Animal diseases and zoonoses at a municipal slaughterhouse in Southwest Nigeria: Three-year retrospective survey (2014–2016)

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Summary

Slaughterhouses are certified premises where animals are slaughtered and inspected to ensure meats are wholesome and safe for public consumption. To determine the common zoonoses encountered in a municipal slaughterhouse of Abeokuta, Ogun State, Nigeria, a three-year retrospective study was conducted (2014–2016). During the review of slaughterhouse records, the overall throughput of cattle slaughtered was 146,794 (4077.6 ± 413.6; 95% confidence interval [CI] 3923.3–4206.7). Female animal slaughtering outweighed male ones at 5:1 ratio ($p < 0.0001$). The highest number of cattle were slaughtered in December 2014, December 2015, and August 2016. Of all the total cattle slaughtered, the overall observed prevalences for bovine tuberculosis (BTB), hydatidosis and fasciolosis were estimated as 9514 (6.5%, 264.3 ± 81.7; 95% CI 236.6–291.9), 1851 (1.3%, 55.8 ± 17.3; 95% CI 49.9–61.6) and 845 (0.6%, median = 19.0; 95% CI 18.7–28.3), respectively. On average the highest number of BTB cases was reported in February-March, it declined slightly in October and increased again in November. Similarly, the highest numbers of hydatidosis and fasciolosis were observed in March and February, respectively. A significant ($p = 0.02$) mean variation of cases of BTB was found across the period and it was higher ($p = 0.03$) during the wet/rainy season in 2015. Our results emphasized the need to promote coordinated active surveillance for zoonoses detection and mitigation to ensure food safety at farm and slaughterhouse levels. Adequate record keeping for specific organ/meat/carcass condemnation is crucial at postmortem, as this represents a significant loss of animal proteins and revenues. Such data can be used for informed policy to intensify reduction in economic loss associated with animal diseases.

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■ INTRODUCTION

Abattoirs (ABAT) and slaughterhouses (SH) are registered facilities designated for food animal inspections pre- and post-slaughtering (antemortem and postmortem) by government-certified veterinary officers. Inspections are routinely performed to ensure meat consumed by the public is of utmost quality and free from any form of zoonotic infectious diseases that could affect consumer health and food safety. Furthermore, abattoir facilities are major sources of valuable information for animal disease outbreaks, but they could become an environment for meat-borne zoonosis dissemination via direct human contact with infected animals and or indirectly by consumption of the contaminated meat (Fasanmi et al., 2017).

Unlike in the industrialized countries, many ABAT/SH in Nigeria struggle to meet internationally recommended standards and guidelines provided by the World Trade Organization (WTO), World Organization for Animal Health (WOAH formerly OIE), World Health Organization (WHO), Food and Agriculture Organisation (FAO) and Codex Alimentarius Commission (Fasanmi et al., 2017). Many studies have documented and criticized the unacceptable working environment, hygiene and operations of ABAT/SH in developing countries and the limitations to international trade (Cadmus and

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Adesokan, 2009; Tekki et al., 2012; Adebowale et al., 2016; Fasanmi et al., 2017). The poor state of national abattoirs, hygiene, management, environment and meat inspection have led to high risks for contamination of meat and meat products. Harmful bacterial, viral, and parasitic zoonotic infectious diseases, and subsequent dissemination to consumers could cause severe to fatal infections (Tekki et al., 2012). A systematic review on abattoir zoonoses in Nigeria conducted by Fasanmi et al. (2017) reported an increased trend in occurrence of abattoir zoonoses as the years of studies progressed; also there was a corresponding increase in human cases of zoonoses as the occurrence in slaughter animals increased from 2001 to 2016. However, there is limited evidence linking zoonoses from food animal slaughtering facilities and the transmission mechanisms to consumers' disease outbreaks involving the food chain (Fong, 2017), which may be caused by inadequate data management and zoonosis surveillance systems in the country.

