especially in the month of April or May. Rainfall varies from 880 to 1772 mm. The area has two main seasons: the wet season from June to September when the area receives its major rainfall and the dry season from October to May with sparse and erratic rainfall. The humidity also varies with altitude. Many of the dwellers, both rural and urban were involved in animal production.

2.2 Study Population

The study includes 740 local male indigenous cattle slaughtered at the Gondar ELFORA abattoir. This animal principally originated from an area which has extensive grazing is the dominant husbandry practice in which animal allowed to graze freely and housed in poorly constructed barn and the area characterized by lowland, midland and highland type of climatic condition [17]. Based on their dental eruption pattern cattle were grouped in to young adult (3 to 6 years), adult (6-8years) and old (>8years) [18, 19]. Body condition of animal had been also taken as poor, medium, good and very good on the basis of body condition scoring guideline of zebu cattle [20].

2.3 Study Design and Sample Size Determination

A six month cross-sectional study was conducted in cattle slaughtered at Gondar ELFORA abattoir from November 2015 to April 2016. During the study period, male cattle were randomly selected using systematic random sampling techniques and they were selected every one day interval per a week. For each day visit both ante mortem and post mortem examination was made and data were recorded for each slaughtered animals. Ante-mortem examination was conducted on individual animals, while the animals were entering into the lairage and in mass after they entered into the lairage. Both sides of the animals was inspected at rest and in motion for the general behavior of the animals, cleanness, and sign of diseases and Post mortem examination was also carried out by visual inspection, palpation and systematic incision on lung and liver according to procedures recommended by Food and Agricultural Organization [21].

The sample size had been calculated according to the formula given by [22]. Since there is no previous information in the area, 50% expected prevalence was considered. With absolute desired precision of 5% at 95% confidence interval have been used. Sample size was calculated using the formula.

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

Where, N= the sample size; P_{exp}= expected prevalence= desired absolute precision. By substituting these values in the formula, 384 cattle were required. But 740 cattle have been examined using random sampling method to increase the precision of the estimated prevalence of the lesions.

2.4 Data Management and Analysis

All data collected were stored in Microsoft excel spreadsheet for statistical analysis and were analyzed using statically package for social science (SPSS) software version (20.0) to determine the prevalence of gross lesion and associated risk factor within the variable. Degree of a Descriptive Statistics was used to determine the level of prevalence of pulmonary and hepatic lesion defined as proportion of lung and liver to the total number of cattle examined. Association between the variable and the distribution of observed lesion in slaughtered cattle was determined using Chi-square test at critical probability value of $p<0.05$.

3. Results

Of the total 740 cattle examined, 87.5% (648/740) of the cases were found positive for different pathological lesions on either lung/liver or both. The pulmonary and hepatic lesions were responsible for 397(53.6%) and 251(33.9%) cases, respectively.

3.1 Prevalence of Pulmonary Lesions

Among gross pulmonary lesions observed in the area emphysema 70 (9.5%) and congestion 65(8.8%) were the most frequently encountered lesion and abscesses were the least frequently observed lesion with the occurrence of 29 (3.9%). Mixed pulmonary lesions (two and above) were also observed with a rate of 6.5% (Table 2).

From the total of cattle examined (740), 156(56.3%) young adult, 185(51.68%) adult and 56(53.33%) old cattle were found positive for pulmonary lesion upon postmortem examination. High pulmonary lesions were encountered in

animals coming from lowland with a rate of 56.52%. High rate of pulmonary lesions were also encountered in animals with poor body condition 49(60.5%) (Table3).

The pulmonary lesion encountered during the study varies among different factors like age, origin and body condition of the animals. Accordingly, the highest prevalent lesion in animals with poor body condition was pulmonary Hydatidosis 13(16%); in animal with very good body condition were pulmonary congestion 18(13.7%), and Hydatidosis 9(13%). Based on the origin of the animals, pulmonary Hydatidosis 9(13%) from lowland, pulmonary congestion 37(11.2%) from midland and pulmonary emphysema 33(9.7%) from highland were frequently encountered lesions during the study period. In addition to this, the distribution of pulmonary lesion varies according to the age of the animals and the frequent lesion that was observed in young, adult and old animals were pulmonary congestion 26(9.4%), pulmonary emphysema 43(12%) and Hydatidosis 11(10.5%), respectively. The statistical analysis showed age and body condition of animals have a significant effect on the occurrence of pulmonary lesions (P<0.05). However, origin of the animals have no significant effect (P>0.05) (Table 4).

