SOCIO-ECONOMIC IMPLICATIONS OF BOVINE LIVER REJECTION IN A MAJOR ABATTOIR IN SOUTH-WESTERN NIGERIA

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ABSTRACT

This study considered the common causes of liver rejection in an abattoir in Nigeria. It was estimated and compared mathematically the lead causes of rejection of bovine liver. Fascioliasis was the main cause of liver condemnation and its social and economic implications were studied. A total of Nigerian Naira 15,772,200 [US$134,000] was lost directly due to this disease condition in a three-year period and in a single abattoir. Finally, advice was proffered to minimize the problems associated with liver rejection in Nigeria and to improve public health and animal welfare.

Keywords: Cattle, fascioliasis, liver rejection, Nigeria, socio-economics.

RESUMO

Este estudo avaliou as causas mais comuns de rejeição do fígado num matadouro na Nigéria. Foram estimadas e comparadas matematicamente as causa principais de rejeição de fígado de bovinos. A fasciolíase foi a causa principal da reprovação do fígado e foram estudadas as suas implicações sociais e económicas. Apurou-se ter sido perdido um total de 15,772,200 nairas nigerianas (US$ 134,000) directamente devido a esta doença, num período de três anos, num único matadouro. Finalmente, foram definidos e aconselhados procedimentos para minimizar os problemas associados à rejeição de fígado na Nigéria e para melhorar a saúde pública e o bem-estar dos animais.

Palavras-chave: Fasciolíase, gado bovino, Nigéria, rejeição de fígado, socioeconomia.

INTRODUCTION

Meat inspection as part of the veterinary public health activities ensures the delivery of hygienically processed meat for public consumption while preventing the transmission of infectious and zoonotic diseases to humans (Alonge & Fasanmi, 1979). The activity also provides vital data and valuable information on the incidences and prevalence of animal diseases and conditions within any country (Edwards *et al.*, 1997; Phiri, 2006; Ansari-Lari & Moazzeni, 2006).

Nigeria, like many other developing countries in sub-Saharan Africa, is plagued by a myriad of problems among which are poverty and inability to feed its teeming population (Perry & Sonnes, 2007). It has been reported that the animal protein consumption of an average Nigerian is very low (Gefu, 1982). However, a careful observations of the evidences used in determining the quality of the meat provided from the abattoir proved that it may be much deficient as is the quantity. The

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need to intensify meat inspection activities in Nigerian abattoirs and introduce trace-back systems is therefore considered important.

Cattle form the bulk of the animals slaughtered in Nigerian abattoirs and it constitutes a large part of the Nigerian "farm to fork" economy. Bovine liver is one of the largest visceral organs in the animal body, which performs numerous functions (Radostits *et al*., 1994), and a very rich source of vitamins and minerals. The tissue is much sought by consumers and food sailors in Nigeria due to its palatability and ease of consumption however, is one of the most commonly condemned visceral organs during routine meat inspection (Phiri, 2006). Losses associated with the rejection of bovine liver affect farmers, butchers and consumers. However, to date, no empirical evidence exists of an evaluation of the socio-economic losses effects of the liver rejection in Nigeria.

Therefore, this study aims to estimate the costs associated with the effects of liver condemnation at the largest abattoir in a Nigerian mega city, Lagos, during routine meat inspection.

MATERIAL AND METHODS

Study Area and Animals

The Oko-Oba abattoir and lairage is located at Agege (longitude 3º 17′ 01″ and latitude 6º 39′32″), a suburb of Lagos state in the western part of Nigeria. It is one of the largest and best organized abattoirs in Nigeria and receives cattle from various parts of Nigeria, mainly northern Nigeria and even from the countries in the West Africa subregion including Niger, Chad, Burkina Faso, Mali and Cameroon (Cadmus *et al*., 2006). Although the abattoir has the daily maximum handling capacity of more than one thousand and three hundred (1300) heads of cattle, presently operates with a slaughter average of around one thousand (1000) heads of cattle daily. Since most Nigeria abattoirs work early in the morning, due to lack of good storage facilities and good preservation systems, the abattoir appears congested in the morning period, a situation that affects normal handling on a daily basis. Since this abattoir receives animals from a wide geographical area of West Africa and it provides meat to a cosmopolitan population of the city of Lagos, it was considered representative for data collection and for monitoring animal disease incidences and patterns of an average Nigerian abattoir.