Improving food safety and hygiene practices at the abattoir phase of the food animal value chain is integral to successful attainment of the sustainable development goals especially food security and sustainable agriculture, sanitation and hygiene (Morse et al., 2018). In meeting these goals in Africa and potential international trade, a need for an integrated and multidisciplinary approach is crucial (Morse et al., 2018). This study is part of an ongoing intervention collaborative research focusing on abattoir zoonotic threats and food safety challenges in Southwest Nigeria. We aimed to estimate the prevalence of abattoir zoonoses in particular tuberculosis, fasciolosis, hydatidosis, brucellosis, and cysticercosis in slaughtered bovines at a municipal slaughterhouse in Ogun State.

■ MATERIALS AND METHODS

Study location

The municipal slaughterhouse is located in Abeokuta North Local Government, Ogun State, Nigeria, at 3º 19.7' E and 7º 9.8' N, and extends over 16,400 square kilometers (Figure 1). Abeokuta has a population of about 533,000. Ogun borders Lagos State to the south, Oyo and Osun states to the north, Ondo State to the east and Benin to the west. Abeokuta is the capital and largest city in the State.

Abeokuta slaughterhouse

The SH consists of a lairage, where the animals are rested 24 hours before slaughter. Antemortem inspections are conducted within the lairage by certified veterinary officers in line with the 1978 Nigerian Meat Edict. The lairage leads to two slaughter slabs (one enclosed, one open), where dressing of carcasses and mixed operations (clean and dirty) are performed by butchers. There, postmortem meat inspections are carried out by qualified veterinarians and para-veterinarians using visual examination, palpation, and systematic incision of carcasses and visceral organs (Adebowale et al., 2020). Potable water sources for abattoir operations and waste treatment facilities are lacking. Animal by-products such as bones, hooves and horns are disposed of within and around SH premises (Adebowale, 2019). Slaughtering is done between 7 am and 11 am from Monday to Saturday.

Data source and collection

Our retrospective study design covered three-year secondary data (January 2014–December 2016) from abattoir records provided by the Department of Veterinary Services, Ministry of Agriculture, Ogun State. The following data were collected: i) throughput of animals slaughtered, ii) various zoonotic diseases, iii) total number of suspected and confirmed cases based on visual inspections and laboratory investigations (where available), respectively, and iv) total number of condemned cases (partial or total condemnation). The data on zoonoses, particularly tuberculosis, fasciolosis, brucellosis, leptospirosis, anthrax and cysticercosis, were considered suitable based on the records presented by the veterinary service department. Animal food production safety has become a high priority for WOAH, and departments of veterinary services of member states including