3.2 Prevalence of Hepatic Lesions

Of the gross hepatic lesions observed in the area fasciolosis 90(12.2%) and calcification 69(9.32%) were the most frequently encountered lesion and fibrosis were the least frequently observed lesion with the occurrence of 19 (2.6%). Mixed hepatic lesions (two and above) were also observed with a rate of 3.7% (Table 2).

From the total of cattle examined (740), 94(33.9%) young adult, 124(34.6%) adult and 33(31.42%) old cattle were found positive for hepatic lesions. High rate of hepatic lesions were encountered in animals coming from lowland with a rate of 52.2%. Animals with poor body condition was showed high rate of hepatic lesions (39.5%). The statistical analysis showed origin and body condition of animals have a significant effect on the occurrence of hepatic lesions (P<0.05). However, age of the animals have no significant effect (P>0.05) (Table 3).

Gross hepatic lesion encountered during the study varies among different factors (age, origin and body condition of the animals). The highest prevalent hepatic lesion in animals with poor body condition was fasciolosis 19(23.5%); in animal with very good body condition were calcifications 20(15.3%). The distribution of hepatic lesion variegate based on the origin of the animals. A high prevalence rate of fasciolosis 28(40.6%) and calcification 26(7.6%) were found in lowland. and highland respectively. In addition to this, the distribution of gross hepatic lesions varies according to the age of the animals and the frequent lesion that was observed in young adult, adult and old animals were lesion due to fasciolosiss 32(11.6%), 45(12.6%) and 13(12.4%) respectively (Table 4).

Table 1: Frequency and Percentage of Pulmonary and Hepatic Lesion

Number Of Cattle Examined	Organ With Lesion	Pathological Lesion	Frequency (%) Of Positive	Prevalence Rate (%)
740	397 Lung	Hydatidosis	50(12.6%)	6.8%
		Emphysema	70(17.6%)	9.5%
		Congestion	65(16.3%)	8.8%
		Abscess	29(7.3%)	3.9%
		Hemorrhage	47(11.8%)	6.4%
		Athelectasis	38(9.6%)	5.1%
		Calcified Nodules	50(12.6%)	6.8%
		Two And Above Lesions	48(12.1%)	6.5%
	251 Liver	Calcification	69(27.5%)	9.32%
		Fasciolosis	90(35.9%)	12.2%
		Hydatidosis	24(9.7%)	3.2%
		Abscesses	25(10%)	3.4%
		Fibrosis	19(7.7%)	2.6%
		Two And Above Lesion	24(9.7%)	3.7%

Table 2: Association of gross pathological lesions of lung and liver with the risk factors

Organ examined	Risk Factors	Variables	No. Animal Examined	No. (%) animal positive	X^2	P-Value
Lung	Age	<6year	277	156(56.3%)	27.511	0.036
		6-8year	358	185(51.68%)		
		>8year	105	56(53.33%)		
	Origin	Lowland	69	39(56.52%)	13.932	0.604
		Midland	331	178(53.8%)		
		Highland	340	180(52.9%)		
	Body Condition	Poor	81	49(60.5%)	48.706	0.002
		Medium	232	127(54.74%)		
		Good	296	154(52.03%)		
		Very Good	131	67(51.14%)		
Liver	Age	<6year	277	94(33.9%)	9.726	0.640
		6-8year	358	124(34.6%)		
		>8year	105	33(31.42%)		
	Origin	Lowland	69	36(52.2%)	90.819	0.000
		Midland	331	125(37.76%)		
		Highland	340	90(26.5%)		
	Body Condition	Poor	81	32(39.5%)	37.276	0.005
		Medium	232	61(35.67%)		
		Good	296	113(38.2%)		
		Very Good	131	45(34.4%)		

Table 4: Distribution of Pulmonary lesions with different categories of risk factors