Data Collection

The retrospective data covering periods from 2004 to 2008 were collected and analyzed based on abattoir records available through the effort of the meat inspectors and veterinary officers of the Lagos State Department of Veterinary Services (LSDVS). Data of period prior to August 2004 were excluded due to inaccuracy and inconsistency. The LSDVS kept effective and accurate records from 2004 onward following a government directive to commence the monitoring of key zoonotic and infectious diseases at the abattoir.

All of the records of abattoir slaughtering of cattle, carcass and overall rejection were obtained for a period of three years (August, 2004 to August, 2007). Abattoir daily visits were performed between 15th November, 2007 and 15th January, 2008 to ascertain the current status and scope of the problems on the slaughter slabs.

Oral interviews were held with butchers, cattle traders and meat inspection officers.

The average prevailing cost of a kilogram of liver tissue was also obtained through interactions and discussions with the butchers and traders.

RESULTS

During the study period (August, 2004 to August, 2007), a total of 1,170,492 heads

of cattle were slaughtered at the Oko-Oba abattoir and lairage in Agege, Lagos. 9,561 (0.82%) bovine livers were rejected and from these 2,073 (0.18%) were subjected to total rejection, while 7,488 (0.64%) were partial rejected. The lead causes of liver rejection at the abattoir were fascioliasis (88.15%), tuberculosis (5.44%), liver cirrhosis (1.86%) and liver abscess/others causes (4.55%) (Table 1).

The interviews with the meat sailors, traders and public health experts revealed that partial rejection of liver tissue often reduces the market value of the remaining liver to about half of its original value as consumers see such tissues as being inferior and so offer less price for it. The price of a kilogram of bovine liver tissue ranges from Nigerian Naira 500 to 700 (which translates to US$4,25 to $5,95) and normal liver tissues weigh between 3 and 5kg (average 4kg) (Swai & Ulicky, 2009).

For this study it was considered the average values in order to estimate the possible losses due to liver rejection in the abattoir.

Table 2 shows the average weight and price values placed on the losses resulting from recorded rejection.

DISCUSSION

The most common causes of liver condemnation at the Oko-Oba abattoir and lairage were fascioliasis (liver fluke disease), tuberculosis, liver cirrhosis, and liver abscess. This is in agreement with the findings of Alonge & Fasanmi (1979). Authors from other countries also reported that fascioliasis was the most common cause of organ condemnation (Tembely *et al.*, 1988; Kambarage *et al.*, 1995; Ansari-Lari & Moazzeni, 2006).

Recent visits to the abattoir (15th November, 2007 to 15th January, 2008) confirmed the trend of the rejection patterns observed from 2004 to 2007.

Nigerian cattle and dairy industry lies in the hand of nomadic herdsmen. These herdsmen move their cattle along major trade routes in Nigeria in search of feed and water. Their animals drink from swamps, dams, water points and streams as they move. These water points usually presents with lush pastures and the animals often graze such while drinking. The intermediate host of *Fasciola spp.* organism is the water snails (*Lymnea* spp.), which are usually attached to lush pastures around watering points. Thus, while the animal graze on pastures or drink water, they sometimes pick the encysted metacercariae (Reinecke, 1983) and this activity predispose them to many disease entities especially fascioliasis. Previous studies had also indicated that helminthiasis is the lead cause of organ rejection in parts of Northern Nigeria (Ojo, 1996).

In this study, an estimated Nigerian Naira of 18,453,600 (US$155,730) was the calculated loss due to these four main causes of liver condemnation. Fascioliasis alone accounts for N15, 772,200 (US$134,000) (85.47%) of the total calculated losses for the three-year period. Similarly, a gross total liver loss of 8,292 kg was observed with about 75% loss of value in 29,952 kg of partially condemned livers in a single abattoir over a three-year period. Estimating that each of the 36 administrative States and the Federal Capital Territory will record similar losses at least in one abattoir per state this will be translated in huge loss of resources [US$5,762,010] for the country. These enormous losses are especially important for a low-income food deficient country [LIFDC] like Nigeria (World Bank, 2006).

Alonge & Fasanmi (1979) previously established an annual loss of about 500,000kg of condemned meat [whole carcass and other organs (liver, lungs, heart, spleen, skin, etc)] at all abattoirs all over Nigeria estimating at a Nigerian Naira of 1.25million (US$1.8 million at 1979 which corresponds in 2008 to about US$231.3 million). Similar findings have been reported by other authors (Ogunrinade & Ogunrinade 1980; Antia & Alonge, 1982).