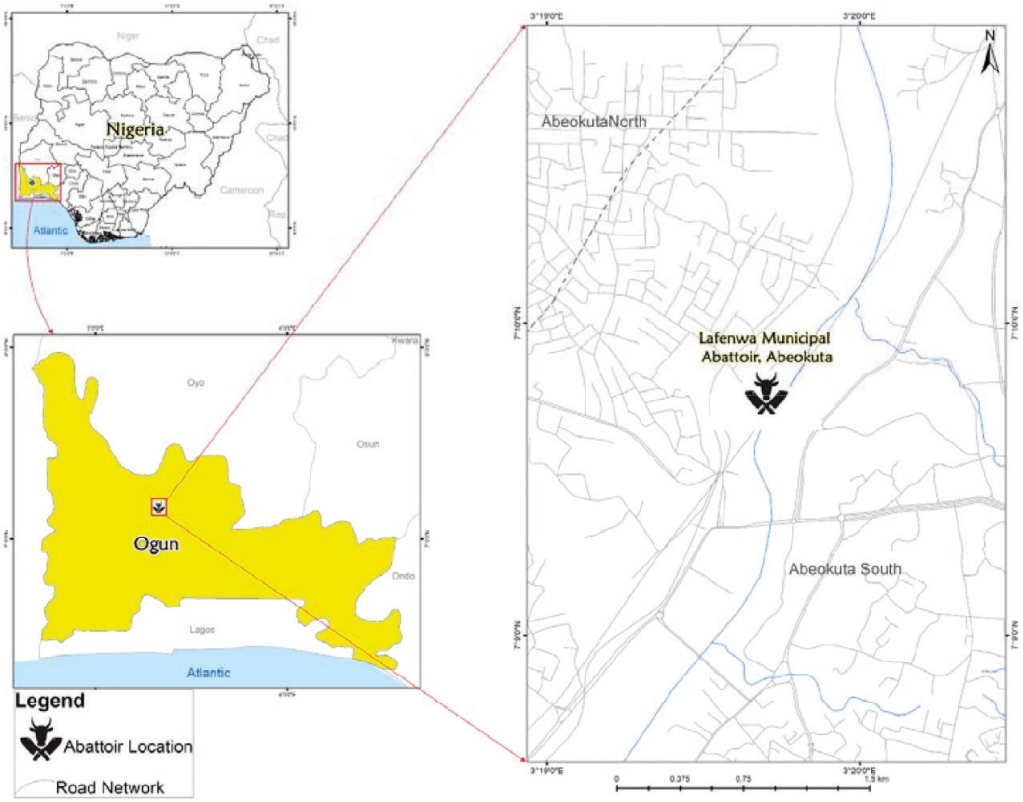

Figure 1: Location of Lafenwa Municipal Slaughterhouse, Abeokuta, Ogun State, Nigeria /// *Localisation de l'abattoir municipal de Lafenwa, Abeokuta, Etat d'Ogun, Nigeria*

Nigeria are central to this mission in monitoring, preventing and controlling zoonoses. Also, efficient monitoring and reporting of these zoonoses conforms with FAO-OIE-WHO priority to control threats through adequate surveillance, disease reporting and early notification to promote timely responses, contain impending outbreak and protect global health.

Data analysis

Data were entered in Excel spreadsheet (2016) and exported into computer statistical analysis software Graph Pad Prism 9.1.0. For descriptive statistics, the throughput of animals slaughtered and various zoonoses reported from 2014–2016 were computed. The apparent prevalence of the various zoonoses with 95% confidence interval (CI) was estimated as the number of cattle visually suspected by certified veterinarians as harboring these diseases/lesions during postmortem meat inspection divided by the number of slaughtered cattle (Dupuy et al., 2014). Furthermore, the mean variations were determined with Student T test or alternative nonparametric test (Mann Whitney). The annual, monthly, and seasonal distributions were estimated and presented as graph plots. To understand better the seasonal patterns of cattle slaughter and disease conditions at the SH the months were divided into two seasons: a dry season (November to March), and a rainy or wet season (April to October). Mean differences in the number of zoonoses reported were determined using the ordinary two-way analysis of variance test (ANOVA); comparison was conducted using Dunnett's multiple comparisons test; the significance level was set at $p \leq 0.05$.

■ RESULTS

Animal slaughter throughput

Following the exploration of the available records on meat inspection from 2014 to 2016, the overall throughput of cattle slaughtered was 146,794 (4077.6 ± 413.6 per month; 95% CI 3,923.3–4206.7). The total numbers of female and male cattle slaughtered were 122,460 (3402.0 ± 411.2 per month; 95% CI 3263.0–3541.0) and 24,334.0 (median = 565.0; 95% CI 589.1–762.8 per month), respectively. The number of females slaughtered outweighed males at ratio 5:1 ($p < 0.0001$), with the highest number of cattle slaughtered in December 2014, December 2015, and August 2016. Figure 2 shows that more animals were slaughtered during the wet season than in the dry season, but this was not significant ($p = 0.55$).

Patterns of zoonotic and non-zoonotic conditions

Three common zoonoses reported at the slaughterhouse over this period were bovine tuberculosis (BTB), hydatidosis, and fasciolosis. Of all 146,794 cattle slaughtered, 9514 (6.5%, 264.3 ± 81.7; 95% CI 236.6–291.9), 1851 (1.3%, 55. 8 ± 17.3; 95% CI 49.9–61.6) and 845 (0.6%, median = 19.0; 95% CI 18.7–28.3) were infected with BTB, hydatidosis and fasciolosis, respectively. Other non-zoonotic diseases or conditions encountered were dermatophilosis (2.4%), lymphadenitis (1.3%), abscess (mainly affecting the liver, kidneys and muscles, 0.6%), mastitis (0.01%), and mange (0.8%) (Table I). For all disease conditions, no confirmatory procedures were conducted.