Risk factors		Age			Origin			Body conditions			
		<6 yr	6-8yr	>8yr	Lowland	midland	highland	Poor	medium	good	v. good
No. of Animal Examined		277	358	105	68	331	340	81	232	286	131
Gross pulmonary l esions	Hydatidosis	24(8.7%)	15(4.2%)	11(10.5%)	9(13%)	19(5.7%)	22(6.5%)	13(16%)	18(7.8%)	12(4.2%)	7(5.3%)
	Emphysema	18(6.5%)	43(12%)	9(8.6%)	8(11.6%)	29(8.8%)	33(9.7%)	10(12.3%)	23(9.9%)	23(7.8%)	14(10.7%)
	Congestion	26(9.4%)	37(8.9%)	7(6.7%)	5(7.2%)	37(11.2%)	23(6.5%)	4(4.9%)	11(4.9%)	32(10.8%)	18(13.7%)
	Abscess	11(4%)	12(3.4%)	6(5.7%)	0(%)	13(3.95)	16(4.7%)	5(6.2%)	11(4.7%)	10(3.4%)	7(2.3%)
	Hemorrhage	22(7.9%)	19(5.3%)	6(5.7%)	4(5.8%)	20(6%)	23(6.8%)	6(7.4%)	13(5.6%)	21(7.1%)	5(5.3%)
	Athelectasis	19(6.9%)	14(3. 9%)	5(4.8%)	3(4.3%)	15(4.5%)	10(5.9%)	1(1.2%)	20(5.6%)	12(4.1%)	5(3.8%)
	CN*	12(4.3%)	29(8.1%)	9(8.6%)	6(8.7%)	23(6.9%)	21(6.2%)	3(3.7%)	14(6%)	22(7.4%)	22(8.4%)
	TA**	24(8.7%)	21(5.9%)	2(2, 9%)	4(5, 8%)	22(6.6%)	22(6.5%)	7(8.6%)	17(7.3%)	22(7.4%)	2(1.5%)

*CN, calcified nodules, **TA, two and above nodules

Table 5: The distribution of hepatic lesions with different categories of risk factors

Risk factors		Age			Origin			Body conditions			
		<6 yr	**6-8yr**	**>8yr**	**Lowland**	**midland**	**highland**	**Poor**	**medium**	**good**	**v. good**
No. Animal Examined		277	358	105	69	331	340	81	232	286	131
Gross hepatic lesions	Calcification	27(9.7%)	36(10.1%)	6(5.7%)	1(1.5%)	42(12.7%)	26(7.6%)	4(4.9%)	14(6%)	31(10.8%)	20(15.3%)
	Fasciolosis	32(11.6%)	45(12.6%)	13(12.4%)	28(40.6%)	47(14.2%)	15(4.4%)	19(23.5)%	21(9.1%)	39(13.6%)	11(8.4%)
	Hydatidosis	10(3.6%)	7(2%)	7(6.7%)	0(0%)	9(2.7%)	15(4.4%)	1(1.2%)	7(3%)	15(5.2%)	1(0.8%)
	Abscess	11(4.0%)	12(3.4%)	2(1.9%)	5(7.2%)	10(3%)	10(2.9%)	5(6.2%)	3(3%)	10(3.5%)	3(2.3%)
	Fibrosis	6(2.2%)	11(3.1%0	2(1.9%)	0(0%)	8(2.4%)	11(3.2%)	2(2.5%)	6(2.6%)	6(2.1%))	5(3.8%)
	TA*	8(2.9%)	13(3.6%)	3(2.85%)	2(2.9%)	9(2.7%)	13(3.8%0	1(2.6%)	6(2.6%)	12(4.1%)	5(3.8&)

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4. Discussions

The present study has revealed that a number of conditions/insults result in the development of gross pathological lesion in lung and liver. The overall prevalence of pulmonary lesions in this study was 53.6% which disagrees with that of [23] who reported 46.22% from Jimma municipal abattoir. In this study the prevalence of pulmonary lesions recorded (53.6%) was higher than that of 28% in Bahir Dar, 15.5% in Nekemite, 24.8% in Adama, 25.61% in Wolaita Sodo and 8.18% in Addigerat municipality abattoir [24, 25, 36, 27] and [28], respectively.

The most commonly encountered pulmonary lesions during postmortem inspection, in the present study, were Hydatidosis, Emphysema, Congestion, Abscess, Hemorrhage, Athelectasis, and Calcified Nodules: 6.8%, 9.5%, 8.8%, 3.9%, 6.4%, 5.1, and 6.8%, respectively. The present study revealed that the most frequently encountered pulmonary lesion were emphysema (9.5%) which is in agreement with the finding of [13] from ELFORA Gonder and [25] from Nekemite who reported a prevalence rate of 10.5% and 10.4%, respectively. This indicates that appropriate control measures were not taken in the study area. In addition, the variation with the present study may be due to agro ecology of the area, harsh climate change in the area, and different management practices. Some diseases are endemic to specific agro ecology where the causative agent or its intermediate host may find favorable conditions.

