



Research Article

Whole Carcass and Organ Condemnation and Their Associated Financial Losses in Ruminants Slaughtered At the Bolgatanga Municipal Abattoir of Ghana

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ABSTRACT

This study was conducted on ruminants slaughtered at the Bolgatanga municipal abattoir in Ghana for the period 2010-2014. The aim was to investigate the causes of whole carcass and organ condemnation in ruminants slaughtered at this facility and assesses the associated financial losses. This was done by analyzing veterinary records on local slaughter of livestock and pathological conditions at slaughter for a total of 11,843 cattle, 13,722 sheep and 19,904 goats. The study revealed that 0.064 % cattle carcasses were totally condemned due to tuberculosis, cysticercosis and jaundice. The main causes of organ condemnation in cattle were pimply gut (3.82%), abscess (2.77%), fasciolosis (2.39%), hydronephritis (1.16%), traumatic reticulo-pericarditis (0.92%), jaundice (0.39%), tuberculosis (0.04%), pneumonia, (0.04%), contagious pleuro-pneumonia (0.04%) and cysticercosis (0.008%). Pimply gut (16.81%) and pneumonia (0.75%) were responsible for organ condemnation in small ruminants. The total direct economic loss due to organ and carcass condemnation amounted to GHc 67,295.00(18,693.06 USD, (USD= GHc 3.60). Bacterial and parasitic diseases were the causes of carcass and organ condemnation in ruminants and these were associated with huge economic losses.

Key words: Carcass, organ, condemnation, cause, ruminants, financial loss

INTRODUCTION

Abattoirs are established for the slaughtering of livestock and poultry for human consumption. Meat from slaughtered animals in these abattoirs must be wholesome for human consumption. Abattoirs are therefore constructed to provide ideal conditions for the hygienic slaughter of animals and the proper disposal of rejected carcasses, organs and other waste products. Meat inspection is performed by trained personnel using both standard antemortem and postmortem inspection techniques (FAO, 1994).

Abattoirs are also an excellent avenue for the early detection of livestock and poultry diseases of economic and public health significance. Some zoonotic diseases detected during meat inspection include tuberculosis, cysticercosis, hydatidosis, leptospirosis, brucellosis and toxoplasmosis (Biffa *et al.*, 2010, Swai and Schoonman, 2012).

Some diseases affecting livestock lead to reduced productivity of animals and cause economic loss due to condemnation of carcasses and edible organs (Swai and

Ulicky 2009, Fekadu *et al.*, 2012, Mandefro *et al.*, 2015). However, there are limited reports on the causes of carcass and organ condemnation in slaughtered animals in Ghana. The available information has centred on the Greater Accra and Northern Regions respectively (Turkson *et al.*, 2009 and Jarikre *et al.*, 2014) with lesser information from other regions. This present study is therefore meant to investigate for the first time the causes of carcass and organ condemnation and their associated financial losses in ruminants slaughtered at the Bolgatanga municipal abattoir, in the Upper East region, Ghana for the period 2010-2014.

MATERIALS AND METHODS

Study area

The study was conducted in Bolgatanga, the capital town of the Upper East region of Ghana, a town, 845 kilometres from Accra, the capital city of Ghana. Bolgatanga is located at Latitude 10°47'08" N and Longitude: 0°51'05" W and is at an altitude of 191 meters above sea level. The municipal abattoir was established

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in 1960 and consists of three separate slaughter slabs. The carcasses are eviscerated and hoisted for inspection, while inspection of offals and viscerals is done on concrete tables. The livestock population in this area comprises 27,517 cattle, 59,772 sheep, 83,656 goats, 14,500 pigs, 128,513 chicken and 78,487 guineafowls (Ghana Statistical Service, 2010).

Study animals

The study animals are cattle, sheep and goats slaughtered at the abattoir. The animals originated from different sub-districts within the municipality and its environs.

Study methods

A retrospective study was conducted by reviewing the Veterinary records of ruminants slaughtered at the Bolgatanga Municipal abattoir for the period 2010-2014. Records on local slaughter of livestock and pathological conditions from meat inspection were retrieved from the municipal veterinary office records. No data was available on the age, sex, breed and body condition score of animals brought for slaughter.

Assessment of direct financial loss

The direct financial loss due to whole carcass and organ condemnation was assessed by considering the number of slaughtered animals at the abattoir, condemnation rate and the prevailing market prices of carcass and organs as described by Ogurinate and Ogurinate, (1980).

$$DAL = \sum AC * AP * CR$$

Where DAL = Direct annual financial loss due to carcass condemnation

AC = Animal slaughter rate at the abattoir

AP = Average price of condemned carcass/organ at the market

CR = Carcass condemnation rate at the abattoir

Data management and statistical analysis

The data obtained was analysed using SPSS (2006) version 16.0 for windows. A one way Analysis of Variance (ANOVA) was used and the significant difference between means determined by using Duncan's test of homogeneity at 5% ($P < 0.05$).

