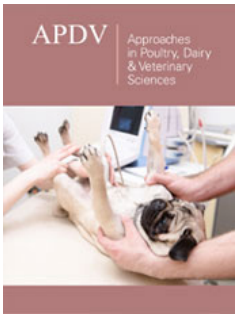
Crimson Publishers
Wings to the Research

Mini Review

Major Cause of Organ Condemnations and their Economic Loss at Different Municipal Abattoirs and Export Abattoirs in Ethiopia

ISSN: 2576-9162



Addis Fikrie* and Elfinesh Bekele

Beef Cattle, Camel and Small Animals Meat Product Research and Processing Industry Development Directorate, Ethiopia

Abstract

This study was conducted to determine the major cause's organ Condemnations and their economic loss in municipal and export abattoirs in Ethiopia. Across sectional and a retrospective abattoir survey was conducted at municipal and export abattoirs respectively. The highest liver, heart, and tongue condemnation was at Legatafo and Sandafa, Welkite and Holeta respectively. Lung condemnations were highest at Addis Ababa Abattoirs enterprise, Adama, Modjo, and Bishoftu whereas the highest kidney was at Jimma, Adama, Modjo, and Bishoftu municipal abattoirs. Accordingly, out of 35,044 cattle slaughtered at 25 municipal abattoirs, 61.16% liver, 52.87% lung, 29.31% kidney, 8.57% heart, 15.36% tongue, and 99.4% spleen were condemned due to gross abnormalities. Similarly, from a total of 1,293,576 sheep and goat slaughtered at two export abattoirs 0.05% head, 0.02% heart, 0.08% kidney, 20.53% liver, and 3.59% lung was condemned due to different diseases.

The major cause of liver, kidney, heart, lung, tongue, and spleen condemnations at municipal abattoirs were calcification (29.41%), decrease in size (27%), pericarditis (29.41%), pneumonia (33.33%), Cysticercus bovis (44.44%) and spleen legali (38.80%), respectively. Likewise, at two export abattoirs, the main cause of Head, kidney, heart, liver, lung, tongue, and spleen condemnations was 70.9 % pericarditis, 44.62 % kidney, 39.80 % pericarditis, 28.20 % liver fluke, 51% pneumonia, 92.86% and 100% Cysticercus bovis in the same order. The total economic loss due to organ combinations was 25,633,595 for municipal abattoirs and 585,547 ETB for export abattoirs in the study area. Strict or proper organ inspection, a proper way of disposing or incineration, introducing rendering plant, Regular deforming of cattle and shoat with anti-helminths, grazing management, Strong linkage between offal processing company and municipal abattoirs should be practice in order to reduce organ condemnations and their economic loss at different municipal and export abattoirs.

Keywords: Organ; Condemnations; Municipal; Export; Abattoirs; Economic loss

***Corresponding author:** Addis Fikrie, Elfinesh Bekele, Major Cause of Organ Condemnations and their Economic Loss at Different Municipal Abattoirs and Export Abattoirs in Ethiopia

Submission: July 30, 2021

Published: August 26, 2021

Volume 8 - Issue 3

How to cite this article: Addis Fikrie. Major Cause of Organ Condemnations and their Economic Loss at Different Municipal Abattoirs and Export Abattoirs in Ethiopia. Appro Poult Dairy & Vet Sci 8(3). APDV. 000690. 2021.
DOI: 10.31031/APDV.2021.08.000690

Introduction

Ethiopia is a home for many livestock species and believed to have the largest livestock population in Africa. The country has 59.5 million heads of cattle, 30.70 million heads of sheep and 30.20 million heads of goats, 56 [1]. The contribution of Agriculture, Industry and Service sector to Ethiopian gross domestic product was 33.88%, 24.77% and 36.87% respectively [2]. The foreign currency rose from 2,747.1 million USD in 2010 to 2,666.2 USD in 2018. The Agricultural products share raised from 70.8% to 78.7% while the manufacturing sector growth from 9.2% to 17.1% in the same physical year. Other shares are from mine and other products [3].

The contribution of meat and meat by-products export to GDP is growing but not to its potential as it is observed in a number of reports [4]. There are more than 300 local abattoirs which slaughter mostly cattle and in rare case sheep for local consumption. The abattoirs located at different parts of the country with different capacity and slaughter facilities.