In this study, the rate of infection leading to pulmonary lesions varied significantly (p<0.05) with age of animals. While the highest percentage of pulmonary emphysema was encountered in adult (12%) followed by older cattle (8.6%). This finding was comparable with the finding of Gebrehiwot *et al*., who reported highest percentage of pulmonary emphysema in cattle greater than seven years of age, which may be due to long term exposure of the animals to different etiologic factors. Moreover, this result showed that the occurrence of pulmonary lesions more significantly depend on age and body condition of animal. However, the Origin of animal has no significant effect (p>0.05). Calcified nodules 15(13.7%) and pulmonary emphysema 10(12.3%) were frequently recorded pulmonary lesions among animal with very good and poor body condition, respectively, which might be due to, improper feeding practice, or injury occurred during slaughtering and improper bleeding.

Because of their anatomical and histological characteristics, lungs are perhaps the organs most exposed to physical, chemical and biological injuries. This is supported by the findings of the current study, which revealed that 53.6% of gross pathological lesions were from lungs. This was higher than the results obtained in Tanzania by [13]. Pulmonary emphysema accounts 17.6% of the gross lesion of lungs examined. Ruminants, particularly cattle, have well-developed interlobular septa and lack of collateral ventilation, making them more susceptible to interstitial emphysema. Pulmonary emphysema is associated with diseases, and it may also be caused by obstruction of air flow or by extensive gasping respiration during the slaughter process [21]. Improper stunning, delayed slaughter after stunning and delayed hoisting after slaughter may also have contributed to the high number of lungs with emphysema [30]. Exposure of animals to stress factors like dust, overcrowding and exhaustion from long treks in search of pasture and water during the dry season may also contribute to respiratory conditions [31].

Body condition of the animals have a significant effect on the distribution of pulmonary lesion. In this study, higher rate of pulmonary Hydatidosis (16%) were recorded in animal with poor body conditions which is in agreement with that of [32] who reported a prevalence rate of 15.2% in Birre Sheleko and Dangila municipality abattoir. The report (16%) by [33] from Wolaita Sodo municipality abattoir is in line with the present finding.

Similarly, from the total of 740 cattle slaughtered in Gondar ELFORA abattoir, hepatic lesions were encountered in 251(33.9%) animals. The finding of the present study is in agreement with that of [13] who reported a prevalence of 34.23% from the same area. The present finding strongly

disagrees with the finding of [34] from Jimma municipality abattoir, [24] from Bahirdar, [35] from Kombolcha, 64.44%, 91.7% and 66.06%, respectively. However, it is significantly higher than that of [28] from Adigrat and [26] from Adama Municipal abattoir, who reported a prevalence rate of 17.58% and 25.7% respectively. This difference in the prevalence of the disease among abattoir may be due to the agro ecology of the area, climatic difference, between the region in which the abattoir located and different cattle management system.

Out of the total liver examined, the major gross hepatic lesion observed were hepatic fasciolosis, calcification, Hydatidosis, fibrosis, and abscesses, (12.2%), (9.3%), (3.2%), (2.6%), and (3.4%), respectively. Among this the most and least frequently recorded hepatic lesions were hepatic fasciola 90 (12.2%) and hepatic fibrosis 19(2.6%), respectively. This is in line with the finding of [26] who reported a prevalence rate of 9.26% for fasciola and 2.01% for fibrosis from Adama municipality abattoir.

The present study also showed the effect of origin and body condition of the animals on the occurrence of gross hepatic lesions. Thus, higher prevalence of hepatic lesions were encountered in animal which were brought from high lands and cattle with good body conditions. This may be hepatic disease are area specific and animal with good body condition are mostly affected by disease like metabolic disease.

This study also revealed that Hydatidosis was more prevalent in lung (16%) in animal with poor body conditions than liver (6.7%). This is due to nature of lung (relatively softer consistency), presence of greater capillary peds and reduced immunological compatibility of the host which allows easier development of cystic lesion [35].

