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Major causes of organ and carcass condemnation and its Financial loss at Wacha municipal Abattoir, SNNPR, Ethiopia

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Abstract

The study was conducted to identify major causes of organs condemnation in cattle slaughtered at wacha municipal abattoir and to estimate the direct economic losses. A cross sectional active abattoir survey, which involves both ante-mortem and post-mortem examinations, was conducted on 745 cattle from December 2015 to Nov 2016 G.C. During ant-mortem examination, in 114 (15.3%) cattle various types of abnormalities were detected which include:- lacrimation (3.49%), pale mucus membrane (3.09%), nasal discharge (1.88%), hernia (1.48%), actinomycosis (1.34%), salivation (1.74%), lameness (0.54%), emaciation (0.41%), depression (0.14%), blindness (0,14%), local swelling (0.27%), and rough hair coat (0.27%). Post – mortem examination revealed that 131 (17.58%) liver, 61 (8.19%) lungs, 9 (1.21%) kidneys and 2 (0.27%) hearts were condemned due to various causes. Fasciolosis (9.26%) was the main causes of liver condemnation followed by hydatid cyst (3.62%) and *cystcircus bovis* (2.55%), respectively. The major causes of lung condemnation were hydatid cyst, emphysema and pneumonia accounting for 5.1%, 1%, 1.61% and 1.07%, respectively. Hydronephrosis and *cystcircus bovis* were the major causes of kidney and liver condemnation with rate of 0.94% and 0.27%, respectively. Totally about 19, 910.0 Ethiopian birr was lost from organs condemnation during the active abattoir survey. The results identified various causes of organ condemnation and their economic importance in the area. Therefore, it is necessary to establish appropriate strategy for prevention and control.

Keywords: Abattoir survey, Cattle, Cause of organ condemnation, Economic loss.

Introduction

Developing countries have about two third of the world's livestock population but their meat and milk production is lower than expected [1]. Ethiopia has large livestock population in Africa with an estimated of 44,314,877 cattle, 23,619,720 sheep, 23,325,113 of goats [2]. However, there are constraints that hindered the potential of livestock production include traditional management system, limited genetic potential, lack of appropriate disease control policy and veterinary services. Due to these and related factors, each year significant economic losses result from condemnation of edible organs and carcass [3, 4]. Parasitic diseases are considered as a major health problem and cause a significant economic loss in countries where livestock production is an important segment of the agricultural practice [1].

Monitoring and other condition at slaughter house have been recognized as one way of assessing the disease status of cattle [5] and abattoirs played an important role in screening animal products with various abnormalities and disease that are not fit for human consumption [6, 7]. Major parasitic diseases such as Fasiolosis, haydatid cyst, cysticercosis and others organ condemnation causes like abscess and cirrhosis cause a significant economic loss by lowering the productivity of cattle and condemnation of edible organs [4, 8].

Fasioloa is a parasite which affects liver of especially ruminant's cattle, sheep, goats and occasionally human beings as an accidental host for species, *Fasciolo hepatica* and Fasciolo gigantic [9]. Fasciolosis is classified as acute 2-6 weeks, sub-acute 6-10 weeks and chronic 4-5 months based on the duration it takes to cause its pathology [11]. Affected organs has different findings like in the acute hepatic fasciolosis which is characterized by a badly damaged, swollen liver in which the capsules may show many small perforations and sub capsular perforations or hemorrhage, the parenchyma shows tracts of damaged tissue and is much more friable than the normal. On the other hand, the chronic hepatic fasciolosis is characterized by the presence of large, leaf shaped flukes in the grossly enlarged and thickened bile duct, particularly in the ventral lobe of the liver. Thus, the bile duct protrude above the surface of the liver; cyst may be seen due to blockage of ducts with flukes and desquamated epithelial cells [12].

