

(RESEARCH ARTICLE)



Reasons for the seizure of cattle meat, their prevalence, and socio-economic impact in the Cotonou slaughterhouse

Sessiwèdé Ingrid Nadine ANAGONOU *, Dourossimi Adam ADENILE and Dadjo Florian DAGA

Laboratory of Ethnopharmacology and Animal Health, School of Sciences and Techniques of Animal Production, Faculty of Agronomic Sciences, University of Abomey-Calavi, 01 BP: 526 Cotonou, Benin.

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Abstract

The epidemiology of livestock diseases can be monitored through information received from slaughterhouses. The aim of this study is to evaluate the frequency of the reasons for the seizure of cattle meat and the economic and social impact of these seizures at the slaughterhouse of Cotonou from June to August 2021. Out of a total of 6,828 slaughtered cattle, partial seizures were made – 831 (12.17%). The organs frequently seized were the lungs (46.21%) and the liver (32.85%). Other organs seized were the heart, kidneys, and udders.

Furthermore, after all the calculations, it was found that the seizures recorded during this year resulted in a total loss of around 7,625,000 XOF. These investigations were carried out in the Cotonou slaughterhouse, in order to contribute to the enrichment of the scientific sphere, but more importantly to be able to improve public health by identifying the dangers, and sources of diseases in humans.

Keywords: Seizure; Carcass; Cattle; Slaughterhouse; Economic impact

1. Introduction

In Benin, the production of slaughtered animals (cattle, sheep, and goats) for red meat is not an intensive and/or organized production system. Several diseases are caused by the consumption of unhealthy meat [1].

For example, according to the World Health Organisation (WHO), trichinellosis is one of the most important foodborne zoonoses distributed worldwide [2]. Unfortunately, zoonoses transmitted through these foods generate significant economic losses [3].

These economic losses in the cattle industry are mainly due to mortality, organ and carcass seizures, reduced meat production, and increased expenses for animal treatment [4, 5]. According to Abuseir et al. (2019), a slaughterhouse is a wealth of valuable information on the incidence of disease and the condition of individual animals [6]. The production loss of the livestock industry worldwide is estimated to be more than USD 900 million per year [7, 8, 9].

The transhumant and free-range farming system is still dominant, with no animal traceability and very limited use of manufactured feeds and veterinary inputs and services to improve the health of slaughtered animals and subsequently ensure the quality and safety of red meat. In addition, major transboundary animal and zoonotic diseases are endemic in the country and include anthrax, contagious bovine pleuropneumonia, peste des petits ruminants (goat plague), foot-and-mouth disease, and Rift Valley fever [10].

* Corresponding author: Sessiwèdé Ingrid Nadine ANAGONOU

In developing countries such as Benin, where livestock production is an important segment of the agro-pastoral economy, there is a need to continue monitoring the status of parasitic zoonoses to determine their prevalence and economic impacts. Such monitoring can help design and prioritize disease control strategies that a country can implement to protect public and animal health. However, data on the prevalence of meat-borne parasitic zoonoses in slaughterhouses and the associated economic losses are very poor in Benin. This research aims to address this data shortage. Its objective was to evaluate the prevalence and economic losses due to the main parasitic zoonoses encountered in the Cotonou slaughterhouse in Benin.

2. Material and methods

This study was conducted in the Cotonou slaughterhouse. It was conducted for the period June 2021 to August 2021 and resulted in the recording of the number of partial organ seizures and total carcass seizures of cattle, regularly slaughtered in this establishment. The results of the post-mortem inspection of each slaughtered animal were recorded by the official veterinarian in special computerized registers, in which each disease is controlled by a special mark and each animal is indicated by its respective slaughter number.

The recording was carried out using an Asus X55A Series laptop computer with an Intel Pentium B970 processor and the Windows 7 Professional 2009 operating system. Subsequent data transfer was performed using Microsoft Excel for Windows 7.