5. Conclusions and Recommendations

Generally, the observation made on the present investigation clearly proved that gross lesion and its association with basic epidemiological risk factors like age, origin and body condition. Both pulmonary and hepatic lesions arises from different causes. Among most frequently encountered pulmonary lesion; Hydatidosis and emphysema in lung have shown an increasing pattern across origin and body condition. Hepatic fasciolosis and calcification were also the main problems at Gondar ELFORA abattoir. Age and body condition of the animals have also a significant effect on the distribution of hepatic lesion. These lesion and disease condition are major problem that leads to rejection of lung and liver in the area due to public health and aesthetic reason. Therefore, based on the above conclusive statement the following recommendations are forwarded.

- Different strategies and approach should be taken to minimize these problems due to the dynamic nature of the diseases.
- Further study should be performed on lesions associated with harsh climate change in the area and its effect on the epidemiology of animal disease
- Valuable attitude and awareness should be created to animal trader, buchermen and owner to alleviate the likelihood of lesion by management problem, handling and default during the slaughtering operation in the abattoir.
- Good meat inspection and better livestock management system should be go in a long way to reduce the problem.
- Researcher in Ethiopia must give attention in identifying of cattle diseases and understanding of their epidemiology for effective prevention of disease and to improve production and productivity.
- Histopathlogical characterization of lesion should be performed to know the root cause and subsequently to reduce the likelihood occurrence of the problems.

6. References

1. Otte J, Knips V. Livestock Development for Sub-Saharan Africa, SSA, Pro-Poor Livestock Policy Initiative program, USD., 2005.
2. MOI. Export products of Ethiopia. Press release of Ministry of information, department of press and Audio visual. Addis Ababa, 2005.
3. IGAD. Livestock Policy Initiative. Working paper, 2008; 7:02-11.
4. Kebede W, Hagos A, Girma Z, Lobago F. Echinococcosis/hydatidosis: its prevalence, economic and public health significance inTigray region, North Ethiopia. Tropical Animal health Production. 2009; 41:865-875.
5. Cadmus SIB, Adesokan HK. Causes and implications of bovine organs/offal Condemnations in some abattoirs in Western Nigeria. Tropical animal health production. 2009; 4:1455-1463.
6. Vegard, Katiyar A. Text book of veterinary systemic pathology, VIK, Publishing house Private L.T.D. New Delhi, India, 1998.
7. Berhe G, Kassahun B, Gebrehiwot T. Prevalence and economic significance of fasciolosis in cattle in Mekelle area of Ethiopia. Tropical animal health production, 2009.
8. Raji MA, Salami SO, Ameh JA. Pathological conditions and lesions observed in slaughtered cattle in Zaria abattoir. Journal of Clininical Pathology and. Forensic Mededicine. 2010; 1(2):9-12.
9. Megersa B, Tesfaye E, Regassa A, Abebe R, Abunna F. Bovine cysticercosis in cattle slaughtered at Jimma municipal abattoir, South Western Ethiopia: Prevalence, cyst viability and its socio-economic importance. Vet World, 2010; 3:257-262.
10. Megersa B, Tesfaye E, Regassa A, Abebe R, Abunna F. Bovine cysticercosis in cattleslaughtered at Jimma municipal abattoir, South Western Ethiopia: Prevalence, cyst viabilityand its socio-economic importance. Vet World, 2010; 3:257-262.
11. Abunna FS, Fentaye B, Megersa A, Regassa. Prevalence of bovine hydatidosis in Kombolcha ELFORA abattoir, North Eastern Ethiopia. Open J Anim Sci. 2012; 2:281-286.
12. Aragaw KY, Negus Y, Denbarga S. Fasciolosis in slaughtered cattle inAddis Ababa Abattoir, Ethiopia. Global Vet., 2012; 8:115-118.
13. Genet M, Guadu T, Bogale B, Chanie M. Pathological conditions causing organ andcarcass condemnation and their financial losses in cattle slaughtered in Gondar, northwest Ethiopia. African journal of basic applied science. 2012; 4:200-208.
14. Terefe D, Kebede K, Beyene D, Wondimu A. Prevalence and financial loss estimation of hydatidosis of cattle slaughtered at Addis Ababa abattoirs enterprise. J Vet Med Anim Health. 2012; 4:42-47.
15. Tembo W, Nonga HE. A survey of the causes of cattle organs and/or carcass condemnation, financial losses and magnitude of foetal wastage at an abattoir in Dodoma, Tanzania, Onderstepoor, 2015.
16. Assefa A, Tesfay H. Major causes of organ condemnation and economic loss in cattle slaughtered at Adigrat