The liver tissue is a very rich source of nutrients including protein, iron, some important vitamins (A, D, E, and K) and minerals. It is often recommended for pregnant mothers, individuals in recovering, children, young adults and also for the prevention and

treatment of ailments including anaemia and deficiencies of vitamins and minerals. Condemnation of large quantity of liver tissue reduces the availability and increases its price and competitiveness, a situation that can lead to psychological starvation and deny the poor access to such nutritious tissue.

Furthermore, rejection of liver tissue at the abattoir tends to increase the level of aggression by the butchers who sometimes bear the complete financial burden of such condemnations (Okoli *et al*., 2005; Phiri, 2006). The butchers, subsequently, become less cooperative with meat inspection officers and may sometimes physically attack or assault inspection officers in the course of their routine duties. In the alternative, such butchers may device ingenious ways of excluding the presentation of such liver for inspection.

In addition, some individual farmers and downstream traders depend entirely on the proceeds from sales of cattle offal as their source of livelihood to take care of domestic issues (children school fees, household feeding, health and other bills). Total or partial offal condemnation without compensation deprives this group of people their source of livelihood and increase the level of economic hardship. This could increase social vices and disrupt social order.

Finally, fascioliaisis arising from *Fasciola gigantica* is a major public health threat due to its zoonotic implications for humans. The fluke occasionally infects humans following the ingestion of watercress or other plants containing encysted metacercariae or through zoonotic transmission from infected animals. This may results in clinical disease in humans.

CONCLUSIONS

Our estimation indicated that the losses associated with rejection of bovine liver during meat inspection at the Oko-Oba abattoir and lairage is enormous and transcend financial losses alone. Farmers, veterinarians, extension officers and government must take urgent actions to reduce these losses. While farmers should aim to prevent diseases like fascioliasis through good farm practices, veterinarians and meat inspection officers should not only derive pleasure in condemnation but should enlighten farmers and the butchers on the dangers of infection with *Fasciola spp*.

Regular deworming of farm animals should be encouraged and research into alternative meat sources should be intensified. The government should consider the options of creating and maintaining grazing reserves and the issue of compensation should be reviewed.

Finally, a good Trace-back system should be introduced in order to monitor the source of the infection and to control the infection at source.

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Table 1 – Liver rejection at the oko-oba abattoir and larage from 2004 to 2007.

Period	Aug-Dec, 2004		Jan-Dec, 2005		Jan-Dec, 2006		Jan-Aug, 2007		Total *
Total cattle slaughtered	156, 953		381,855		402,139		229,545		**1,170,492**
Condemnation/Condition	T	P	T	P	T	P	T	P	
Fascioliasis (Liver fluke disease)	165	1,005	546	2,273	207	2821	88	1322	**8,427 (88.15)**
Tuberculosis	161	Nil	167	Nil	172	2	18	Nil	**520 (5.44)**
Liver Cirrhosis	1	11	Nil	Nil	114	52	Nil	Nil	**178 (1.86)**
Liver Abscess	93	Nil	181	2	96	Nil	62	Nil	**434 (4.55)**
Percentage	4.4	10.6	9.3	23.8	6	30	1.7	13.8	
Total (% of total and partial condemnation)	**420 (41.34)**	**1,016 (58.66)**	**894 (39.30)**	**2,275 (60.70)**	**589 (20.49)**	**2,875 (79.51)**	**168 (12.71)**	**1,322 (87.29)**	**9,561 (100)**

*Percentages are placed in parenthesis.
Note: T = Total numbers facing complete rejection.
P = Total numbers facing partial rejection.

Table 2 – Liver rejection at the oko-oba abattoir and larage from 2004 to 2007.

Condition	T.C. (2004-2007)	Weight (Kg)	Cost Implication (Naira)	P.C (2004-2007)	Weight (Kg) [½ of total approximate weight is lost totally]	Cost Implication [total cost of the condemned ½ plus 50% price of acceptable ½] (Naira)	Total Loss (Naira)
Fascioliasis	1,006	4,024	2,414,400	7,421	[½] 29,684	13,357,800	
Tuberculosis	518	2,072	1,243,200	2	[½] 8	3,600	
Cirrhosis	115	460	276,000	63	[½] 252	113,400	
Abscess	434	1,736	1,041,600	2	[½] 8	3,600	
	2,073	**8,292**	**4,975,200**	**7,488**	**14,976**	**13,478,400**	**18,453,600**
			[US$42,000]			**[US$113,740]**	**[US$155,740]**

Note: T.C. = unit of liver tissue totally condemned.
P.C. = unit of liver tissue partially condemned.
The average weight of a liver is taken to be 4kg at a price of N600/kg (US$5.10).
Conversion rate is Nigerian Naira 118.50= US$1.