The characteristics studied were the frequency of total and partial seizures, the type and frequency of lesions found during the post-mortem health examination, and, finally, their evolution during the period of analysis.

2.1. Material

The studied group consisted of 6828 heads of cattle slaughtered during the study period at the Cotonou slaughterhouse. These animals came from various origins: North Benin (Alibori and Borgou departments); Niger, Mali, and Burkina Faso. The inspection equipment used during the veterinary inspection consisted of a pair of boots, a gown, an inspection knife, and a sharpening gun.

2.2. Methods

The method used is based on the post-mortem inspection of the carcasses and the elements of the 5th quarter (lungs, liver, heart, spleen, kidneys) of slaughtered cattle. The inspection technique used at the Cotonou slaughterhouse was adopted for this purpose. The animals selected for slaughter underwent ante-mortem inspection to detect diseases not detectable in the animal at post-mortem inspection. At the end of this inspection, decisions are made to confirm or cancel the slaughter of the animals.

The post-mortem inspection techniques used were: a visual examination of the carcass to assess its general conformation and color. After this stage, the elements of the 5th quarter were examined in detail. This examination consisted of visual observation, palpation, and systematic incision of each organ to detect the presence of cysts, adult parasites, tuberculosis lesions, and other abnormalities [11]. Whenever a seizure was detected, the reason(s) for the seizure is noted, as well as the species of the animal slaughtered.

2.3. Statistical analysis

Two software packages were used to carry out the statistical analyses. The software used was Excel 2016, which served as a database for recording data and calculating averages and standard deviations.

3. Results

Out of 6828 cattle slaughtered during this period, 831 showed pathological lesions warranting condemnation (see table 1), i.e. a rate of 12.17%.

Table 1 Reasons for the seizures and their prevalence from June to August 2021 in the Cotonou slaughterhouse

Types of seized organs	Reasons for the seizures	Number of seized organs		Weight (kg)	Approximate economic loss XOF (€)
		abs	%		
lungs	tuberculosis	199	23.94	253	2,945,000 (4,483)*
	pulmonary congestion	88	10.58	112	
	pulmonary abscesses	97	11.67	123	
liver	distomatosis	78	9.38	151	
	parasitic cyst	15	1.8	29	
	echinococcosis	12	1.44	23	
	abscess	58	6.97	113	
	tuberculosis	99	11.91	192	
	putrefaction	11	1.32	21	
heart	pericarditis	08	0.96	4	
	tuberculosis	08	0.96	4	
kidneys	nephritis	10	1.2	5	
udders	mastitis	148	17.81	148	
Total		831	100	1178	

Remark: * the price of 1 kg of meat is 2,500 XOF and 1 € = 656.9 XOF

We also analyzed the reasons for the carcass seizures (see table 2).

Table 2 Reasons for the seizures and their prevalence from June to August 2021 in the Cotonou slaughterhouse

Types of seized carcass	Reasons for the seizures	Number of seized carcass		Weight (kg)	Approximate economic loss XOF (€)
		abs	%		
Adult cattle	tuberculosis	11	84.61	1320	4,680,000 (7,124)*
	putrefaction	02	15.39	240	
Total		13	100	1560	

Remark: * the price of 1 kg of carcass is 3,000 XOF and 1 € = 656.9 XOF

According to the data of two tables, tuberculosis was absolutely the most frequent reason for the seizures for this period of study, and the lungs were the most common affected organs by the infection.

The lungs were the most frequent seized organ for the period of study – 384 (46.21%), followed by liver – 273 (38.85%), udders – 148 (17.81%). The heart and kidney were rarely seized – 16 (1.92%) and 10 (1.2%), respectively (see figure 1).