Hydatid cyst might be considered as main parasitic disease that cause huge organ contamination. It is also a zoonotic parasitic disease caused by dog tapeworm called Ecinococcus granulosis and its larva stage, the hydatid cyst. This cestode parasite is readily recognizable in the lungs and livers of infected animals are very much linked with geographical location. This parasite if found worldwide and causes series public health problems in certain parts of the world [13]. In apparent meat inspection have also role on the epidemiology of the disease. The disease can be controlled by prevention of access of dogs to hydatid cyst, teaching of farmers on pattern of transmission in an endemic area, decreasing of stray dogs and regular treatment of dogs with praziquantel [14].

Cysticercosis is a disease condition refers to the presence of larva of certain tapeworms in the tissue of human or animals. Its effect on the largely depends on the organ involved and the degree of parasitism. In some sites such as peritoneum and sub cutis, the cysticeri are tolerated with little reaction, but those species that invade and displace tissues in critical organs such as liver, heart and brain may grave sighs and death [12]. The cysticerci at slaughter are covered by a layer of serosa. If this layer is broken the typical thickened organism appears [15].

Other Pathological cause of organs and carcass condemnation includes abcesss, calcification, cirohosis, emphysema and etc. Abscess is a localized collection of pus separated from the surrounding tissue by fibrous capsule [16]. Abscess is collection of liquid inflammatory product consisting of cells (leukocytes) and liquefied tissue enclosed with in fibrous capsule. Abscess usually from in response to invading pathogen or a foreign material [17]. Local infection may take the form of circumscribed aggregation of bacterial debris and necrotic tissue, known as an abscess [18].

Calcification is a deposition of calcium salts in dead and degenerating tissue. It may be regarded as body reaction to immobilize foreign agents and many occur in any tissue or origin when calcium particle are removed from the surrounding. Tissue may appear white or grey, irregular rounded and frequently honey comb stricter calcification is detected on post mortem examination by gritty sound up on incision with knife calcified parasitic organs [16]. Calcifications occurs in variety of condition and is two types namely local and general. Local calcification is an attempt by the body to repair tissue damage and to enclose and immobilize dead cells and other materials whereas general calcification is related to extreme deposition of calcium salts in different tissue to high blood or tissue level [19].

Emphysema is destination of the lung that caused by over destination of alveoli without escape of air in to interstitial space [12]. The two major forms of pulmonary emphysema are generally recognized as alveolar and interstitial emphysema. Alveolar emphysema is abnormal permanent enlargement of air space distal to the terminal bronchiole and destruction of alveolar septal walls with or without apparent fibrosis. Whereas interstitial emphysema is the presence of the supporting connective tissue storma of interlobular, sub-pleural, and mediastinal the lung tissues [20]. It also caused by obstruction of the out following of air or by extensive gas pining Respiration during slaughter procedures. Post mortem finding of the emphysematous lung include a pale enlarged grayish-yellow color and up on palpation the affected area feels puffy and crepitate [16].

Several studies have been conducted through abattoir survey to determine the prevalence and economic loss resulting from organ condemnation in many abattoirs of Ethiopia including southern region [21-23]. However, most of the studies were focusing only on specific disease such as fasciolosis, hydatidosis and cysticercosis. Furthermore, economic loss due to various disease causes was estimated in some abattoirs of the country [24-26]. Hence, it would be essential to

have information on occurrence of various diseases causes and their economic loss from different parts of the country to establish appropriate strategy for prevention and controls. Currently, there is lack of information on occurrence of various diseases causes and their economic loss due to organ condemnation in Wacha. Therefore, the objectives of this study were to identify the major causes of organ condemnation and to estimate direct economic loss due to organ condemnation at Wacha municipal abattoir.

Materials and Methods

Study area

The study was conducted starting from December 2015 to Nov 2016 at Wacha municipal abattoir.Wacha abattoir is found in Daramalo woreda. Daramalo is one of the woredas in the SNNPR of Ethiopia, part of Gamo Gofa Zone, which is bordered on the south west kucha ,on the south east Kamba, on the north west by Zala and north east by Dita. Daramalo is located between 6°35' to 6°55' N latitude and 67.15°E longitude with an altitude of 2000 masl and 480kms south west of Addis Ababa, 267 km from regional city Hawassa, 94 km from wolaita sodo and 210 km from zone city arbaminch. It covers the area of 1450 km [24].