Addis Ababa abattoir enterprise, Adama, Burayou, Sululta, lege dadhi and Hawasa municipal abattoirs are slaughter huge number of cattle each year. The primary aim of the abattoir is to produce healthy meat, wholesome and clean products which are safe for human consumption [5]. Besides, abattoirs provide information on the epidemiology of diseases on livestock and to know to what extent the public is exposed to certain zoonotic diseases [6]. The significant financial losses in different abattoirs in Ethiopia was due to death of animals, inferior wet gain, condemnations of organs and carcass at slaughter during meat inspection. This production loss to the livestock industry is estimated at more than 900 million USD annually [7,8]. Additionally, losses from offal's are due to skills and knowledge gap in value addition to utilize slaughterhouse inedible by product, lack of buyers and un expansion of rendering plant. The losses have a significant financial impact on the abattoirs income and forced the abattoirs to incurred additional cost for the disposal. More ever it has a significant economic loss as a country in utilizing of offal resource for the sustainable growth of meat industry.

Several studies have been conducted through abattoir survey to determine economic loss resulting from organ condemnation in many abattoirs of Ethiopia [9]. However, all studies focused on a single abattoir which did not shows full and organized condemnations of organs in Ethiopian local abattoirs. Hence this research was conducted to identify the major causes of organ condemnations and their economic loss in cattle slaughtered at different municipal and export abattoirs in Ethiopia.

Materials and Methods

Study area

The study was conducted at different municipal and export abattoirs that located at Oromia, Amahara, Addis Ababa and southern nations nationalities and peoples' regional state. The Latitude and Longitude of Oromia, Amhara, Addis ababa and Southern nations nationalities and peoples' region are 7° 59' 20.62" N & 39° 22' 52.25" E, 11° 30' 0 N & 38° 30' 0 E, 8.9806° N & 75.0814° W 38.7578° E, 6°03'31.03" N and 36° 43' 38.28" E respectively. The four-region classified under climatic zones of Dega, Weyna Dega and Kolla.

Study animals

The study animals are cattle for municipal abattoirs, sheep and goat for export abattoirs that slaughtered at abattoirs. The animals originated from different district of the regions.

Study types

Across sectional abattoir survey was conducted by reviewing veterinary records based on at total of 35,044 cattle slaughtered at 25 municipal abattoirs from September 2019 to August 2020 while retrospective abattoir survey was used for export abattoirs based on a total of 1,293,576 sheep and goat slaughtered at two export abattoirs from 2017-2018.

Assessment of economic loss

At municipal abattoirs the price of each organ was different but on average the price of liver, heart, kidney, lung and tongue was 54, 41, 40, 37, and 36 birr per animal respectively. At both export abattoirs the average weight of Head, Heart, both kidney, Liver, Lung, Tongue and Spleen kg of sheep and goat were 0.1, 0.17, 0.14, 0.5, 0.65, 0.13 and 0.05 in their order. The local selling price of head (0.09 ETB), Heart (1.81 ETB), Kidney (0.14 ETB), liver (1.74 ETB), lung (0.87 ETB), tongue (3.39 ETB), spleen (17.82 ETB) per pieces at export abattoirs. Based on this information, the Economic loss due to condemnation was calculated by the following formula.

Annual economic loss of each organ condemned (liver, lung, kidney, Heart, Tongue and Spleen)=number of each organ condemned annually x average price each organ

Total annual economic loss= AELL+AELLU+AELH+AELT+AELS

Where, AELL= Annual economic loss of liver condemned

AELLU= Annual economic loss of Lung condemned

AELH= Annual economic loss of Heart condemned

AELT= Annual economic loss of Tongue condemned

AELS= Annual economic loss of Spleen condemned

4.5. Data management and analysis

The Collected data were recorded on in Microsoft excel 2016 and analyzed by statistical software, SPSS version 23. Descriptive statistics was used to determine the condemnation rate of each organ, defined as proportion of each organ condemned to the total number of that particular organ examined.

Result and Discussion

Organ condemnations at different municipal abattoirs

Liver condemnations were highest at lega tafo and sendafa where 95% of liver were condemned from cattle slaughtered at each abattoir (Table 1). At Addis Ababa Abattoir enterprise, Ejere and Debre Markos municipal abattoirs liver condemnations were also higher (85% for each). At Sebata, Ginchi, Modjo, Bishoftu and Sululta 80 % of liver were condemned from each cattle slaughtered in similar way. The lowest liver condemnations (5% each) were found at welkite and Butajira municipal abattoirs.

Lung condemnations were at highest at Addis Ababa Abattoir enterprise, Adama, Modjo, Bishoftu and Jimma which account 75% for each municipal abattoir while the lower (5.50 % & 6 % respectively) was at Hawasa and Sebata abattoirs. There were no lung condemnations were recorded at Holeta and Burayu slaughterhouse.

