

The Major Causes of Organ and Carcass Condemnation and its Economic Significance in Cattle Slaughtered at Dilla Municipal Abattoir

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Abstract: Cross-sectional study was conducted from November 2017 to April 2018 at Dilla municipal abattoir. The aim of this study was to identify and determine the major causes of organ and carcass condemnation and to estimate financial losses attributed due to the condemned organs and carcass from cattle slaughtered in Dilla municipal abattoir. Ante mortem and post mortem inspection procedures were followed throughout the study period. Ante mortem inspection was carried out in the lairage and apparently healthy animals were selected, identified by giving identification numbers in accordance with simple random selection method and post mortem inspection conducted based on their identification numbers to detect gross abnormalities that prone to organ and carcasses to be rejected from human consumption. In the current study, a total of 400 cattle were examined. The study revealed that major causes of condemnation were due to fasciola and hydatid cyst, in both cases liver and lung respectively. Out of 263 organs were condemned 122 (46.4%), 113 (43%), 15 (5.7), 9 (3.4%) and 4 (1.5%) were liver, lung, tongue, heart and kidney respectively. In the cases of 122 liver condemned, 61 (50%), 41 (33.6%), 13 (10.7%) and 7 (5.7) were due to the fasciola, hydatid cyst, calcification and cirrhosis respectively. Out of 113 lung condemned were, 51 (45.1%) hydatid cyst, 50 (44.2%) congestion, 6 (5.3%) emphysema, 4 (3.6%) abscess and 2 (1.8%) edema. The annual loss due to the condemnation of organs from cattle slaughtered in the Dilla municipal abattoir was estimated at approximately 3,951.97 USD or 107,493.75 ETB. The result of this present study justify immediate need of prevention of various pathogen that causes organ and carcass condemnation and pathological abnormalities through development of animal health delivery, enforcement of slaughter policy and training of slaughter house personnel on standard slaughter operation.

Key words: Ethiopia • Cattle • Fasciola • Organ • Condemnation • Hydatid Cyst • Economic Loss

INTRODUCTION

Ethiopia has the largest livestock population in Africa with an estimated 49.3 million heads of cattle 46.9 million Sheep and Goats 7.77 million and 2.3 million camels [1]. However contribution from these huge livestock resource to the national income is disproportionately small, owing to several factors. Diseases are among the major obstacle in health production performance of livestock [2]. In the country great livestock potential is not properly exploited due to mainly prevailing socio-cultural value and altitude or traditional management system limited genetic potential governance policies and rampant diseases and parasitism representing major drawback of livestock potential in trophies [3].

Abattoir provide information on the epidemiology of diseases on the livestock to know what extent the public is exposed to certain zoonotic diseases and estimate the financial losses incurred through condemnation of affected organs and carcass [4, 5]. Therefore' data gathered on animals slaughtered at abattoir can be a convenient and in expensive sources of information [6]. This information records can be used by farmers to improve the husbandry of their animals [7] and probably avoid some losses related to preventable diseases. An abattoir or slaughter house as a building for butchering can be a sources of valuable information of the incidence of animal diseases and conditions, some of which were zoonotic [8]. It is a food factory whose primary aim is to produce healthy, wholesome

clean products which are safe for human consumption. Inadequate care of these food animals reduces their productivity and exposes them to different forms of disease agents, which may become hazardous to man and his environment [9].

In the country, there are different cases of organs and carcass condemnation. From these, reports of findings from abattoirs in various locations revealed that hydatidosis is widely spread in Ethiopia with great economic and health significance [10]. Liver condemnation occurs due to fasciolosis once ingested parasites migrate through the liver parenchyma to reach the bile ducts. Due to their migratory effect, the liver will be damaged and it will be condemned [11].

A thorough meat inspection procedure requires two steps. These are ante mortem and post mortem inspections. The importance of ante mortem inspection in the abattoir has long been recognized in an attempt to avoid the introduction of clinically diseased animals into the abattoir or slaughter house and should be done within 24 hours of slaughtering; if the process is delayed, secondary or repeated inspection should be done within a day [12,13].