Over the three years, the average monthly occurrence of BTB was highest in February (9.5%) and March (9.7%), and declined in October (5.2%, Figure 3a). Similarly, hydatidosis and fasciolosis occurrences were highest in March (11.4%) and February (15.5%), respectively. With regard to the seasons, no significant variation in the mean number of BTB was reported in both wet and dry seasons, although higher numbers were reported during the wet season in 2014 (15.5%), 2015 (22.2%) and 2016 (18.5%) (Figure 3b). Similarly, for hydatidosis ($p = 0.23$) and fasciolosis ($p = 0.34$) there was no mean difference in the seasonal occurrence.

Organ condemnations due to multiple pathological conditions observed during postmortem inspection were reported. However, partial or total condemnation data was only recorded for BTB. The condemnations involved the lungs, liver, kidneys, spleen, heart, intestines, skin and muscles, but organ-specific data was absent, making it difficult to estimate associated monetary or animal protein loss over the period.

■ DISCUSSION

This study revealed that more female cattle are slaughtered than male ones and corroborates our previous study on female cattle slaughter and fetal wastage in the same SH (Adebowale et al., 2020). Other studies in Nigeria (Hassan et al., 2016; Onyinye et al., 2018) and in other African countries (Swai et al., 2012; Tasiame et al., 2016) have reported similar outcomes. The high rates of female slaughtering impacts livestock sector productivity, sustainability (as more females are required in reproductive and milk production processes than males), and food security in Nigeria. To promote sound economic livestock management and sustainability in developing countries, animals presented at abattoirs for slaughter should be males, and reproductively inactive females (Fayemi and Muchenje, 2013). Furthermore, higher numbers of animals slaughtered during the wet season may be caused by the usual increase in cattle production with a corresponding decrease in prices in that season.

The most common zoonoses reported at inspection were BTB, hydatidosis and fasciolosis. Our findings support a previous study in Nigeria that reported fasciolosis (6.8%), other helminths (7.7%), tuberculosis (2.4%), and contagious bovine pleuropneumonia (1.8%) as common zoonoses or disease conditions encountered in seventeen major slaughterhouses from 14 of 19 states in Northern Nigeria and in Abuja (Federal Capital Territory) (Bello et al., 2015). Similarly in Tanzania, common zoonoses in trade cattle slaughtered at Tanga City abattoir included hydatidosis, cysticercosis and BTB (Swai and Schoonman, 2012). Other abattoir-based surveys in Tanzania showed

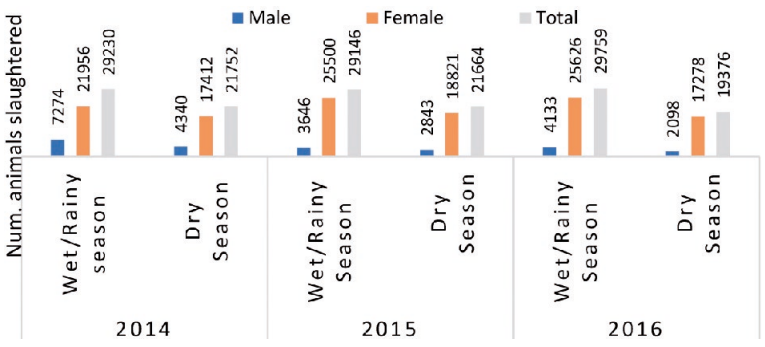

Figure 2: Number of animals across seasons at Lafenwa Municipal Slaughterhouse, Abeokuta, Ogun State, Nigeria (2014–2016) /// *Nombre d'animaux en fonction des saisons à l'abattoir municipal de Lafenwa, Abeokuta, Etat d'Ogun, Nigeria (2014–2016)*

Table I: Various diseases/conditions, partial and total condemnations reported at Lafenwa Municipal Slaughterhouse, Nigeria, from 2014 to 2016 /// *Diverses maladies/conditions, condamnations partielles et totales déclarées à l'abattoir municipal de Lafenwa au Nigeria de 2014 à 2016*

