
CAUSES OF KIDNEY CONDEMNATION AND ASSOCIATED DIRECT FINANCIAL LOSS AT KUMASI ABATTOIR, GHANA BETWEEN 2002 – 2014

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ABSTRACT

A retrospective and active abattoir survey were conducted from 2002 to 2013 and from November 2013 to March 2014 respectively to determine the major causes of kidney condemnation at Kumasi abattoir, Ghana and also to estimate direct financial loss associated with kidney rejection. Ten kidneys out of 690 cattle and 901 out of 1,052,907 kidneys were condemned respectively between the periods 2013 – 2014 and 2002 – 2013 respectively. The major causes for kidney condemnation were nephritis (33.3 %), putrefaction (25.6 %), tuberculosis (18.2 %), abscessation (13.1 %) and hydronephrosis (10.0 %). The overall direct financial loss from kidney condemned during the study period was estimated to be GH¢ 3,189. Factors such as age, sex, breed, season and festive periods were observed to influence the occurrence of kidney condemnation. The study recommends that attention should be given to the kidney during post mortem inspection as some of the causes of its condemnation were zoonotic.

Keywords: Abattoir, Kidney condemnation, Lesions, Financial implications, Ghana

INTRODUCTION

Livestock in Africa needs to be properly assessed and maximized to contribute to improved nutritional status and the economic growth of the populace. To harness the contribution of Ghana's livestock population placed at 58.4 million; cattle - 2.5 %, sheep - 6.4 % and goats - 8.3 %, to the wellbeing of the populace, the abattoirs must be able to produce healthy, wholesome and clean meat products which can be obtained by ensuring proper ante and postmortem inspection to detect diseases.

On the other hand, the purpose of meat inspection is to protect public health by providing risk free meat products to the society.

Also, it provides information that can be utilized for animal diseases control (Gracy *et al.*, 1999). Most of the abattoir studies undertaken have focused more on the liver, whereas offal including kidney, lung, heart and intestine which constitute delicacy in African meat market and restaurants has not been accorded due attention especially in Ghana.

In Ghana, abattoir studies has focused on fetal wastages (Atawalna *et al.*, 2013) with less emphasis on kidney diseases in slaughtered food animals. This study investigates the prevalence of kidney condemnation and the direct financial losses associated with such condemnation in cattle slaughtered at Kumasi Abattoir between year 2002 and 2014.

MATERIALS AND METHODS

Study Area: The study area has been described by Atawalna *et al.* (2013). Kumasi abattoir lies between 6°39'36.6"N Latitude and 1°36'15.4"W Longitude, in the Kumasi city of Ghana. The animal care, management and slaughtering system that operate in the abattoir have been described by Frimpong *et al.* (2012). Ruminants including cattle meant for slaughter at the Abattoir are often transported from different regions within Ghana especially Brong Ahafo and the northern regions of Ghana and from neighboring countries like Burkina Faso, Mali and Niger. Slaughtered cattle were inspected by trained veterinary technical officers who are supervised by a veterinarian.

Data Collection

Active surveillance: Data on kidney rejection was collected daily for a period of five months (November 2013 to March 2014) after the carcasses were thoroughly examined by standardized post-mortem procedure and lesions were differentiated and judged according to the guidelines on meat inspection manual for developing countries (Herenda *et al.*, 1994).

Retrospective study: Data on the total number of cattle slaughtered and kidney condemned; partial and total was collated from the abattoir records between 2002 and 2013. The results were analysed to determine the monthly and yearly kidney condemned. The direct annual financial loss due to rejection of kidney was calculated based on the reports of Ogunrinade and Ogunrinade (1980) using: $DAL = AC \cdot AP \cdot CR$, where DAL = direct annual financial loss due to organ, AC = annual cattle slaughter at the abattoir, AP = average price of each organ at the market and CR = condemnation rates of each organ.

Data Analysis: Descriptive statistics was used to determine organs and carcass condemnation rates, define as proportion of organs and

carcass condemned to the total number of organs and carcass examined.

RESULTS

For the active survey, 1.5 % prevalence, 10 out of 690 kidneys was obtained (Table 1), while retrospectively, 901 kidneys (0.9 %) of 1,052,907 cattle slaughtered in the twelve year period were condemned. The yearly distribution of the kidney lesions is presented in Table 2.