Sample size

The sample size was determined based on the formula given by Thrusfeld [27]

$$n = \frac{1.962Pex\ (1\text{-}Pex)}{d2}$$

Where Pex= expected prevalence; n= is required sample; d= desired precision; and 1.96 z-value = for 95% confidence level

Accordingly, a total of 384 fecal samples were calculated as sample size but 745 cattle were taken to increase precision.

Study Animals

The study animals were cattle brought to the abattoir for slaughter from different districts and kebeles around wacha town.

Study Design

The study was conducted through active abattoir survey.

Active abattoir survey: - a cross sectional study was conducted to identify the major causes of organ condemnation and to estimate the direct economic loss due to organ condemnation in cattle slaughtered at wacha municipal abattoir. A total of 745 cattle were examined by ante-mortem and post-mortem examination using standard examination procedures. The study animals were selected randomly using systematic sampling method. During the ante-mortem examination, each of study animal was identified based on the enumerate mark on their body marked before slaughter and their general behaviors signs of disease nutritional status, cleanliness and any type of abnormalities were recorded [28]. Judgment was also done based on the procedure given by FAO [1]. Post-mortem examination was conducted through visualization, inspection, palpation and systematic incision of each visceral organ particularly the liver, lung, heart and kidney for the presence of cysts, various adult parasites and other abnormalities [29].

Assessment of Direct economic loss

Total number of cattle slaughtered, average current local market price and number of each condemned organ were used to estimate the economic loss represented by the cause related condemnations over the study period. Average current local market price of each organ was obtained from the butcheries in Wacha town.

Data analysis

Collected data were entered and stored in to Microsoft excel and analyzed by statistical methods using STATA 11. Descriptive statistics was used to determine the level of organ condemnation defined as the proportion of condemned organs to the total number of organs examined.

Results

Out of 745 cattle subjected to ante-mortem examination, 114(15.3%) cattle were affected by various type of abnormalities. The abnormalities detected include:- lacrimation, pale mucus membrane, nasal discharge, hernia, actinomycosis, salivation, lameness, emaciation, depression, blindness, local swelling and rough hair coat (Table-1).

Table -1 Abnormalities encountered during ante-mortem examination at Wacha abattoir

Abnormalities	Number of infected animals	Percentage (%)
Hernia	11	1.48
Lacrimation	26	3.49
Lameness	4	0.54
Actinomycosis	10	1.34
Nasal discharge	14	1.88
Depression	3	0.41
Salivation	13	1.74
Local swelling	2	0.27
Pale mucus membrane	23	3.09
Blindness	3	0.41
Emaciation	3	0.41
Rough hair coat	2	0.27
Total	114	15.3

Up on post-mortem examination, , 131 (17.58%) liver, 61 (8.19%) lungs, 9 (1.21%) kidneys and 2 (0.27%) hearts out of the total examined organs were condemned due to Fasciolosis, hydatid cyst, *cystcircus bovis*, Cirrhosis, Calcification and others (Table -2). Fasciolosis 69 (9.26%) were found to be the main cause of liver condemnation followed by hydatid cyst 27(3.62%) and *cystcircus bovis* 19 (2.55%) respectively. The major causes of lung condemnation were hydatid cyst, emphysema and pneumonia accounting for 5.1%, 1.61% and 1.07% respectively. Hydronephrosis and *cystcircusbovis* were the major causes of kidney and liver condemnation with rate of 7 (0.94%) and 2 (0.27%) respectively (Table -2).