Disease/ condition	2014 (N = 50,982)				2015 (N = 50,810)				2016 (N = 45,002)			
	Suspected		Condemned (n = 2523)		Suspected		Condemned (n = 3747)		Suspected		Condemned (n = 3244)	
	Total (%)	Mean (SD) per month	TC (%)	PC (%)	Total (%)	Mean (SD) per month	TC (%)	PC (%)	Total (%)	Mean (SD) per month	TC (%)	PC (%)
* BTB	2523.0 (5.0)	210.3 (59.2)	1815.0 (71.9)	708.0 (28.1)	3747.0 (7.4)	312.3 (80.0)	3010.0 (80.0)	737.0 (20.0)	3244.0 (7.2)	270.3 (74.9)	2608.0 (80.4)	636.0 (19.6)
* Hydatidosis	630.0 (1.2)	52.5 (17.5)	NA	NA	580.0 (1.1)	48.3 (11.2)	NA	NA	641.0 (1.4)	53.4 (13.8)	NA	NA
* Fasciolosis	352.0 (0.6)	29.3 (16.8)	NA	NA	189.0 (0.3)	15.8 (6.0)	NA	NA	304.0 (0.7)	25.3 (14.6)	NA	NA
# Dermatophilosis	1220.0 (2.4)	101.7 (30.5)	NA	NA	1427 (2.8)	118.9 (73.5)	NA	NA	769 (1.7)	64.1 (6.6)	NA	NA
# Lymphadenitis	200 (0.4)	16.7 (12.6)	NA	NA	760 (1.5)	63.3 (31.0)	NA	NA	885 (1.9)	73.8 (19.5)	NA	NA
# Abscess	279 (0.5)	23.3 (12.0)	NA	NA	285 (0.5)	23.8 (11.1)	NA	NA	317 (0.7)	26.4 (12.0)	NA	NA
# Mastitis	181 (0.4)	15.1 (7.7)	NA	NA	93 (0.2)	7.8 (4.6)	NA	NA	67 (0.1)	5.6 (3.4)	NA	NA
# Mange	362 (0.7)	30.2 (18.6)	NA	NA	633 (1.2)	52.8 (55.7)	NA	NA	236 (0.5)	19.7 (8.5)	NA	NA

SD: Standard deviation; * Zoonotic conditions; # Non-zoonotic conditions; N: Total number of cattle slaughtered each year; n: Total number of organs/meats condemned each year; TC: Total condemnation; PC: Partial condemnation; NA: Data not available; BTB: Bovine tuberculosis /// *SD: Ecart-type ; * Conditions zoonotiques ; # Conditions non zoonotiques ; N : Nombre total de bovins abattus chaque année ; n : Nombre total d'organes / de viandes condamnés chaque année ; CT : Condamnation totale ; PC : Condamnation partielle ; NA : Données non disponibles ; BTB : Tuberculose bovine*