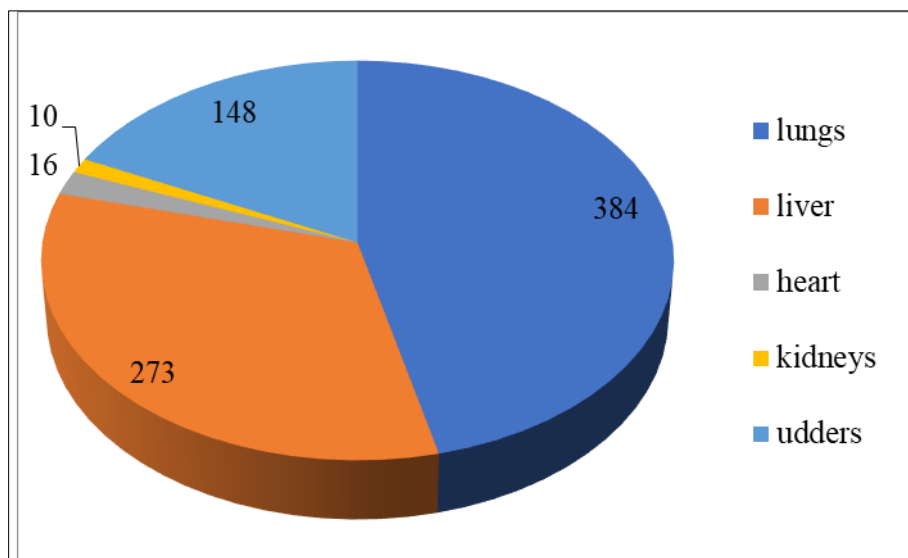


Figure 1 Number of seized organs

Tuberculosis was the main reason for the seizures of the lungs (23.94) – 2 times more frequent than pulmonary abscesses (11.67%) and 2.26 times more frequent than pulmonary congestion (10.58%) (see figure 2).

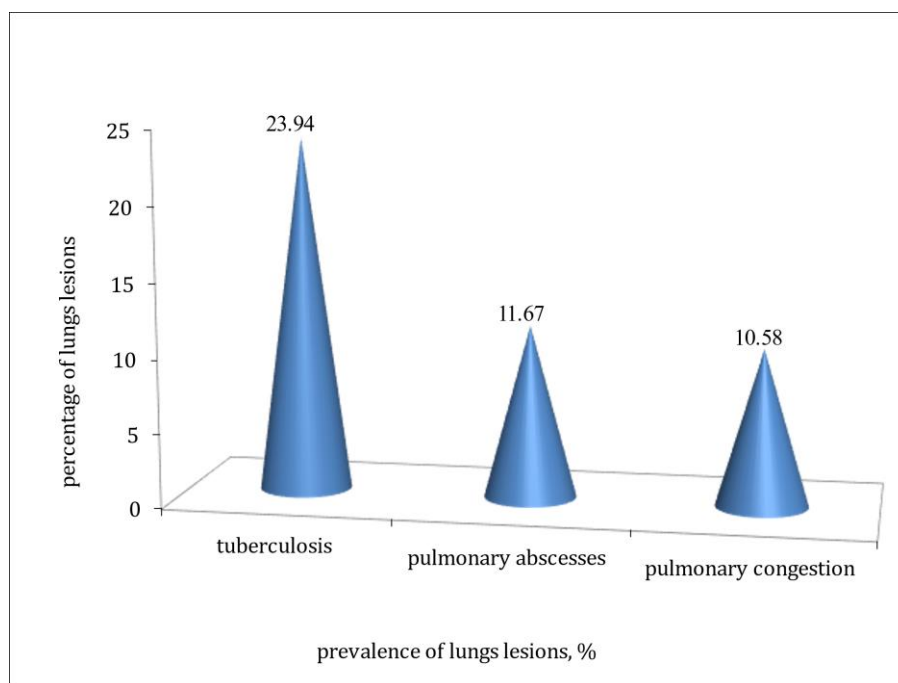


Figure 2 The prevalence of the reasons for the lungs seizures

As for the lungs, tuberculosis was the main reason for the seizures of the liver (11.91), but with no significant difference with distomatosis – 9.38%. At the same time, the rate of tuberculosis of liver was 1.7, 6.6, 8.3 and 9 times higher than the rate of abscess, parasitic cyst, echinococcosis and putrefaction, respectively (see figure 3).