The purpose of meat inspection, comprising of ante mortem and post mortem examination, is to remove gross abnormalities from meat and its products, prevent the distribution of contaminated meat that could result in zoonotic disease, and assist in the detection and eradication of certain diseases in livestock [5]. It is necessary to be aware of the extent to which the public is exposed to certain zoonotic diseases detected in abattoirs and the financial losses through condemnation of affected organs [4]. A proper ante mortem inspection of the animals makes the task of routine postmortem inspection simpler and a straightforward procedure [12]. Post mortem inspection is a process in which meat hygiene revolves since it provides information indispensable for the scientific evolution of clinical signs and pathological processes that affect the wholesomeness of meat [14, 12].

Therefore, the objectives of this study were to identify the major diseases that lead to carcass and organ condemnation of cattle slaughtered at Dilla municipal abattoir and to estimate the associated magnitude of financial loss due to condemnation.

MATERIALS AND METHODS

Study Area: The study was conducted at Gedeo Zone Dilla town municipal abattoir. Dilla is the administrative

and trading center of the zone located at a distance of 365km south of Addis Ababa, 90km from Hawassa and it has the mean annual rainfall of 1333.1mm, the mean annual temperature of 30.2°C and 6°24'30"N, 38°18'30"E of longitude and latitude respectively and 1570m above the sea level. The main highway that stretches from Addis Ababa to Moyale town (which borders the country with the northern Kenya) passes through Dilla town.

Study Type and Study Animals: The studied animals were the cattle that have been brought from Kebado and Wonago markets to Dilla town municipal abattoir for slaughtering purposes.

Sample Size Determination and Sampling Procedure: The total number of cattle required for the study was calculated based on the formula given by Thrusfield [15] for simple random sampling. By rule of thumb, where there is no information on an area, it is possible to take 50% prevalence to calculate the sample size using the following formula.

$$n = \frac{(1.96)^2 (P)(1-p)}{d^2}$$

where

n = Sample size

P = Expected prevalence

d = Desired level of precision (5%)

Study Methodology

Retrospection Study: Retrospective study has been taken based on data recorded in the last years; this information was not enough to determine the major causes of carcass and organ condemnation because there were no any researches done in the area about the whole abattoir work but they simply knew how many animals (Cattle) were slaughtered each year in the past.

Active Abattoir Survey

Ante Mortem Inspection (AMI): Pre-slaughter examinations of large ruminants (cattle) were conducted in the lairage. During AIM, various risk factors such as sex, body condition and market of animals were recorded with the proper recording number method. Ante mortem inspections were conducted on individuals, while animals were in the lairage. Animals were inspected while at rest or in motion. Moreover, the general behavior of the animals, nutritional status, cleanliness, signs of

diseases and abnormalities of any type registered according to the standard ante mortem inspection procedures [12], but in this study the latter was not done since it is impossible to know their origin of animals that bought from market and animals that were fit for human consumption would be allowed for slaughtering.

Detail Post Mortem Inspection (PMI): During post mortem inspection, evisceration has done. After evisceration liver, lung, heart, kidney, brain and carcass was thoroughly be examined by visual inspection, palpation and style mastic incision for the presence of cysts, adult's parasites and other abnormalities. Pathological lesion was differentiated and judged according to the guide lines on meat inspection for developing countries [16]. The results recorded and the decisions at post mortem was classified as fit for human consumption, conditional approved as fit for human consumption, totally condemned as the not fit for human consumption and partially condemned as fit for human consumption [17].

Economic Losses: Financial loss assessment has been done based on local market price of the carcass and organs.

The annual slaughter rate was estimated from retrospective abattoir record. The financial loss due to condemnation was estimated by the formula set by [18] Oganrinade and Ogunrinade (1980) as follows.

$$EL = \sum srx \text{ coy} \times \text{Roy}$$

where

EL = Estimated annual economic loss due to organ and carcass condemnation from international or domestic market.

Srx = Annual cattle slaughter rate of the abattoir

Coy = Average cost of ea each liver/lung/ heart/kiney/ brain or carcass.

Roy = Condemnation rates of cattle liver/lung/heart/kidney/brain or carcass.

Data Analysis: Data collected during postmortem inspection was entered in to spread sheet. Descriptive statistics used to determine organ or carcass condemnation rates defied as proportion as organs and the presence also citation between the outcome variable and various potential risk factors.

RESULTS

Abattoir Survey

Ante mortem Inspection (AMI): Ante mortem inspection of cattle that have brought to Dilla municipal abattoir were carried out for detection of any visible abnormalities encountered. Among those cattle that passed ante mortem inspection, 400 cattle were selected simple random method by giving the identification number and post mortem inspection performed on those selected animals.