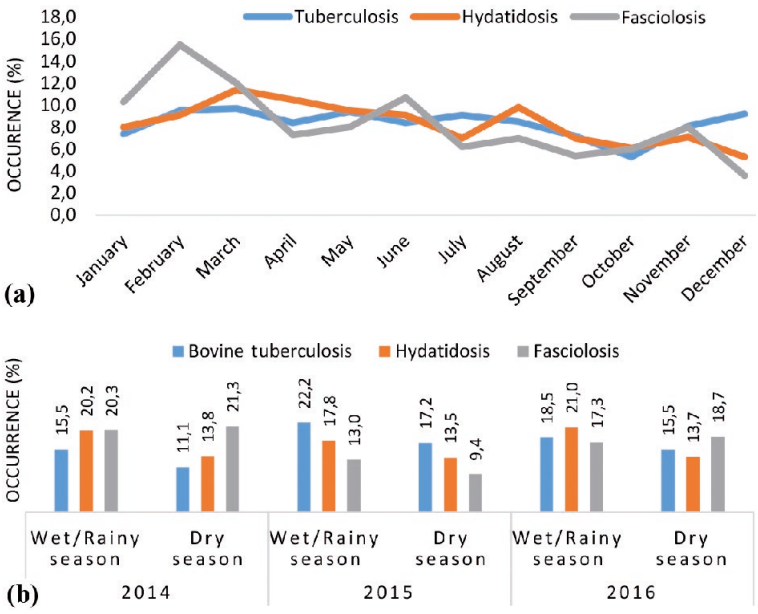

Figure 3: (a) Monthly trend of major zoonoses and (b) Major zoonoses reported across seasons, Lafenwa Municipal Slaughterhouse, Abeokuta, Ogun State, Nigeria (2014–2016) /// *(a) Evolution mensuelle des principales zoonoses et (b) Principales zoonoses signalées en fonction des saisons, abattoir municipal de Lafenwa, Abeokuta, Etat d'Ogun, Nigeria (2014–2016)*

that cattle organs and/or carcass condemnation were associated with hydatidosis, cysticercosis, fasciolosis, and BTB (Mellau et al., 2011; Tembo and Nonga, 2015), though with lower levels of occurrences except fascioliosis when compared with our study. In our study, abattoir data showed that organ condemnations (both partial and total) were based on lesions observed at postmortem by certified veterinarians. Condemnations of organs were documented solely for BTB. The common zoonoses reported at Lafenwa SH pose potential health risks to meat consumers and intensify the need for routine surveillance in animals to estimate the prevalence adequately, possible economic impacts, and public health consequences (Mellau et al., 2011).

BTB prevalence between 2014 and 2016 was 6.7%. This was similar to previous studies conducted in Nigeria (Ejeh et al., 2014; Okeke et al., 2016), Pakistan (Memon et al., 2018), Sicily, Southern Italy

(Abbate et al., 2020). In contrast, a higher prevalence was reported in Lagos, Nigeria (25.7%, Agbalaya et al., 2020) and a lower one in Maiduguri, Nigeria (1.6%, Bala et al., 2011), and Tanga, Tanzania (0.32%, Swai and Schoonman, 2012). In Nigeria, BTB is an endemic zoonotic disease of major public health and economic importance. BTB control measures have not been implemented in cattle production systems in the country, resulting in high risks of occupational and consumer exposures (Agbalaya et al., 2021). The estimated incidence and associated human deaths caused by BTB in Africa is 68,900 and 8440 per year, respectively (Kanabus, 2021). BTB control and eradication continuum in cattle have been very challenging in Nigeria and many developing countries. The limitations may include the extensive rearing systems and migratory patterns of herders in the country, inhibiting disease tracking and surveillance. Also, poor implementation practices in the form of on-farm BTB control programs, inefficient and non-integration of disease surveillance systems of farms to slaughterhouses monitoring may exacerbate control practice. Furthermore, there is a lack of infrastructural resources, including financial commitment by the government to mitigation planning as well as poor laboratory capacity and functionality building for prompt detection of disease along the cattle food chain, poor disease response strategies, and poor record keeping and reporting. Conversely, many European Union countries have successfully eradicated BTB through a 'test-and-slaughter' strategy, which involves the systematic testing of cattle at herd level and slaughter of infected animals, with movement restrictions for the herd of origin until it is declared free from infection in consecutive whole-herd tests. In addition, these countries provide large incentives to support veterinarians, animal health services and livestock farmers (Abbate et al., 2020).

The prevalence of hydatidosis (caused by the larval stages of the tapeworm *Echinococcus granulosus*) and of fasciolosis (caused by *Fasciola* spp.) was lower in this study (1.3% and 0.6%, respectively), corroborating previous studies in Nigeria (Bala et al., 2011) and Iran (Shahbazi et al., 2016). In contrast, a study conducted in cattle slaughtered at Lira Municipality Abattoir in Northern Uganda recorded over 65.0% of liver samples infected with *Fasciola* spp. (Opio et al., 2021). The low prevalence of these diseases in our study may be due to improved and heavy use of antiparasitic agents to enhance animal production and economic gains. Cattle acquired from the northern regions of the country are placed on arrival under quarantine by veterinary services in the State, and provided routine treatments including deworming.