The udders were also ones of the most seized organs – 17.81%, due to mastitis. The rates of heart and kidneys seizures were insignificant, compared with others organs.

As for the economic loss, it was estimated according to the weights of seized meat (organs and carcass) in XOF (converted in Euro, €), considering the selling price per kg of meat on Beninese territory. For these estimates, we have obviously considered the losses from seizures during the period covered by our study: from June 2021 to August 2021.

Out of 6828 cattle carcasses inspected, 1178kg of meat were partially seized and 1560kg of carcasses were totally seized. Therefore, the total economic loss was estimated at 7,625,000 XOF (11,607 €).

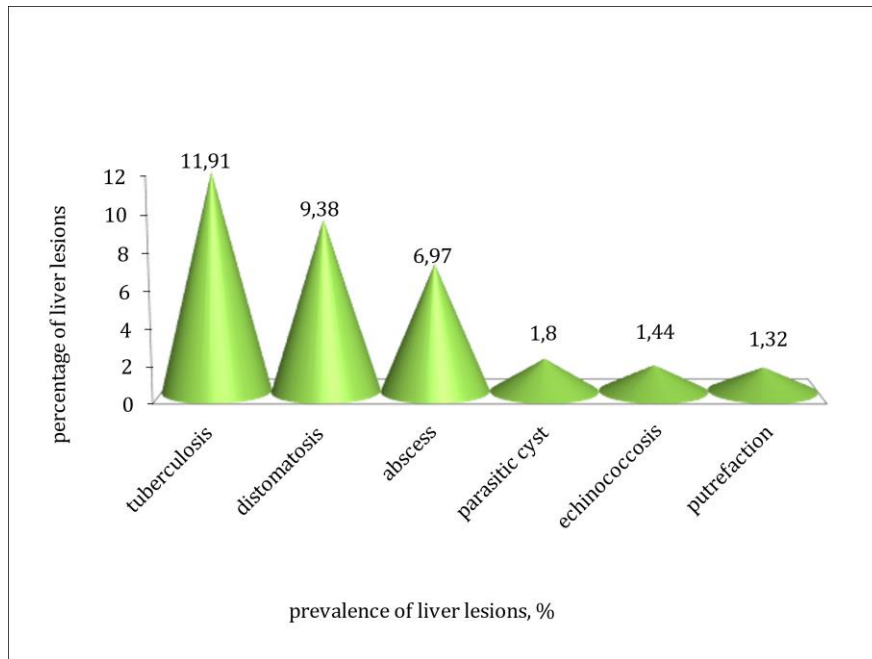


Figure 3 The prevalence of the reasons for the liver seizures

4. Discussion

Our study enabled us to inspect 6828 meat carcasses. In economic terms, our work revealed the loss of more than 2738 kg of meat in three months. This means that the total amount of organs seized was 1178 kg plus the 1560 kg of total carcass seizures. In terms of health, 15 reasons for seizure were found, including 13 cases of partial seizure and two cases of total seizure. The main ones are distomatosis; parasitic cysts and tuberculosis.

In our study, the most frequent reason for seizure was tuberculosis – 317 out of 844 (37.56%). The economic importance and public health significance of tuberculosis have been established in many countries [12, 13, 14]. Similar to the result obtained by Awah-Ndukum et al [15] in Yaoundé-Cameroon, tuberculosis was the main cause of whole carcass condemnation. The prevalence of tuberculosis is lower than that reported in Chad [16] and Nigeria [17] while fasciolosis was the main cause of carcass condemnation recorded in Jimma and Gondar abattoirs in Ethiopia [18, 19].