Heart condemnations were highest (51%) at Welkite and lowest (0.85%) at Teji abattoirs. Waliso and Butajira abattoirs also had lower percentage (1% each) of heart condemnations. On other hands, there was no heart condemnations record was found at Ejere, Holeta and Burayu abattoirs.

Higher Lung condemnations (75% for each) were found at Adama, Modjo Bishoftu and Jimma Municipal abattoirs while lower condemnations were documented at welkite, waliso and teji which account 6.5% ,4% and 3.43% in their order. There were no condemnations of lung at Holeta and Debre markos abattoirs.

Tongue condemnations were highest (44.74%) at Holeta abattoirs and almost lower at all municipal abattoirs. Most of spleen obtained from all municipal abattoirs were condemned whether it is health or not without any use.

Table 1: Organ condemnations at different municipal slaughterhouse in Ethiopia (n=335,044).

		Liver	Kidney	Heart	Lung	Tongue	Spleen
S. N	Municipal Abattoirs	cond (%)	cond (%)	cond (%)	cond (%)	cond (%)	cond (%)
1	Welkite (n=800)	400(5)	3200(40)	4080 (51)	520(6.5)	1080(12)	8000(100)
2	Waliso (n=100)	108(9)	396(33)	12(1)	48(4)	12(1)	1200(100)
3	Teji (n=1400)	108(8)	270(19)	12(0.85)	48(3.43)	12(0.85)	1400(100)
4	Sebeta (n=6600)	5,280(80)	396(6)	12(18)	360(5.45)	12(0.18)	6,600(100)
5	Addis Ababa (n=54000)	45,900(85)	40500(75)	8100(15)	13500(25)	2700(5)	34,000(62.96)
6	Ginchi (n=2160)	1,728(80)	540(25)	604(28)	432(20)	216(10)	2,160(100)
7	Ejere (n=4500)	3,825(85)	900(20)	0	900(20)	259(12)	4,500(100)
8	Holeta (n=5400)	4,272(79)	0	0	0	2400(44.74)	5,400(100)
9	Burayu (n=144,000)	24,816(17)	0	0	19140 (13.29)	0	144,400 (100)
11	Adama (n=10,800)	8,100(75)	8100(75)	1620(15)	8100(75)	1080(10)	10,800(100)
12	Modjo(n=5075)	4,060(80)	3806(75)	761(15)	3806(75)	659(13)	5,075(100)
13	Bishoftu (n=7700)	6,160(80)	5775(75)	1155(15)	1155(75)	1540(20)	7,700(100)
14	Dukem (n=5400)	2,500(46)	700 (13)	300(6)	1500(29)	100(0.02)	5,400(100)
15	Gelan (n=1222)	635(52)	109 (9.5)	85(7)	586(48)	183(15)	1,222(100)
16	Sululta (n=35,314)	28,251(80)	3531(10.48)	53(0.15)	14125(40)	2118(6)	35,314(100)
17	Lega tafo (n=36000)	34,200(95)	7200(20)	5400(15)	25200(70)	1800(5%)	20,000(55.56)
18	Sendafa (n=2268)	2,148 (95)	468(21)	336(15)	1596(70)	120(5%)	1932(85.19)
19	Fiche (n=2160)	432(20)	432(20)	259(12)	432(20)	108(5)	540(25)
20	Butajira (n=9000)	450(5)	4320(48)	90(1)	58500(6.5)	1080(12)	9,000(100)
21	Bahirdar (n=3085)	2,570(83)	144(20)	144(20)	144(20)	0	3085(100)
22	Debre markos(n=4680)	3,978(85)	3603(77)	1825(39)	0	702(15)	4,680(100)
23	Chancho (n=2880)	576(20)	576(20)	432(15)	576(20)	144(5)	2,880(100
24	Jimma (n=16200)	13,122(81)	12150(75)	2430(15)	12150(75)	648(4)	16,200(100)
25	Hawasa (20,000)	11,300(56)	1100(5.50)	1000(5)	14305(72)	1000(5	2040(10.20)
	Total	204,919	98,216	28,710	177,123	17,973	333,128

Cond-Condemnation

Cause of organ condemnation and rejection rate at municipal abattoirs

Table 2: Cause of organ condemnation and rejection rate at municipal abattoirs.