Table 1: Distribution of kidney lesions in cattle slaughtered in Kumasi Abattoir from November 2013 to March 2014

Kidney Lesion	2013		2014		
	Nov.	Dec.	Jan.	Feb.	Mar.
Nephritis	1	1	0	1	0
Hydronephrosis	0	1	0	0	1
Abscesses	0	0	1	0	0
Tuberculosis	0	2	0	1	0
Putrefaction	0	0	0	1	0
Total	1	4	1	3	1

The causes of the kidney rejection in the slaughtered cattle include nephritis (33.3 %), putrefaction (25.6 %), tuberculosis (18.2 %), abscessation (13.1 %) and hydronephrosis (10.0 %). Lesions which include hydronephrosis characterized by enlargement and disruption of the lobular pattern of bovine kidney (Figure 1A) and putrefaction (Figure 1B). Some other lesions include chronic or granulomatous nephritis with tubercles (Figures 1C and D) accounted for over 55 % of the kidneys condemned.

The highest monthly incidence was observed in July and August (Figures 2 – 6) which were in the rainy season.

Age, sex, breed, season and festive periods were observed to influence the occurrence of kidney condemnation (Figures 7 – 9). Animals within age range of 1 – 2 years were found to be more susceptible to kidney diseases than those from 5 – 7 years. Cows were more prone to kidney disease, while the indigenous West African short horn (WASH) cattle were observed to be more resistant than the Sanga and Zebu cattle breeds.

Table 2: Distribution of kidney lesions in cattle slaughtered in Kumasi abattoir from 2002 to 2013

Kidney Lesion	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Nephritis	24	22	2	40	62	36	24	33	38	13	5	0	300(33)
Hydronephrosis	13	1	3	22	11	20	5	5	6	-	2	2	90(10)
Abscesses	4	3	8	27	14	14	-	20	17	1	2	7	118(13)
Tuberculosis	20	10	17	16	13	13	11	24	4	16	11	9	164(18)
Putrefaction	20	18	14	26	26	19	18	14	14	27	19	16	231(26)
Total	81	54	44	131	126	102	58	96	79	57	39	34	901

Figure in parenthesis = percentage

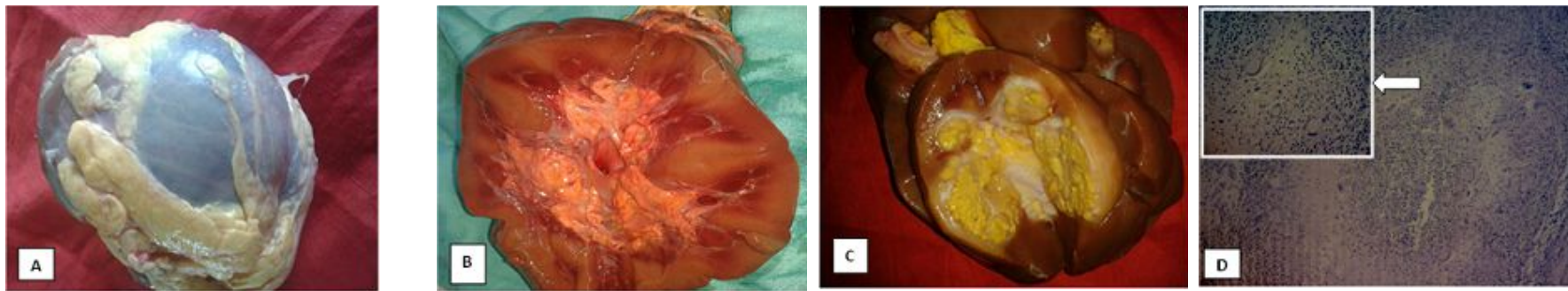


Figure 1 A: swollen and disrupted kidney, B: putrefied kidney C: confluent tubercles in the renal parenchyma D: Histological section of a granulomatous nephritis, with insert showing giant cell

