

## PRELIMINARY STUDY OF BOVINE CARCASS BRUISES AND ITS ASSOCIATED FINANCIAL LOSSES IN KUMASI ABATTOIR, GHANA

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### ABSTRACT

*In Ghana, huge quantity of meat is wasted daily due to bruise-related carcass condemnation in the slaughter houses and abattoir throughout the country. However, there is limited information on the impact of such bruise-related meat and financial losses in the country. This study estimated the prevalence of bruises and its financial wastage in bovine carcasses at Kumasi Abattoir. Bovine carcasses totalling 21,336 were examined. Bruised carcasses were identified and bruised parts grouped according to locations as shoulder, loin, butt, rib and other locations. The overall prevalence of bruised carcasses during the short study period was 16.76 % (3576/21336). The total weight of meat condemned and direct financial loss incurred were 622.4 kg and GH¢ 13,609.28 respectively. With regards to location, shoulder had the highest frequency, whereas the rib had the lowest. Education of butchers and cattle traders on human animal transport and handling before slaughter in order to minimize meat wastage and associated financial losses due to bruising is recommended.*

**Keywords:** Bovine carcass, Bruises, Financial losses, Prevalence, Kumasi Abattoir

### INTRODUCTION

One of the greatest challenges many developing countries face is how to provide enough meat to feed her ever increasing population. In Ghana, the total meat available for domestic consumption is estimated at 223,670 metric tons, whereas the estimated national requirement is 350,280 metric tons (MOFA, 2013). This estimate indicates a huge deficit of local meat production for domestic consumption. Consequently, Ghana imports about \$200 million worth of meat and meat products annually to satisfy local demands (MOFA, 2013). The limited meat produced locally is further wasted through bruise-related condemnation, amongst others.

Bruise is considered as a constraint that limits the wholesomeness of carcasses and is defined as the escape of blood from damaged

blood vessels into the surrounding muscle tissues. Bruising is caused by a physical blow with a stick or stone, animal horn, metal projections or animal fall and these activities do happen during handling, transporting and stunning. The damage caused by bruises has great impact on the meat quality (Marshall, 1977; Huertas *et al.*, 2010).

Carcass bruising is very common and its economic losses are of substantial problem in the meat value chain and have been estimated at several million dollars annually by several authors (Van Donkersgoed *et al.*, 2001; McKenna *et al.*, 2002; Huertas *et al.*, 2015).

Bruises are invisible in live cattle due to the toughness of the hide. During ante-mortem inspection of the animal, there may be no traces of bruises while the animal may be declared fit for slaughtering but during post-mortem examination of carcasses, the

effect will be visible with blood accumulating at the place of injury. In severe cases, the entire carcass would be covered with the accumulated blood. Bruised meat is not suitable for consumption because it is an ideal medium for bacterial growth (Chambers *et al.*, 2004). Therefore, it is most often trimmed off and this result in meat wastage with resultant downgrading of the meat value.

Despite all this, in Ghana, much is desired to prevent injury to animals meant for slaughter through series of beatings with sticks, ropes and even the use of stones en route to slaughter points. With appropriate interventions, huge quantity of meat loss due to bruise-related carcass condemnation in the slaughter houses and abattoirs will be reduced. Across the world, literature abounds on the prevalence of bruises and their economic implications, however, in Ghana, information of such is scanty.

This study investigated the prevalence of bruises in bovine carcasses, meat wastage resulting from bruise-related carcass condemnation and estimated the direct financial loss associated with carcass condemnation in Kumasi Abattoir, Ghana.

## MATERIALS AND METHODS

**Description of Study Area:** The study was conducted for four months (July to October, 2015) at the Kumasi Abattoir Company Limited (KACL). KACL is located at Kaase Industrial Area in Kumasi, the second largest city in Ghana. The Abattoir company limited was established in the year 1997 with the grant from Canadian International Development Agency (CIDA) and Government of Ghana and it commenced its operation in 1998. The Kumasi Abattoir is located on Latitude 6°39'36.6°N and Longitude 1°36'15.4°W (Frimpong *et al.*, 2015). The company is currently managed by private firm known as Social Security and National Insurance Trust (SSNIT). The slaughtered cattle were mostly Zebu, Sangas and few West African short horns. The slaughtering of cattle is done daily, with an average daily slaughter of 150 – 200. Meat and

meat products from the abattoir are distributed throughout the Kumasi Metropolis and beyond.

**Study Design:** A purposive sampling technique was adopted for the detection of bruises in slaughtered cattle in Kumasi abattoir. The number of animals affected and the weight of meat loss was recorded.

**Scoring of Bruises:** The method adopted was similar to that described by Huertas *et al.* (2015), where bruises and carcass identification were recorded by the two of the authors, while two animal science students were trained as observers. The abattoir was visited daily and each pair of observers assessed all carcasses slaughtered the day of the previous visit at the abattoir using an adapted subjective scoring methodology (Strappini *et al.*, 2012). Fresh bruises and those with a bright red colour were recorded.