Organs	Causes	Number condemned (%)	Condemnation rate (%)
Liver	Cirrhosis	12054 (5.88)	3.6
	Faciola	48216 (23.53)	14.39
	Distomatosis	12054 (5.88)	3.6
	Calsification	60270 (29.41)	17.99
	Contamination	12054 (5.88)	3.6
	Discoloration	12055 (5.88)	3.6
	Hydatid cyst	36162 (17.65)	10.79
	Hemorrhage	12055 (5.88)	3.6
	Total	204918	61.16
Kidney	Pus accumulation	19643 (20)	5.86
	Hydatid cyst	6548(7)	1.95
	Stone	6548(7)	1.95

	Decrease in size	26191 (27)	7.82
	Color change	13095 (13)	3.91
	Abscess	13095 (13)	3.91
	Emphysema	6548(7)	1.95
	Nephratitis	6548(7)	1.95
	Total	98216	29.31
Heart	Chodosis	1689 (5.88)	0.5
	Cystcercus bovis	5066 (17.65)	1.51
	Hydropercardium	3378 (11.77)	1.01
	Abscess	3378 (11.77)	1.01
	Pericardiatisis	8444 (29.41)	2.52
	Hydatidiosis	6755 (23.53)	2.02
	Total	28710	8.57
	Hydra cyst	29521 (16.67)	8.81
Lung	Pneumonia	59041 (33.33)	17.62
	Hepatit	14760 (8.33)	4.41
	Emphysema	29521 (16.67)	8.81
	Discoloration	29522 (16.67)	8.81
	C.bovis	14759 (8.33)	4.41
	Total	177123	52.87
	Cystcercus bovis	7988 (44.44)	2.38
Tongue	wounded tongue	3994 (22.22)	1.19
	Pamplona	1997 (11.11)	0.6
	hydatid cyst	3994 (22.22)	1.19
	Total	17973	5.36
Spleen	Inflammation	53967 (16.2)	16.11
	Hyda cyst	79951(24)	23.86
	Spleen legali	129254 (38.80)	38.58
	Hemorrhage	69957(21)	20.88
	Total	333,128	99.43

Out of 335,044 cattle slaughtered 204,919 (61.16%) liver, 177,123 (52.87%) lung, 98,216 (29.31%) kidney, 28710 (8.57%) heart, 17973 (5.36%) tongue and 333,128(99.4%) spleen were condemned due to gross abnormalities and found to be unfit for domestic markets and human consumption (Table 2). According to this study the common organ condemnations encountered on liver were 60270 (29.41%) calcification, 48216 (23.5%) Faciolosis, 36162(17.6%) Hydatidcyst, 12054 (5.88%) Distomatosis, discoloration, contamination, cirrhosis, and hemorrhage for each disease. Heart was condemned due to Pericardiatisis 8444 (29.41%), hydatidiosis 6755 (23.53%), C. bovis 5066 (17.65%), hydropercardium and abscess 3378 (11.77% for each).

Lesions encountered on kidney were 26191 (27%) decrease in size, 19643 (17.6%) Pus-accumulation, 13095(11.8%) Color change & abscess, and 6548 (5.9 %) stone, hydatid cyst, emphysema and nephritis. Lung was rejected due to pneumonia 59041 (33.33%), Hydatid cyst, emphysema and discoloration 29521 (16.67%), hepatitis and C.bovis 1459(8.33%) for each.

Tongue condemnations was due to Cystcercus bovis 7988 (44.44%), wounded tongue and Pamplona each 3994 (22.22%) and hydatid cyst 1997 (11.11%) while most of spleen were condemned due to spleen legali 129,254 (38.8%) and Hyda cyst 79951(24%).

The liver, lung, kidney and spleen condemnation rate at different municipal abattoirs in current study was higher than condemnation rate reported by Fatuma [10] 44.5%, 35.7%, 6.5% and 9.4% respectively at Hawasa municipal abattoirs but similar in terms of heart, and tongue condemnation. All organ condemnations rate in current study were higher than condemnations rate reported by Eyob et al. [11].

Other offal condemnations due to lack of buyers

All of Head, leg bone and intestine obtained from all bovines slaughtered at local/municipal abattoirs were condemned due to lack buyers for these products. The service user or local abattoirs did not utilize these products, but they provide freely to labor of the abattoirs in order to sell to surrounding community of low income.

Economic loss due to condemnation at municipal abattoirs

Liver and lung had higher rejection rate which is 61.16% and 52.87% respectively than kidney (29.31%), heart (8.57%) and

tongue (5.36%). Most of spleens obtained from municipal abattoirs were rejected. Due to such rejection the annual financial loss in present study was 25,633,595 ETB (Table 3).