Post Mortem Inspection: On those cattle that had been selected at ante mortem examination, post mortem inspection carried out by carefully visualization after evisceration of the organs. A total of 400 cattle were slaughter and thoroughly examined, 122 (46.4%) liver, 113 (43%) lung, 15(5.7%) tongue, 9 (3.4%) heart and 4 (1.5%) kidney were condemned based on their gross pathological lesions (Table 1).

Out of the total livers (122) condemned, the principal causes of condemnation was due to fasciola 61 (50%) and Hydatid cyst 41 (33.6%). The liver was also condemned due to calcification and cirrhosis represent ting 13 (10.7%) and 7 (5.7%) respectively (Table 2)

From total 113 lungen were condemned in cattle; the major cause of condemnation was due to hydatidcyst 51 (45.1%) and pulmonary congestion 50(44.2%). The lung was also condemned due to pulmonary emphysema, pulmonary abscess and pulmonary edema of 6(5.3%); 4(6%) and 2(1.8%) respectively (Table 3).

According to this study, the sex and body conditions of cattle have significant ($p < 0.05$) effect. But market site have insignificant effect ($p > 0.05$). In the case of sex, male have higher prevalence than the female. Poor body conditioned animal have higher prevalence than that of good body conditioned animals.

Economic Significance: The direct economic loss due to rejection of organs and carcass condemnation was calculated based on average price per organs at Dilla town. Current study revealed losses of organ condemned at Dilla municipal abattoir estimated according to the formula set by Ogunrinade, A. and Ogunrinade, B.I. (1980), to be 581.69 USD or 10354.00 ETB (Table 5)

DISCUSSION

Abattoir provides information on the epidemiology of disease on livestock, to know what extent of the public

Table 1: Proportion of condemned organs due to varies lesions

	Causes of condemnation	No of condemned organs	Each organ proportion (%)	Total organ proportion (%)
Liver	Fasciola	61	50	23.2
	Hydatidcyst	41	33.6	15.6
	Calcification	13	10.7	5
	Cirrhosis	7	5.7	2.6
	Total	122		
Lung	Hydatidcyst	51	45.1	19.4
	Congestion	50	44.2	19.0
	Emphysema	6	5.3	2.3
	Abscess	4	3.6	1.5
	Edema	2	1.8	0.8
	Total	113		
Tongue	C.bovis	15	100	5.7
	Total	15		
Heart	Hydopericardium	6	66.7	2.3
	Pericarditis	3	33.3	1.1
	Total	9		
Kidney	Hydronephrosis	3	75	1.1
	Nephritis	1	25	0.4
	Total	4		
	Gross Total	263		100

No of examined cattle (n=400)

Table 2: Prevalence of condemned livers.

Causes of liver condemnation	N ^o of condemned organs	Prevalence (%)
Fasciola	61	50
Hydatid cyst	41	33.6
Calcification	13	10.7
Cirrhosis	7	5.7
Total	122	100

Table 3: Prevalence of condemned lungs

Causes of lung condemnation	No of condemned organs	Prevalence (%)
Hydatidcyst	51	45.1
Congestion	50	44.2
Emphysema	6	5.3
Abscess	4	3.6
Edema	2	1.8
Total	113	100

Table 4: Significances of Risk factors

Risk factors	Sampled animals sex, body condition score and market site	No. of positive animals	Prevalence (%)	P. value
Sex	Female	83	34(40.96)	0.02
	Male	317	88(27.76)	
BCS	Good	236	57(24.15)	0.01
	Medium	164	65(39.63)	
Market site	Kebado	222	62(27.93)	0.212
	Wonago	178	60(33.71)	

Table 5: Summary of economic loss

Types of organs condemned	No of animals annually slaughtered	No of organ condemned	Av. price per organ	Total
Liver	2730	122(46.4%)	70 ETB	ETB.8540
Lung		113(43%)	12 ETB	ETB.1356
Tongue		15(5.7%)	20 ETB	ETB. 300
Heart		9(3.4%)	10 ETB	ETB. 90
Kidney		4(1.5%)	17ETB	ETB. 68

is exposed to certain zoonotic diseases and estimated the financial losses incurred through condemnation of affected organs [4, 5]. In the current study 400 cattle were selected from those cattle that were passed ante mortem inspection by simple random selection method and post mortem examination was carried out accordingly to their identification number.