Table -2. Causes and percentage of organ condemnation

Condemned	Cause	Number of organ condemned	Percentage (%)
Liver	Fasciolosis,	69	9.26
	Hydatid cyst	27	3.62
	Cystcercus bovis	19	2.55
	Cirrhosis	15	2.01
	Calcification	1	0.13
	Total	131	17.58
Lung	Hydatid cyst	38	5.1
	Emphysema	12	1.61
	Pneumonia	8	1.07
	Abscessation	3	0.40
	Total	61	8.19
kidney	Hydronephrosis	7	0.94
	Hydatid cyst	2	0.27
	Total	9	1.21
Heart	*Cystcercus bovis*	2	0.27
	Total	2	0.27

Assessment of direct economic loss: - the total direct economic loss incurred due to organ condemnation during active abattoir survey was estimated to be 19,910.00 birr. Higher economic losses were encountered mainly due to fasciolosis (9660 birr) and hydatid cyst (4600 birr) respectively (Table -2).

Table 3: Economic losses analysis at wacha abattoir

Condemned	Cause	Number of organ condemned	Percentage (%)	Lost money (Ethio birr)
Liver	Fasciolosis,	69	9.26	9660.0
	Hydatid cyst	27	3.62	3780.0
	Cystcercusbovis	19	2.55	2660.0
	Cirrhosis	15	2.01	2100.0
	Calcification	1	0.13	140.0
	Total	131	17.58	18,340.0
Lung	Hydatid cyst	38	5.1	760.0
	Emphysema	12	1.61	240.0
	Pneumonia	8	1.07	160.0
	Abscess	3	0.40	60.0
	Total	61	8.19	1,220.0
kidney	Hydronephrosis	7	0.94	210.0
	Hydatid cyst	2	0.27	60.0
	Total	9	1.21	270.0
Heart	*Cystcercus bovis*	2	0.27	80.0
	Total	2	0.27	80.0
Grand total				19,910.0

Discussion

This study reveals that fasciolosis, hydatid, *cystcystcercus bovis*, pneumonia, emphysema, hydro-nephritis, cirrhosis, hepatitis, calcification, and abscess were the major causes of organs condemnation in cattle slaughtered at wacha municipal abattoir. The current finding is similar with reports from different abattoirs of Ethiopia reported by Amen *et al*. [4]; Shegaw *et al.* [25]; Yifat *et al.* [26]; and Nurit *et al.* [30]. Out of the total examined organs 131(17.58%) liver, 61(8.19%) lungs, 9(1.21%) kidneys and 2(0.27%) hearts were condemned due to various causes. The rejection rates of liver in this study was lower than the reports of Yifat *et al.* [26] from Gondar, Nurit *et al*. [30] from kombolcha and Amen *et al*. [4] from Jimma municipal abattoirs who reported 31.1, 66.55, and 64.4%, respectively. But it was observed higher as compared with studies conducted by Oryan *et al.* [31] 4.2% and Hassan *et al*. [32] 7.9% from Iran. The rejection rate of lung in this study was lower than reports by Gente *et al*. [3] of 19.68% at Gondar, Asmare *et al*. [24] of 25.8% at bahirdar and Amen *et al*. [4] of 46.2% at Jimma municipal abattoirs. The rejection rates of kidneys and hearts in this study were lower than the rejection rate (i.e. 18% and 11%) that reported by Amen *et al*. [4] from Jimma and (5.77%) and (3.71%) by Shegaw *et al.* [25] from Mekelle abattoirs.

Variations in the rejection rate of organs probably due to differences in agro-ecological conditions that favorable to the parasites, livestock management system and prevalence of disease at the different study sites. The study should that fasciolosis (9.26%) was the main cause of liver condemnation. This finding was 11.25% and relatively in agreement with the previous studies conducted by Mihreteab *et al*. [22] and Dechassa *et al* [33] at Adwa and Jimma municipal abattoir, respectively. But it was lower than reports

at Jimma abattoir by Tadelle and Korku [34], at Gondar by Genet *et al*. [3] and at kombolcha by Nurit *et al*. [30]; who reported 63.89, 48.5 and 36.06% respectively. Condemnation due to hydatid cyst (3.62%) in the present study was lower than studies conducted by Gebertsadik *et al*. [21] who reported 12.56% from Tigray by Mihreteab *et al*. [22], 31.7% from Addis Ababa and Asmare *et al*. [24] 10.2% from Bahir Dar municipal abattoirs. Also cyst cercusbovis was observed at a rejection rate of liver 2.55% which is higher than reports by Ashwani and Gebertsadik *et al*. [21] who reported 0.26% rate of rejection from Tigray and Amen *et al*. [4] 0.22% from Gonder.