Table 3: Assessment of direct economic loss (n=335,044).

Types of organs	Number Condemned	Rejection rate (%)	Average unit price(ETB)	Annual loss (ETB)
Liver	204,919	61.16	53.54	10,971,363
Lung	177,123	52.87	37.05	6,562,407
Kidney	98,216	29.31	40.8	4,007,219
Heart	28,710	8.57	39	119,690
Tongue	17,973	5.36	35.7	641,636
Spleen	333,128	99.4	10	3,331,280
Total				25,633,595

Condemnation rate, causes and economic loss of organs at export abattoirs condemnation

The condemnation rate, cause and its associated economic loss in sheep and goat at Luna and Elfora Debre Zeit export abattoir are depicted in Table 1.

The condemnation rates

Out of a total 1,202,988 sheep and goat slaughtered at Luna export abattoirs, 660(0.05%) head, 270 (0.02%) heart, 990 (0.08%) kidney, 246,924(20.53%) liver, 43212(3.59%) lung, 12(0.00%) and 30(0.00%) was condemned due to different disease. At Elfora debre zeit Export abattoirs out of 90,588 slaughtered sheep and goat, 132 (0.15%) Heart, 4496(4.96%) kidney, 51822(57.1%) liver, 51822(32.81%) lung, 44 (0.0%) tongue was condemned but there is no condemnations of head and spleen was recorded. At both abattoirs the condemnations rate of liver and lung was higher than other organ. The condemnations rate of liver (57.1%), lung (32.81%), kidney (4.96%) at Elfora debre zeit export abattoirs was higher than at Luna export abattoirs which is (20.53%) for liver, 3.59 % for lung and 0.08% for kidney. But other organs (Head, Heart spleen, Tongue) condemnations were almost similar at both abattoirs. The overall condemnation rate (95.18%) at Eflora debrezit export abattoirs was higher than condemnation rate (24.28%) at Luna export abattoirs. The present study revealed that liver had the highest (23.09%) total condemnation (rejection rate), then others organ followed by lung which is (5.64%).

Cause of organ condemnation

Table 4: condemnation rate, cause and its associated economic loss in sheep and goat at Luna and elfora debre zeit export abattoirs (2017-2018).

		Luna (n=1,202,988)			Elfora (n=90,588)			Total (n=1,293,576)		
Organ	Cause of condem nations	No of condemned (%)	Condem nation rate (%)	Financial loss (in ETB)	No of condemned (%)	Condem nation rate (%)	Financial loss (in birr)	no of conde mned (%)	Condemnation rate (%)	Financial loss (in ETB)
Head	Abscess	114 (17.3)	0.01	10.26	0	0	0	114 (17.27)	0.01	10.26
	C.bovis	78(11.8)	0.01	7.02	0	0	0	78 (11.82)	0.01	7.02
	peri carditis	468 (70.9)	0.04	42.12	0	0	0	468 (70.91)	0.04	42.12
	Nephritis	0	0	0	0	0	0	0	0	0
	H.nephrosis	0	0	0	0	0	0	0	0	0
	Pleuritis	0	0	0	0	0	0	0	0	0
	Total	660(100)	0.05	59.4	0	0	0	660 (100)	0.05	59.4
Heart	Abscess	84 (31.11)	0.01	152.04	4 (3.03)	0.01	7.24	88 (21.89)	0.01	159.28
	C.bovis	54(20)	0	97.74	12 (9.09)	0.01	21.72	66 (16.42)	0.01	119.46
	peri carditis	132(48.89)	0.01	238.92	28 (21.21)	0.03	50.68	160 (39.80)	0.01	289.6
	Live fluke	0	0	0	88 (66.67)	0.1	159.28	88 (21.89)	0.01	159.28
	Total	270 (100)	0.02	488.7	132(100)	0.15	238.92	402 (100)	0.03	727.62
kidney	hydra cyst	0.00	0	0	328 (7.30)	0.36	45.92	328 (5.98)	0.03	45.92
	Calcified. cyst	0.00	0	0	568 (12.63)	0.63	79.52	568 (10.35)	0.04	79.52
	Pneumonia	0.00	0	0	2448 (54.45)	2.7	342.72	2448 (44.62)	0.19	342.72
	Empayseama	0.00	0	0	980 (21.80)	1.08	137.2	980 (17.86)	0.08	137.2