RESULTS

A total of 11,843 cattle, 13,722 sheep and 19,904 goats were slaughtered for the period 2010-2014. There was no significant difference in the annual slaughter figures of cattle. However there was a significant difference between sheep and goats slaughter figures during the study period ($P < 0.05$) (Table 1). Majority (3540) of sheep was slaughtered in 2013, while the least (2401) was in 2010. The highest number of goats (4572) was slaughtered in 2011, while the least (3047) was in 2014.

The causes of carcass and organ condemnation and associated direct financial losses in cattle are depicted in Table 2. 8 cattle carcasses, representing 0.064% of

slaughtered cattle, were totally condemned for various reasons. Majority (6/8) were condemned due to suspected tuberculosis, while one carcass each was condemned due to bovine cysticercosis and jaundice respectively.

The condemnation rate of organs in cattle at this abattoir was as follows: liver (3.95%), intestines (3.82%), lungs (1.42%), kidneys (1.41%) and heart (0.96%). The pathological conditions responsible for liver condemnation were fasciolosis (2.39%), abscess (1.17%) and jaundiced carcass (0.39%). Intestines (3.82%) were condemned for pimply gut lesions, however four conditions were responsible for lung condemnation. They included abscess (1.31%), tuberculosis (0.06%), nonspecific pneumonia (0.04%) and contagious bovine pleuro-pneumonia (0.008%).

Hydronephritis (1.16%) and abscess (0.25%) were identified as causes of kidney condemnation. The heart was condemned mainly due to traumatic reticulo-pericarditis (0.92%) and abscess (0.04%). No carcass was totally condemned in small ruminants. The overall organ condemnation rate was 10.62 % and 7.03% in sheep and goats respectively. Organ condemnation in sheep was due to pimply gut lesions (10.11%), pneumonia (0.44%) and fasciolosis (0.007%).

Pimply gut lesions (6.7%) and pneumonia (0.031%) were the causes of organ condemnation in goats. The total direct financial losses due to carcass and organ condemnation in ruminants amounted to GHc 67,295.00 (18,693.06 USD, (USD = GHc 3.60). The loss due to whole carcass and organ condemnation in cattle was 2666.67 and 8790.28 United States Dollars (USD) respectively. The loss due to organ condemnation was 3436 and 3800 USD in sheep and goats respectively.

DISCUSSION

This study investigates the causes of carcass and organ condemnations and their associated financial losses in 11,843 cattle, 13,722 sheep and 19,904 goats slaughtered at the Bolgatanga municipal abattoir for the period 2010-2014. Eight bovine carcasses were condemned due to suspected tuberculosis (75%), cysticercosis (12.5%) and jaundice (12.5%) respectively. These findings are in tandem with the report of Phiri, 2006 in some abattoirs in Western Zambia where tuberculosis (83.1%), cysticercosis (2.7%) and sarcosporidiosis (4.4%) were the main causes of bovine carcass condemnation.

These findings are also similar to reports by Yibar *et al.*, (2015), in the Bursa province of Turkey where carcasses were condemned mainly due to tuberculosis and jaundice and that of Yesihak and Webb, (2015), in Ethiopia where, poor bleeding (0.11%), abscess (0.06%), adhesion (0.04%), tuberculosis (0.03%), pneumonia (0.01%), cysticercosis (0.01%) and bruising (0.01%) were causes of whole cattle carcass condemnation. However in the present study, no carcasses were rejected as a result of poor bleeding and bruising.

The result in this study contradicts that of Jarikre *et al.*, (2014), in Tamale abattoir, where whole cattle carcasses were condemned due to contagious bovine pleuropneumonia (27.5%) and tuberculosis (14.3%) respectively, while in the present study, contagious bovine

Table 1: Number of ruminants slaughtered for the period 2010-2014

Animal Species	2010	2011	2012	2013	2014	TOTAL	P-value
Cattle	2585	3020	2330	2369	1539	11843	0.177106
Sheep	2401 ^b	2654 ^b	2502 ^b	3540 ^a	2625 ^b	13772	0.00708*
Goat	4445 ^a	4572 ^a	4174 ^{ab}	3666 ^b	3047 ^c	19904	0.00011*
TOTAL	9431	10246	9006	9575	7211	45519	

^{abc}Means in the same row with different superscripts are significantly different (P<0.05).

Table 2: Causes of whole carcass and organ condemnation in cattle for the period 2010-2014

Carcass/organ	Cause	No condemned (%)	unit cost (GHc)	Financial losses (GHc)
Whole carcass	Cysticercosis	1(0.008)	1,200	1,200
	Tuberculosis	6(0.048)		7,200
	Jaundice	1(0.008)		1,200
Total		8(0.064)		9,600/2666.67 USD
Liver	Fasciolosis	283(2.39)	50	14,150
	Abscess	139(1.17)		6,950
	Jaundice	46(0.39)		2,300
Total		468(3.95)		23,400
Heart	Traumatic	110(0.92)	30	3,300
	Reticulo-pericarditis	5(0.04)		150
Total		115(0.96)		3,450
Lung	Abscess	156(1.31)	15	2,340
	Pneumonia	5(0.04)		75
	Tuberculosis	7(0.06)		105
	CBPP	1(0.008)		15
	Total		169(1.42)	
Kidneys	Hydronephritis	137(1.160)	10	1,370
	Abscess	30(0.25)		300
Total		167(1.41)		1,670
Intestines	Pimply gut	452(3.82)	5	2,260
Grand Total				31,645/8790.28 USD