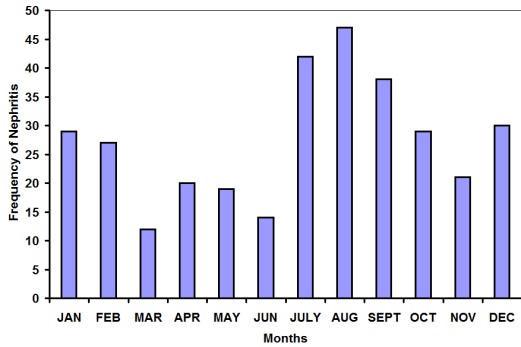


Figure 2: Monthly trends of nephritis observed in cattle slaughtered at Kumasi abattoir from 2002 – 2013

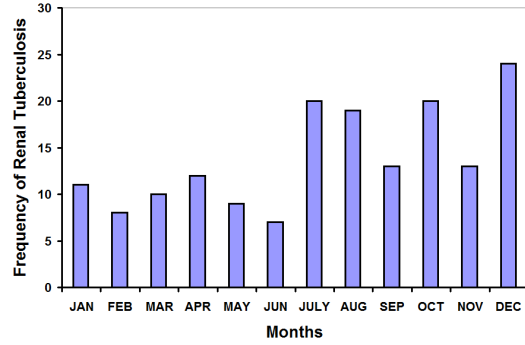


Figure 5: Monthly trends of renal tuberculosis observed in cattle slaughtered at Kumasi abattoir from 2002 – 2013

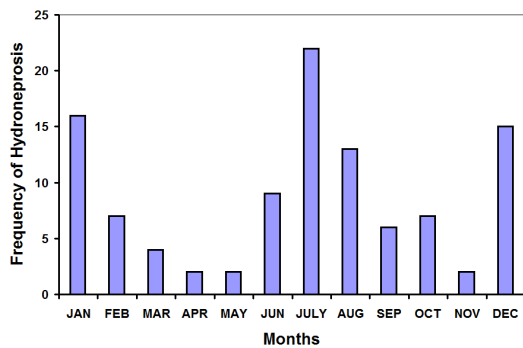


Figure 3: Monthly trends of hydronephrosis observed in cattle slaughtered at Kumasi abattoir from 2002 – 2013

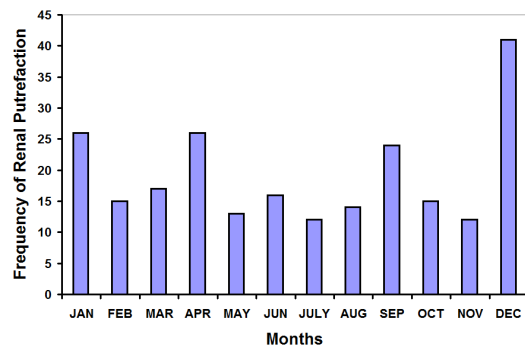


Figure 6: Monthly trends of renal putrefaction observed in cattle slaughtered at Kumasi abattoir from 2002 – 2013

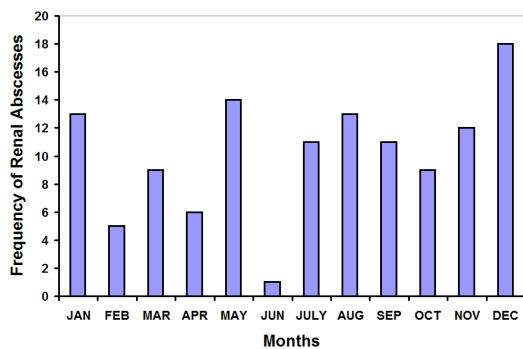


Figure 4: Monthly trends of renal abscesses observed in cattle slaughtered at Kumasi abattoir from 2002 – 2013

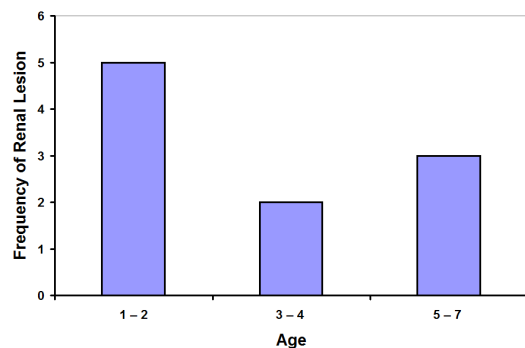


Figure 7: Influence of age on renal lesion observed in cattle slaughtered at Kumasi abattoir (2013 – 2014)