	Abscess	198 (20)	0.02	27.72	4 (0.09)	0	0.56	202 (3.68)	0.02	28.28
	Nephritis	792(80)	0.07	110.88	104 (2.31)	0.11	14.56	896 (16.33)	0.07	125.44
	H.nephrosis	0	0	0	64 (1.42)	0.07	8.96	64 (1.17)	0	8.96
	Total	990 (100)	0.08	138.6	4496(100)	4.96	629.44	5486 (100)	0.42	768.04
liver	hydra cyst	36 (0.01)	0	62.64	2436 (4.70)	2.69	4238.64	2472 (0.83)	0.19	4301.28
	Hydra tid	72(0.03)	0.01	125.28	600 (1.16)	0.66	1044	672 (0.22)	0.05	1169.28
	Calcified. cyst	6966 (2.82)	0.58	12120.84	7156(13.81)	7.9	12451.44	14122 (4.73)	1.09	24572.28
	cyst tenculosis	56028 (22.69)	4.66	97488.72	6576 (12.69)	7.26	11442.24	62604 (20.96)	4.84	108931
	ST.hepatica	21108 (8.55)	1.75	36727.92	17016(32.84)	18.78	29607.84	38124 (12.76)	2.95	66335.76
	Cirrhosis	75834 (30.71)	6.3	131951.2	3180 (6.14)	3.51	5533.2	79014 (26.45)	6.11	137484.4
	Hepatitis	2076 (0.84)	0.17	3612.24	3936 (7.60)	4.34	6848.64	6012 (2.01)	0.46	10460.88
	Abscess	1410 (0.57)	0.12	2453.4	572 (1.10)	0.63	995.28	1982 (0.66)	0.15	3448.68
	Liver fluke	83364 (33.76)	6.93	145053.4	876 (1.69)	0.97	1524.24	84240 (28.20)	6.51	146577.6
	C.bovis	30 (0.01)	0	52.2	8 (0.02)	0.01	13.92	38 (0.01)	0	66.12
	Daistom	0.00	0	0	1812 (3.50)	2	3152.88	1812 (0.61)	0.14	3152.88
	Pneumonia	0.00	0	0	3864(7.46)	4.27	6723.36	3864 (1.29)	0.3	6723.36
	Empayseama	0.00	0	0	1904 (3.67)	2.1	3312.96	190 (0.64)	0.01	3312.96
	Pleuritis	0.00	0	0	1886 (3.64)	2.08	3281.64	1886 (0.63)	0.15	3281.64
	Total	246924 (100)	20.53	429647.8	51822	57.21	90170.28	298746 (100)	23.09	519818
Lung	hydra cyst	198 (0.46)	0.02	172.26	2904 (9.77)	3.21	2526.48	3102 (4.25)	0.24	2698.74
	Hydra tid	0.00	0.00	0	964 (3.24)	1.06	838.68	964 (1.32)	0.07	838.68
	Calcified. cyst	4608 (10.66)	0.38	4008.96	2816 (9.48)	3.11	2449.92	7424 (10.18)	0.57	6458.88
	cyst tenculosis	0.00	0.00	0	1288 (4.33)	1.42	1120.56	1288 (1.77)	0.1	1120.56
	ST.Hepatica	3852 (8.91)	0.32	3351.24	1590 (5.35)	1.76	1383.3	5442 (7.46)	0.42	4734.54
	Pneumonia	25308 (58.57)	2.1	22017.96	11884(39.99)	13.12	10339.08	37192 (51)	2.88	32357.04
	Empayseama	3414 (7.90)	0.28	2970.18	5904 (19.87)	6.52	5136.48	9318 (12.78)	0.72	8106.66
	Abscess	4716 (10.91)	0.39	4102.92	36 (0.12)	0.04	31.32	4752 (6.52)	0.37	4134.24
	Nephritis	1116 (2.58)	0.09	970.92	0.00	0	0	1116 (1.53)	0.09	970.92
	Cirrhosis	0.00	0	0	1062 (3.57)	1.17	923.94	1062 (1.46)	0.08	923.94
	Hepatitis	0.00	0	0	1190 (4)	1.31	1035.3	1190 (1.63)	0.09	1035.3
	Daistom	0.00	0	0	80(0.27)	0.09	69.6	80 (0.11)	0.01	69.6
	Total	43212 (100)	3.59	37594.44	29718	32.81	25854.66	72930 (100)	5.64	63449.1