Recently, Abdelsalam DOUTOUM et al. examined the economic effects of bovine tuberculosis in Chad [20]. However, in Benin, the economic impact of this disease on livestock productivity, bovine tuberculosis control programmes and other economic effects related to the disease are not yet well documented or studied. Few slaughterhouse meat inspection surveys have shown the rate of condemnation of the whole or partial carcass and organs. For small ruminants, P.S. KIKI et al. reported in 2021 that out of 6,868 small ruminants (sheep and goats) slaughtered in the slaughterhouse of the city of Parakou, the organs frequently seized in both species were the lungs (52.7% and 33.6% respectively in goats and sheep) [21]. Tuberculosis is a zoonotic disease and its occurrence in slaughterhouses should be considered a public health problem [22].

In our study, we found that liver seizures are mainly due to distomatosis. The frequency of this reason is related to the season, as most of the animals come from water areas. In these areas, there is a pullulation of the distomatosis vector, i.e. *Limnae truncatula* hosting *Fasciola hepatica* which is its causal agent. The areas where the animals stay to meet all the conditions for the transmission of distomatosis because the vector has been observed during the whole period of the year. Indeed, worms are known to be intermediate hosts of *Fasciola gigantica*. In addition, routine deworming is not practiced by many farmers. The losses caused by the seizure of livers in slaughterhouses are enormous. This loss has been estimated at more than one million Algerian dinars in two slaughterhouses in Algeria [23]. This represents a significant loss of income for meat professionals. However, the major problem with this inspection in slaughterhouses is the frequent absence of transmission of the reasons for seizing livers to farmers and their health veterinarians. This lack of feedback from slaughterhouses leads to fasciolosis being virtually forgotten by those in the field [24].

The prevalence of other causes of seizure such as nephritis, pericarditis, parasitic cyst, putrefaction and echinococcosis was low (1.2%, 0.96%, 1.8%, 1.32% and 1.44%). Mastitis was more frequent than the previous rare reasons – 17.81%. Nephritis, hydronephrosis, and kidney stones have been reported elsewhere as the main causes of kidney failure [25, 26]. While Amene et al [5] reported hydronephrosis as the main cause of kidney failure.

Pericarditis was the main cause of heart failure. This result is similar to those obtained by Yifat et al [27] and Shitaye et al [28]. Other causes of cardiac condemnation have also been recorded by other authors. These are hydatid cysts and *Cysticercus bovis* [29].

The etiological agents of the abscesses observed in this study are not known.

The study revealed huge direct financial losses. For about 3 months (June 2021 to August 2021), 7,625,000 XOF (11,607 €) of loss was recorded. This is induced by the condemnation of carcasses and organs and the various causes of condemnation. Larger direct monetary losses from organ condemnations in Ethiopia alone, ranging from US\$ 9,093.88 to US\$ 13,508.16 [equivalent to 5,638,205-8,375,059 XOF, at US\$ 1 = 620 XOF] were estimated [5].

Thus, tuberculosis and fasciolosis are the main diseases that have important economic implications for livestock production in Africa. Indeed, it has been estimated that tuberculosis alone causes financial losses of US\$10 million per year [5], with public health consequences through the consumption of contaminated milk and fresh meat [30]. Losses due to fasciolosis have been estimated at around US\$ 200 million/year with over 600 million infected animals [23].

5. Conclusion

Our study, which lasted three months, showed that the main reasons for the seizures of cattle organs and carcasses at the Cotonou slaughterhouse were distomatosis, parasitic cysts, echinococcosis, liver abscesses, hepatic tuberculosis, putrefaction, pulmonary tuberculosis, pulmonary congestion, pulmonary abscesses, pericarditis, cardiac tuberculosis, nephritis, and mastitis. All these reasons for seizing meat are likely to cause various pathologies in consumers.

Actions should be programmed to reduce the presence of these diseases. On the one hand, they will ensure the protection of the consumer's health and, on the other hand, they will defend the economic interests of the farmers.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

Statement of ethical approval

The different experiments are carried out in an ethical manner in accordance with national and international law.

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