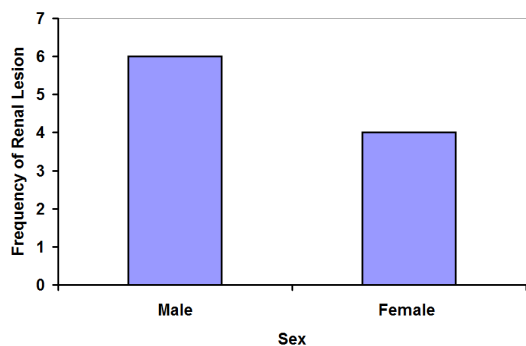


Figure 8: Influence of sex on renal lesions observed in cattle slaughtered at Kumasi abattoir (2013-2014)

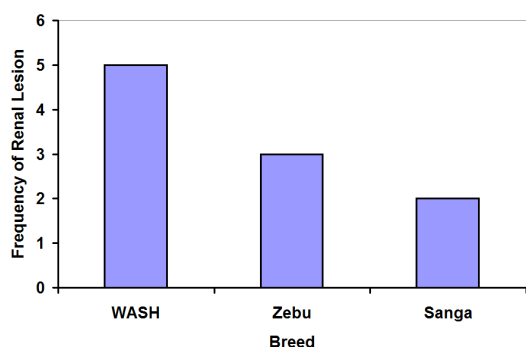


Figure 9: Influence of breed on renal lesions observed in cattle slaughtered at Kumasi abattoir (2013-2014)

The overall direct financial loss from kidney condemned for the 12 years was estimated to be GH¢ 3,153.5, while that of the four months period was GH¢ 35.00 (Table 3).

DISCUSSION

This report describes the cause and direct financial implication of kidney condemnation in a metropolitan abattoir in Ghana. The prevalence of 1.5 % observed lower when compared to 5 % reported by Ansari-Lari (2005) in Iran.

This underscores the need for thorough meat inspection as some etiologies of these are infectious and zoonotic. Nephritis which was responsible for the highest percentage of total kidney rejection in this study was as observed in most studies on renal lesions of food animals (Ansari-Lari, 2005).

Table 3: Financial cost of kidney lesions in cattle slaughtered in Kumasi Abattoir between 2002 – 2013 and November 2013 – March 2014

Year	Yearly Kidney Lesion	Financial Cost GH¢
2002	81	283.5
2003	54	189
2004	44	154
2005	131	458.5
2006	126	441
2007	102	357
2008	58	203
2009	96	336
2010	79	276.5
2011	57	199.5
2012	39	136.5
2013	34	119
Sub-total	901	3153.5
Nov. 2013 – Mar. 2014	10	35
Total	911	3188.5

The tuberculosis lesion observed in this study was far lower than the findings of Marcato and Bettini (1990) and Tavassoly (2003) with reports of 80 % (Italy) and 60.1 % (Iran) tuberculosis lesion in cattle respectively, but higher than 4.2 % reported by Monaghan and Hannan (1983) in Dublin.

The higher incidence of kidney diseases observed in raining season was similar to that reported by Ansari-Lari (2005). Though the calculated direct financial loss may not be enormous but the zoonotic implications of some of the findings could be worrisome. The possible reason for the age and breed predisposition may not be readily explained but reports from previous investigators revealed similar observation (Tavassoly, 2003; Ansari-Lari 2005). The condemnations were more in the rainy season and during festive periods which showed that meat yield was more important than quality in those periods especially in poor-resource settings.

Conclusion: The present study provides a baseline data on renal lesions in slaughtered cattle in Ghana and the need to pay attention on kidney lesion during post mortem inspection as some of the causes of its condemnation were zoonotic hence awareness should be created among butchers of the possible public health

consequences. It also underscore the need for future investigation on the classification of nephritis and bacterial or parasite cause with a plan for a specific program for control of such condition in slaughtered cattle.

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