GHc = Ghanaian cedi, USD = United States Dollar, 1 USD = GHc 3.60

Table 3: Causes of organ condemnation and financial loss in Sheep for the period 2010-2014

Organ	Cause	No condemned (%)	Unit cost (GHc)	Financial Loss (GHc)
Intestines	Pimply gut	1,197(10.11)	10	11,970
Lungs	Pneumonia	60(0.44)	5	300
Liver	Fasciolosis	1(0.007)	10	10
Total		1,258(10.62)		12,370/ 3436 USD

Table 4: Causes of organ condemnation and financial loss in Goats for the period 2010-2014

Organ	Cause	No condemned (%)	unit cost (GHc)	Financial Loss(GHc)
Intestines	Pimply gut	1,337(6.7)	10	13,370
Lungs	Pneumonia	62 (0.31)	5	310
Total		1,399(7.03)		13,680/ 3800 USD

pleuropneumonia was cited as a cause of lung condemnation but not that of whole carcass. The reason for this difference is due to the fact that most of the animals slaughtered at the Bolgatanga municipal abattoir originated locally, while those at the Tamale abattoir might have originated from different districts within the Northern region of Ghana or outside Ghana.

In cattle the organs frequently condemned were liver (3.95%), intestines (3.82%), lungs (1.42%), kidneys (1.41%) and heart (0.96%). This finding are similar to the views of other researchers from the subregion (Cadmus and Adekosan, 2009) and other part of Africa (Daborn *et al.*, 1995, Alembrhan and Haylegebriel, 2013; Abunna and Hordofa 2013 and Tembo and Nonga, 2015).

In cattle, livers were condemned due to fasciolosis (2.39%), abscess (1.17%) and jaundiced carcass (0.39%). These findings were similar to the reports of most researchers especially those from the tropics (Alembrhan and Haylegebriel, 2013; Abunna and Hordofa, 2013).

For the intestine, pimply gut lesions were the main cause of condemnation in 3.82% cattle, 10.11% sheep and 6.7% goats slaughtered which reflects the economic importance of this condition in ruminants as reported by Daborn *et al.*, 1995 in Tanzania.

These findings however differ from the opinion of Regassa *et al.*, 2013, that cirrhosis, pneumonia, pericarditis, nephritis and abscess were the causes of organ condemnation in small ruminants at the Luna export abattoir, Ethiopia. These differences may be due to the different geographical location and prevailing climatic condition that may favour different disease conditions.

Lungs in cattle were condemned for the following reasons: abscess (1.31%), tuberculosis (0.06%), non specific pneumonia (0.04%) and contagious bovine pleuro- pneumonia (0.008%).

These findings corroborate the work of several authors that pneumonia, tuberculosis, pulmonary emphysema and contagious bovine pleuro- pneumonia were the main causes of lung condemnation in slaughtered

ruminants (Phiri, 2006, Alawa *et al.*, 2010, Jarikre *et al.*, 2014, Tembo and Nonga, 2015).

The presence of tuberculous lesions in the lungs of cattle slaughtered in this area, further strengthens that reports of Bonsu *et al.*, 2000 who reported a bovine tuberculosis prevalence of 13.8% in the Dangme West district of Ghana, Atiadeve *et al.*, 2014, 5% prevalence in the Greater Accra region and that of 6.5% in the Dormaa and Kintampo districts in the Brong Ahafo region of Ghana (Folitse *et al.*, 2014). This high prevalence of bovine tuberculosis from these regions calls for a national concern and pragmatic approach to the control of zoonotic diseases

Also, hydronephritis (1.16%) and abscess (0.25%) were the causes of kidney condemnation in this study. This finding is similar to reports by other researchers in Africa (Alawa *et al.*, 2010, Mesele *et al.*, 2012 and Alembrhan and Haylegebriel, 2013). In this study, the heart was condemned mainly due to traumatic reticulo-pericarditis (0.92%) and abscess (0.04%). The relatively high prevalence of traumatic reticulo-pericarditis may be due to poor husbandry practices, where cattle have access to metallic objects while grazing on pasture or dumps sites.

Abscesses were found to be the reason for condemnation of livers (1.17%), lungs (1.31%), kidneys (1.41%) and heart (0.04%). These results are similar to reports by Raji *et al.*, 2014 and Mesele *et al.*, 2012. This calls for further research to isolate the microorganisms responsible for multiple abscesses and determine their antibiotic sensitivity pattern.

The total direct financial losses due to carcass and organ condemnation in ruminants amounted to 18,693.06 USD. This loss is considerably lower than the value of 1,268,579 USD incurred at Gondar, Ethiopia (Mesele *et al.*, 2012). The difference may be due to the volume of slaughter, rate of condemnation of organs and the prevailing market price of meat in the various regions.

Conclusion

Bacterial and parasitic diseases were common in slaughtered ruminants and are associated with huge financial losses, which may warrant coordinated intensified disease control measures.

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