Tongue	hydra cyst	0	0	0	0	0	0	0 (0.00)	0	0
	C.bovis	12 (100)	0	40.68	40 (100)	0	135.6	52 (92.86)	0	176.28
	Abscess	0	0	0	4 (9.09)	0	13.56	4 (7.14)	0	13.56
	Total	12(100)	0	40.68	44	0.05	149.16	56 (100)	0	189.84
Spleen	*C.bovis*	30 (100)	0	534.6	0.00	0	0	30(100)	0	534.6
	Total	30(100)	0	534.6	0.00	0	0	30 (100)	0	534.6
	Overall	292,098	24.28	468,504	86,212	95.17	117,042	378310	29.25	585,547

The main causes of sheep and goat head condemnations were peri carditis (70.9%), abscess (17.27%) and Cysticercus bovis (11.82%): (Table 4). Heart condemnations were due to peri carditis (39.80%), live fluke (21.89%) and abscess (21.89%). Main causes of kidney condemnations were pneumonia (44.62%) followed by emphysema (17.86%), Nephritis (16.33%), Calcified cyst (10.35%), abscess (3.68%), H.nephrosis (1.17%). In this study live fluke (28.20%), Cirrhosis (26.45%), cyst tenculosis (20.96%), ST. Hepatica (12.46 %), Calcified cyst (4.73%) were the major reason for liver condemnations. Lungs in sheep and goat condemned due to the following reason: Pneumonia (51%), emphysema (12.78%), Calcified cyst (10.18%), ST.Hepatica (7.46 %) and abscess (6.52%). The main gross pathological changes that cause tongue and spleen condemnations in this study were Cysticercus bovis. This study showed that peri carditis, pneumonia, Cirrhosis, Liver fluke hydra cyst, Cysticercus bovis were the major cause of shoat (sheep and goat) offal condemnation both at Luna and Elfora export abattoirs.

Economic loss of offal condemnations

Luna export abattoir losses 468,504 (ETB) due to condemnation of offal by different diseases while Elfora export abattoir losses 117,042 ETB. From a total of losses at Luna export abattoirs, higher loss which is 429,648 ETB was from liver and 37,594.44 ETB was from lung while lower losses which is 59.4 ETB from Head, 138.6 ETB from kidney,488.7 ETB from Heart and 534.6 from spleen. From a total of losses recorded at Elfora export abattoir, liver account 90,170.28 ETB, lung 25,854.66 ETB, kidney 629.44 ETB, spleen 149.16 ETB and Heart 238.92 ETB. Both of export abattoirs losses a total of 585,547 ETB due to condemnation. The higher losses were from liver (519,818 ETB) and lung (63449.10 ETB) while the lower was from the remains.

Major Challenges and Opportunities in the Study Area

Major challenges of offal resource utilization

Skills and knowledge gap in value addition to utilize slaughterhouse by product. Most municipal abattoirs have no rendering plant (Except Addis Ababa Abattoirs enterprise) in order to utilize slaughter by product (bone, head, fat and condemned organs) for producing bone and meat meal to supply as a raw materials for poultry feed producers. There were skills and knowledge gap to use such rendering plant in order to generate income.

Lack of offal market system

The offal's produced in municipal slaughterhouse were collected by butches, slaughterhouse and cooperative workers based on their agreement in order to sell to local market, other offal collectors and offal processing company. There are many illegal traders involved in offal market, supply chain and the destination were not well known. There is no rules and regulation to control the market and the sellers have not got well organized market information.

Inadequate training

Most of municipal abattoirs managed under regional town administration in which the meat inspection carried out by veterinarian regularly employed under the administration. Most of worker in slaughterhouse have not got adequate training on by product handling, utilization, marketing and hygiene and sanitation.

Lack of incineration

Condemned organs and other slaughter byproduct if not disposed properly they become a source of contamination and environmental pollution. Most of municipal abattoirs have no incinerators (except few) so that they disposed the condemned organs (liver, kidney, tongue, heart, lung spleen) and other offal's (intestine, head with horn, leg bone and hooves) to the abattoir environment and in some cases they burned traditionally. The regional city administration collects solid wastes (head, leg bone and hooves) in a few of municipal abattoirs in order to dispose in municipal solid waste disposal site.

Inconsistent (unsustainable) market

Penis, testicle, intestine, hooves and tail were collected by offal processing company (young tai offal processing company and Aksheker casing Ethiopia) from most of municipals abattoirs in previous time but know a days due diminishing in demand for these products in international market the offal processers were terminated their contrats in receiving these products.