All animals that had been selected by ante mortem inspection were subjected to post mortem examination accordingly. A total of slaughtered animals 400 samples were selected and thoroughly examined by the post mortem procedure. From the total samples examined, liver, lung, tongue, heart, kidney 122 (46.4%); 113(43%); 15(5.7%); 9(3.4%); 4(1.5%) Condemned respectively, due to parasites and other pathological lesions. In this finding, pathological conditions like abscess, calcification, cirrhosis, hydro-nephritis, nephritis and hydro-pericardium were observed. Similar findings were reported at Zari abattoir by Probins *et al.* [19]. From the total cattle slaughtered, parasites like hydatid cyst and fasciola were found to be the major causes that rendered liver and lung condemnation from local market by Budke *et al.* [20].

In the current finding, (46.4%) of fasciola cases is higher at Dilla municipal abattoir than the work recorded at Jimma municipal abattoir 46.15% by Tadelle and Worku [21], 24.32% in Mekele municipal abattoir by Berhe *et al.* [22] and 14% at Wolayita Soddo municipal abattoir by Abunna *et al.* [23]. Thus, the most reasonable conditions for the presence of different prevalence in bovine fasciolosis from area to area throughout the country are due to favorable conditions for intermediate hosts, the cattle feeding habit and availabilities.

The current findings of hydatid cyst (33.6%) in liver and (45.1%) in lung at Dilla municipal abattoir is higher than that of 10.44% in liver and 12.45% in lung recorded in Wolayita Soddo municipal abattoir by Bekele and Butako [24].

In the present study revealed that the prevalence of hydatid cyst cattle slaughtered at Dilla municipal abattoir was 33.6%. This finding is lower than the findings from different places in Ethiopia like 61% in Asella by Koskei [25], 52.69% in Hawassa by Regassa *et al.* [26] and 48.9% in Debre Markos by Kebede *et al.* [10]. Factors like difference in social activity, animal husbandry systems, lack of proper removal of carcass and attitude to dogs in different regions may contribute to the variation in prevalence in different areas of a country.

This study recorded a total economic loss incurred due to condemnation of organs and carcass in in abattoir survey was 380.66 USD or 10354.00 ETB. The current

finding was lower than the annual loss of 39,490.0 and 172,664.09 Ethiopian birr were reported from Gondar and Jimma by Genet and Amen [27, 28] respectively. Variations in the amount of economic loss among different abattoirs refer to the difference in the prevalence of diseases, rejection rates of organs, slaughtering capacity of the abattoirs, local market price of organs and in the respective study area.

CONCLUSION AND RECOMMENDATIONS

Parasitic diseases constitute a major impediment to livestock production in Ethiopia due to the direct and indirect losses they cause. Among these fasciolosis and hydatid cyst are the most economically important diseases of livestock at different parts of the country where its occurrences is related to the presence of environmental favorable conditions for the development of intermediate hosts (snails & dogs). The study revealed that due to the above mentioned cases were the main causes of organ condemnation and resulted in financial loss at Dilla municipal abattoir.

Based on the above findings, the following recommendations are forwarded.

- Make areas non-suitable for survival of intermediate host.
- Reduce exposure of animals around swampy and stagnant water area
- Give awareness about the disease control and management conditions for peasant associations and livestock owners.
- There should be immediate and proper disposal of all condemned organs and carcasses at proper place.
- Cooperation should be done between veterinarian and medical persons in order to prevent zoonotic diseases
- Regular deworming of dogs and elimination of stray dogs should be practiced all over the country.

ACKNOWLEDGEMENTS

Before all, I would like to thank god for his grace and immeasurable peace, love, strength and patience throughout my academic year.

I would like to express my heart full thanks to my advisor Dr.Tefera W/Mariam for his helpful advice, guidance, rectifying manuscripts, constructive criticism and provision of materials.

My special thanks also forwarded to Dr. Abriham Yohannes G/Mikael for his guidance and supervision during the study period at Dilla municipal abattoir.

At last but not least, I am extremely thankful to my father Ato Yuta Senare, my mother Shure Bune and my brother Youke Yuta for their financial help and constructive advice during all my school life.

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