In the three years reviewed, BTB and hydatidosis were more reported in the wet season than in the dry season, corroborating findings also in Nigeria by Bala et al. (2011). However, this was contrary to a survey conducted in the same slaughterhouse in 2013 (Oluwasile et al., 2013). Hydatidosis risk is higher in areas of high rainfall, snail infestation and high animal density (Mellau et al., 2011). High incidence of hydatidosis and fasciolosis during the wet season suggests that cattle may have contracted the infection during the late dry season and early rainy season, a period of intense scarcity of crop residues when pastoralists migrate their cattle to low land marshy areas in search of feed and water. During this period, cattle usually ingest the metacercarial cysts or embryonated eggs for fasciolosis and hydatidosis, respectively, on plants around January. Also, condemnation of organs or carcasses may be more frequent in the wet than in the dry season, with great economic implications for farmers and butchers who are not compensated for their losses by the government (Ejeh et al., 2014).

The approach to end the challenges of infectious diseases/zoonoses in the country will need to be based on maximizing the efficient and cost-effective use of resources through good governance and stewardship, adequate monitoring and evaluation ensuring accountability and prompt reporting, engaging with and educating the communities as part of the extended health system, and accelerating efforts for local adaptation of WHO, FAO and WOAH global strategies (Raviglionea and Maher, 2017).

Lastly, the true prevalence of the common zoonoses reported in this study could not be estimated taking into account the sensitivity of meat inspection and the scarce data on the detection performance of meat inspection. According to Dupuy et al. (2014), it is critical to conduct future work including expert opinions to establish the baseline detection fractions, i.e. the overall proportion of infected or affected animals successfully detected by meat inspection by the official inspector compared with known reference methods, for common zoonoses in slaughterhouses and abattoirs in Nigeria.

■ CONCLUSION

The presence of various zoonoses in this study indicates inadequate farm-level disease prevention approaches, further exacerbated by subsequent unsafe abattoir/slaughterhouse meat production for public consumption. The predominant zoonoses, which were bovine tuberculosis and mild infections such as hydatidosis and fasciolosis, potentially contribute to substantial economic loss for butchers and to animal protein deficit due to organ or meat condemnations. The intensification of BTB control programs and funding at national and farm levels is critical to ensure safety of the cattle meat value chain in the country. Poor record keeping and organ condemnations based only on gross pathology due to inadequate laboratory facilities for more specific and sensitive diagnosis needs improvement. Laboratories' involvement, personnel continuing programs in diagnostics, and educational awareness on zoonoses among all stakeholders are crucial. An integrated active surveillance system for prompt detection of specific zoonoses, and risk-based approach to transmission prevention along the meat food chain are essential to promote consumer health and non-exposure to zoonoses.

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Conflicts of interest

The study was carried without any conflict of interest.

Author contributions statement

OOA and OE participated in the conception and design of the work; OOA, OO, and MO collected data; OOA and AAA performed statistical analyses; OOA drafted the first version of the manuscript; OE critically reviewed the manuscript. All authors read and approved the final version of the manuscript to be published and agreed to be accountable for all aspects of the work.

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Résumé

Adebowale O.O., Ekundayo O., Olasoju M., Oladejo O.O., Awoseyi A.A. Maladies animales et zoonoses dans un abattoir municipal du sud-ouest du Nigeria : enquête rétrospective sur trois ans (2014-2016)