municipal abattoir, northern Ethiopia. Vet. World, 2013; 6:734-738.
17. Tsedeke Kocho, Enderias Geta. Agro ecology maping of livestock system in small holdercrop livestock mixed farming of wolaita and dawurodisterictes,southern Ethiopia. Livestoch Reaserch for Rural Development. 2011; 23:21.
18. Delahunta A, Habel RE. Applied Veterinary Anatomy. W.B.Sounders Company, U.S.A, 1986, 4-16.
19. Pace JE, Wakeman DL. Determining the age of cattle by their teeth. CIR253. Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences. University of Florida, Gainesville, FL., 2003.
20. Nicholson MJ, Butterworth MH. A guide to condition scoring of zebu cattle. International livestock center for Africa, Addis Ababa, Ethiopia, 2009.
21. FAO. Manual of Meat Inspection for Developing Countries. Animal and Health Production Papers Food and Agriculture Organization of the United Nations Rome. Italy. 1994, 5-9.
22. Thrusfeild M. Veterinary Epidemiology. 2nd Edn. Blackwell Science Ltd., Oxford, UK., 2005, 182-198.
23. Amene F, Eskindir L, Dawit T. The Cause, Rate and Economic Implication of Organ Condemnation of Cattle Slaughtered at Jimma Municipal Abattoir, Southwestern Ethiopia.DVM Thesis, Hawassa University, School of Veterinary Medicine, Hawassa, Ethiopia, 2012.
24. Amuamuta A, Akalu B, Chanie M. Major causes of lung and liver condemnation and financial impact in cattle slaughter at Bahir DarMunicpial Abattior. Afr. J Basic Applied Sci. 2012; 4:165-171.
25. Nebyuu M, Debela A, Solomon K, Tesema T, Fanta D, Alemayeu R. Major organ and carcass condemination in cattle slaughtered at nekemite municipality abattoir,east Wolega, Ethiopia, 2013.
26. Mahindra P, Jatenie JE, Rahman TM. Investigation of major in to Major cause of organ condemnations in bovine slaughtered at Adama municipality abattoir and their economic importance, East Wolega, Ethiopia, 2014.
27. Fufa A, Debele H. Major Cause of Organ Condemnation for Cattle and Its Financial Impact at Wolaita Sodo Municipality Abattoir, Southern Ethiopia, 2013.
28. Alembrhan A, Haylegebriel T. Major causes of organ condemnation and economic loss in cattle slaughtered at Adigrat municipal abattoir, northern Ethiopia. Veterinary World 2013; 6(10):734-738.
29. Tembo W, Nonga HE. A survey of the causes of cattle organs and/or carcass condemnation, financial losses and magnitude of foetal wastage at an abattoir in Dodoma, Tanzania, Onderstepoor, 2015.
30. Kusiluka LJM, Kambarage DM. Diseases of small ruminants in sub-Saharan Africa: A handbook on common diseases of sheep and goats in sub-Saharan Africa, VETAID, Roslin, 1996.
31. Kebede N, Gebre-Egziabher Z, Tilahun G, Wossene A. Prevalence and financial effect of Hydatidosis in cattle slaughtered in Burre Sheleko and Dangela municipal abattoir, north western Ethiopia. Zoonosis and public health. 2011; 58:41-46.
32. Nigatu K, Habetamu M, Abebe W, Getachew T. Hydatidosis of slaught ed cattle in Wolaita Sodo abattoir, southern Ethiopia, 2009. tropical animal health production DOI:10.1007/11250-008-2964-9.
33. Fekadu A, Eskindir L, Dawit T. The Cause, Rate and Economic Implication of Organ Condemnation of Cattle Slaughtered at Jimma Municipal Abattoir, Southwestern Ethiopia. Global Veterinaria 2012; 9(4):396-400.
34. Mohammed N, Hailemariam Z, Mindaye S. Major Cause of Liver Condemnation and Associated Financial Loss at Kombolcha Elfora Abattoir, South Wollo, Ethiopia. European Journal of Applied Sciences. 2012; 4(4):140-145.
35. Hubbert WT, Culoch WF, Selnurronberger AA. Diseases transmitted from animal to human. 6th edition, Chorler C, Thomas publisher, Spring Field, Illinosis, U.S.A, 1975, 682-692.