Hydatid cyst found to be the main cause of lung condemnation with rate of 5.1% which is much lower than reports from Mekelle, Ambo, Nekemte and Dire Dawa abattoirs by Gebremeskel and Kalayou [35], Endrias *et al*. [36], and Fufa *et al* [37] respectively.

In this study rejection rate of lung due to emphysema was 1.61% which is in agreement with the rate reported by Yifat *et al.* [26] 1.5% from Gondar but lower than the rate reported by Amen e*t al* [4] 6.77% from Jimma and Genet e*t al*. [3] 10.5% from Gondar abattoirs. Other causes of lung condemnation was pneumonia and it was observed at a rate of 1.07% which is in agreement with reports by Amen e*t al* [4] at jimma, and Yifat *et al.* [26] at Gondar abattoir and lowers thanthe report by Genet e*t al*. [3] who reported 12.45% in cattle slaughtered from Gondar abattoir. The present study also showed that higher kidney was condemned due to hydro-nephritis.

This result is in agreement with previous studies by Yifat *et al.* [26] and Amen e*t al* [4] from Gondar and jimma abattoirs, respectively.However, according to Genet e*t al*. [3] higher rejection rate to kidney was due to hydatidcyst and pyonephritis. The main cause of heart rejection in this study was cyst cercusbovis (0.27%) which is relatively similar with previous studies by Amen e*t al* [4] who reported 0.22%. However, Genet e*t al*. [3] from Gondar abattoir reported that pericarditis, Abscessation and hydatid cyst were the common causes of heart condemnation. The differences in the rejection rate of organs with related to different causes may be due to the differences in the prevalence of the disease and variation in animal management system at different study sites. From the retrospective study, liver and lung were the most condemned organs. This finding was relatively in agreement with previous report by Endalew and Nurraddis [38] who reported (11.25 and 7%) from North Gondar and lower than studies conducted by Shegaw *et al.* [25] who reported 51.95 and 29.54% from Mekelle. The total direct economic loss incurred due to condemnation of organs in active abattoirs survey was 19,910 .0 birr. Similarly, in Gondar Elfora abattoir 18, 973.22 birr was reported by Yifat *et al.* [26]. This economic loss due to fasciolosis and hydatid cyst was lower than the report by Amen e*t al* [4] from Jimma municipal abattoir who reported 125, 8420 and 27,207.3 Ethiopian birr, respectively. Variations in the amount of economic lost in differences in the prevalence of diseases, rejection rate of organs, slaughtering capacity of the abattoirs, local market price of organs and management of animals.

Conclusion and Recommendation

The present study revealed that fasciolosis, hydatid cyst, *cystcercusbovis*, pneumonia, emphysema, hydro-nephritis, cirrhosis, hepatitis, calcification and Abs cessation were the major causes of organs condemnation in cattle in wacha municipal abattoirs resulting in consideration economical loss in cattle production. Eradication of these disease requires cooperation between the public health and official veterinary authorities. Depending on the above conclusion the following recommendations are forwarded.

❖Standard regulations and functional meat inspections policies should be formulated for organs and carcass approval.

❖Procedures for immediate, safe and controlled elimination of all condemned abattoir materials should be developed and the sale of contaminated offal and heads as dog's feed should be prohibited law.

❖Back yard slaughter of cattle should strictly be prohibited and controlled by the gov't.

❖Regular deworming of dogs and elimination of stray dogs should be practiced and training of abattoir workers on procedures and cares during flaying and evisceration should be conducted.

❖ works need to be done to enhance the awareness of the animal attendants, farmers, customers, abattoirs workers and butchers pertaining to the public health significance of the disease, and proper disposal of condemned offal's and carcasses.

❖Further studies should be carried in cattle that are going to be slaughtered in different abattoirs of the country and introduce preventing measures to reduce unnecessary financial losses encountered in this abattoir.

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