Challenge of ethiopian municipal abattoirs

a) Inadequate slaughterhouse facility

b) Most of abattoirs were not modernized

c) Lack of cold room and deep freeze

d) Inadequate infrastructure (electric city, road)

e) Poor sanitation and hygiene.

f) Backward waste disposal system

g) Unstructured human power (some worker employed by municipal and others employed by service user).

h) Inadequate working budget-Regional town administration (municipals) allocated insufficient budget for the municipal slaughterhouse. This was bottle neck for un improvement of most municipal slaughterhouse.

i) Lack of delegated institutional support-Most of municipal abattoirs managed under regional town administration. Unlike of other institutions which support export sector (Garment, Leather, and Horticulture, Meat, food and phermatical), there were no institutions which provide technical support for the municipal slaughterhouse.

Opportunities to utilize offal resources

1. Establishment of offal processing and exporting company in Ethiopia.

2. Government institution support to strength market linkage between supplier and offal processing and exporting company.

3. Duty free offal processing machinery and chemical importation.

4. Nongovernmental organization technical and financial support on value addition

5. High number of bovine slaughtered each year at municipal abattoirs around Addis Ababa city.

Conclusion

This study revealed that calcification, fasciolos ,cirrhosis, pericardiatisis, hydatid cyst cysticercus bovis, liver fluke, pneumonia, empaysema, dscolouration, pus accumulation, abscess, decrease in size, nephrititis, cyst tenculosis spleen legali, and hemorrhage are the main reason for condemnations of organ at municipal and export abattoirs in the study area. This result in a big economic loss (25,633,395 ETB) per year at municipal abattoirs and less amount of loss (585,546 ETB) per year at Luna and Elfora debrezeit export abattoirs. Hence based on the above conclusion the following recommendation was forwarded:

1. Strict or proper organ inspection should be practice to reduce diseases impact on public health.

2. Condemned organ should be disposed or incinerated appropriately in such way not pollute environment.

3. Rendering plant should be introduced for value addition of condemned organ in order to reduce environmental damage or pollution.

4. Strong linkage between offal processing company and municipal abattoirs should be established in order to utilize the offal resource efficiently

5. Regular deworming of cattle and shoat with anti-helminthes and grazing management of animals to avoid access of animals to parasite eggs.

Acknowledgment

I acknowledged all municipal abattoirs and regulatory authority for providing all necessary data during my study.

References

1. Centeral Statstics Survey Agricultural Sample Survey (2016/2017) Report on Livestock and Livestock characteristics. Statistical bulletin Vol II: 585.
2. MOTI (2019) Ministry of trade and Industry ten years strategic plan, Addis ababa, Ethiopia.
3. Plecher H (2020) Share of economic sectors in the GDP in Ethiopia.
4. Tekeba E, Kelifa H, Tadesse T, Abebaw M (2018) Meat production, consumption and marketing tradeoffs and potentials in Ethiopia and its effect on GDP growth: a review. Journal of Nutritional Health & Food Engineering 8(3): 228-233.
5. Cadmus, SI and Adesokan HK (2009) Causes and implication of bovine organs/offal condemnations in abattoirs western Nigeria. Tropical Animal Health and Production 41(7): 1455-1463.
6. Jibat T, Ejeta G, Asfaw Y, Wudie A (2008) Causes of abattoir condemnation in apparently health slaughtered sheep and goats at Helmex abattoir, Debre Zeit, Ethiopia. Revue Vet Med 159(5): 305-311.
7. Abebe F, Yilma J (2012) Estimated annual economic loss from organ condemnation, decreased carcass weight and milk yield due to bovine hydatidosis (*Echinococcus granulosus*, Batsch, 1786) in Ethiopia. Ethiopian Veterinary Journal 16(2): 39-51.
8. Ezana G (2008) Major diseases of export-oriented livestock in export abattoirs in around Adalben Woreda, Debre Zeit, Faculty of veterinary medicine, Haramaya University, Ethiopia.
9. Miheret M, Biruk M, Habtamu T, Ashwani K (2013) Bovine hydatidosis in Eastern Part of Ethiopia. MEJS 5(1): 107-114.
10. Fatuma KH (2017) Effects of organ condemnation and the direct financial loss attributed to condemned organs in cattle. Global Journal of Veterinary Medicine and Research 5(6): 141-147.
11. Eyob H, Lati E, Biresaw S, Berhanu S (2015) Causes of organ condemnation, its public health and financial significance in Nekemte municipal abattoir, Wollega, Western Ethiopia. Journal of Veterinary Medicine and Animal Health 7(6): 205-214.