Les abattoirs sont des lieux certifiés où les animaux sont abattus et inspectés pour garantir que les viandes sont saines et sans danger pour la consommation publique. Pour déterminer les zoonoses courantes rencontrées dans un abattoir municipal d'Abeokuta dans l'Etat d'Ogun au Nigeria, une étude rétrospective sur trois ans a été menée (2014–2016). Lors de l'examen des registres de l'abattoir, le nombre total de bovins abattus était de 146 794 (4077,6 ± 413,6 ; intervalle de confiance à 95 % [IC] 3923,3–4206,7). Le nombre d'animaux femelles abattus était supérieur à celui des animaux mâles, ratio de 5:1 ($p < 0,0001$). Le plus grand nombre de bovins a été abattu en décembre 2014, décembre 2015 et août 2016. Sur l'ensemble des bovins abattus, les prévalences globales observées pour la tuberculose bovine (TBB), l'hydatidose et la fasciolose ont été estimées respectivement à 9514 (6,5 %, 264,3 ± 81,7 ; IC 95 % 236,6–291,9), 1851 (1,3 %, 55,8 ± 17,3 ; IC 95 % 49,9–61,6) et 845 (0,6 %, médiane = 19,0 ; IC 95 % 18,7–28,3). En moyenne, le nombre le plus élevé de cas de TBB a été signalé en février-mars, il a légèrement diminué en octobre et a augmenté à nouveau en novembre. De même, les nombres les plus élevés d'hydatidose et de fasciolose ont été observés respectivement en mars et février. Une variation moyenne significative ($p = 0,02$) des cas de TBB a été constatée sur l'ensemble de la période et elle a été plus élevée ($p = 0,03$) pendant la saison humide/pluvieuse en 2015. Nos résultats ont souligné la nécessité de promouvoir une surveillance active coordonnée pour la détection et l'atténuation des zoonoses afin de garantir la sécurité sanitaire des aliments dans les exploitations agricoles et les abattoirs. Un enregistrement adapté des condamnations spécifiques des organes/viandes/carcasses est crucial en *post mortem*, car cela représente une perte importante en protéines animales et en revenus. Ces données peuvent être utilisées pour une politique éclairée visant à réduire davantage les pertes économiques liées aux maladies animales.

Mots-clés : bovin, zoonose, abattoir, sécurité sanitaire des aliments, Nigeria

Resumen

Adebowale O.O., Ekundayo O., Olasoju M., Oladejo O.O., Awoseyi A.A. Enfermedades animales y zoonosis en un matadero municipal del suroeste de Nigeria: estudio retrospectivo de tres años (2014–2016)

Los mataderos son lugares certificados donde los animales se sacrifican y se inspeccionan para garantizar que la carne es sana y segura para el consumo público. Para determinar las zoonosis comunes encontradas en un matadero municipal en Abeokuta, Estado de Ogun, Nigeria, se realizó un estudio retrospectivo de tres años (2014–2016). Cuando se examinaron los registros del matadero, el número total de bovinos sacrificados fue de 146 794 (4 077,6 ± 413,6; intervalo de confianza [IC] del 95 %: 3 923,3–4 206,7). El número de hembras sacrificadas fue superior al de machos, en una proporción de 5:1 ($p < 0,0001$). El mayor número de bovinos se sacrificó en diciembre de 2014, diciembre de 2015 y agosto de 2016. Entre todos los bovinos sacrificados, las prevalencias globales observadas de la tuberculosis bovina (TBB), la hidatidosis y la fasciolosis se estimaron en 9 514 (6,5 %, 264,3 ± 81,7; IC 95 % 236,6–291,9), 1 851 (1,3 %, 55,8 ± 17,3; IC 95 % 49,9–61,6) y 845 (0,6 %, mediana = 19,0; IC 95 % 18,7-28,3) respectivamente. Por término medio, el mayor número de casos de TBB se registró en febrero-marzo, disminuyó ligeramente en octubre y volvió a aumentar en noviembre. Asimismo, las cifras más altas de hidatidosis y fasciolosis se observaron en marzo y febrero, respectivamente. Se encontró una variación media significativa ($p = 0,02$) en los casos de TBB a lo largo de todo el periodo y fue mayor ($p = 0,03$) durante la estación húmeda/lluviosa de 2015. Nuestros resultados pusieron de manifiesto la necesidad de promover una vigilancia activa coordinada para la detección y atenuación de las zoonosis con el fin de garantizar la seguridad alimentaria en las explotaciones ganaderas y los mataderos. El registro adecuado de las condenas específicas de órganos/carnes/carcasas es crucial en el período post mórtem, ya que esto representa una pérdida significativa de proteínas animales y de ingresos. Estos datos pueden utilizarse para una política informada que permita reducir aún más las pérdidas económicas derivadas de las enfermedades animales.

Palabras clave: ganado bovino, zoonosis, mataderos, inocuidad alimentaria, Nigeria