**Location and Severity of the Bruises:** The bruising was visually identified and classified according to location on the carcass: butt, loin, rib, shoulder and other location while the classification of bruises according to depth or severity was not attempted (Huertas *et al.*, 2015). The meat affected was trimmed for each bruise was saved in a plastic bag and later weighed.

**Data Analysis:** Descriptive analysis was performed with Microsoft Excel 2013 and the result presented in percentages. The total direct financial loss was evaluated using the modified method described of Denbarga *et al.* (2011) thus:  $L = N_{ic} \times P_{ic}$ , where  $L$  = total financial loss,  $N_{ic}$  = weight of trimmed meat and  $P_{ic}$  = average price of meat. Potential changes in the destination of the meat cuts or downgrading of the carcasses as well as the higher costs at the industry to trim the damaged carcasses were not considered in this study.

## RESULTS

The post mortem data gathered on bruises on bovine carcasses indicated that out of 21336 cattle examined at Kumasi abattoir, 3576(16.76

%) were bruised (Table 1). The location of the bruises showed that the shoulder was most bruised (49.36 %), followed by other locations (25.19 %), the loin (13.11 %), the butt (6.94 %) and the rib (5.40 %) (Table 2). It also showed that the shoulder bruising recorded the highest weight of 166.46 kg trimmed meat, followed by the other locations (137.60 kg), the loin (129.60 kg), the butt (112.00 kg) and the rib which recorded 76.80 kg as the least. The total weight of trimmed parts was 622.40 kg with an estimated cost of GH¢ 13609.28 (US dollars 3402.32) for the four month period of the study (Table 2).

**Table 1: Prevalence of bruises in bovine carcasses (July to October, 2015) in Kumasi Abattoir, Ghana**

Study Period	Number of Carcasses Examined	Number with bruises	Prevalence (%)
July	5636	960	17.03
August	5328	840	15.77
September	4804	864	17.99
October	5568	912	16.38
<b>Total</b>	21,336	3,576	16.76

## DISCUSSION

This study evaluated occurrence of bruises and the related economic losses in cattle slaughtered in Kumasi abattoir. The prevalence of 16.76% observed in this study is comparable to that observed in 8.0 – 20.0 % in slaughterhouses in Chile (Gallos *et al.*, 2000; Strappini *et al.*, 2010) and lower to 60% prevalence observed in Uruguayan slaughter plants (Huertas *et al.*, 2015). These variations in prevalence may be due to differences in methodologies used for diagnosis and recording of bruises (Huertas *et al.*, 2015).

This study that showed the shoulder was most bruised and the butt was the least bruised, was contrary to the report of Huertas *et al.* (2015) where the butt was the most bruised (80.03 %) and the shoulder the least bruised (6.02 %).

These observations could be related to pattern of abuse often meted to the animals in the course of transportation and before slaughter. These measures include dragging of cattle from various loading trucks, or using staff to hit them in the shoulder region or rough handlings such as slamming, stunning box doors on cattle, hitting with sticks and other objects. Additionally, worn out broken metal located in the restrained entrance could also results in shoulder bruises (Grandin, 2000).

Bad driving habits, such as slamming on the brakes and sudden acceleration have been found to have great effect on the frequency of occurrence of bruise especially when cattle fall in the truck due to careless driving with others in turn stepping on them, these actions could cause injury to any part of the body.

The direct financial loss within this period is attributable to total weight of trimmed parts which was 622.40 kg (estimated cost of GH¢ 13609.28 or US dollars 3402.32) which with extrapolation could be US dollars 10206.9 per year. This is way below that reported for Uruguay (approximately 8 billion American Dollars per year) (Huertas *et al.*, 2015) or U.S. (\$ 22.30 million annually) (Grandin, 1980).

**Conclusion:** This study confirmed that significant numbers of cattle brought to the Kumasi abattoir for slaughtering were exposed to some form of injury resulting in carcass bruising leading to substantial meat condemnation and financial losses. Cattle bruising reduced available meat for human consumption and therefore must be prevented. It is recommended that awareness creation programs should be instituted for butchers and other stakeholders on the factors that predispose the animals to injury and bruising. The impact of injury and bruising on meat quality, meat wastage and financial loss should be explained to all stakeholders of the livestock industry. Further studies should be conducted for a period of two years with emphasis on the various factors that predispose animals to injury at farm, during transportation and at the point of slaughter in order to reduce meat wastage due to bruise-related condemnation.

**Table 2: Location of bruise in bovine carcasses and associated direct financial loss (July to October, 2015) in Kumasi Abattoir, Ghana**

Location of Bruise	Frequency	Total weight of trimmed parts (kilogram)	Weight of trimmed parts (Pounds)	Cost of trimmed parts (Ghana Cedis*)
Shoulder	3072	166.4	366.08	3642.08
Loin	816	129.6	289.12	2841.12
Butt	432	112.0	246.4	2442.4
Rib	336	76.8	168.96	1680.96
Other Locations	1568	137.6	302.72	3002.72
<b>Total</b>	<b>6,224</b>	<b>622.4</b>	<b>1,373.28</b>	<b>13,609.28</b>

\*1 pound = Gh¢ 10.00

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