

Abattoir Waste Management Strategies In Nigeria: A Case of Ota, Ogun State Nigeria

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DOI: 10.29322/IJSRP.12.08.2022.p12810
<http://dx.doi.org/10.29322/IJSRP.12.08.2022.p12810>

Paper Received Date: 13th July 2022
Paper Acceptance Date: 29th July 2022
Paper Publication Date: 6th August 2022

Abstract- High production of meat and meat products for human consumption has led to high waste generation from abattoirs. Nigeria as a developing nation has been characterised by inadequate waste disposal, treatment, and management technologies leading to pollution. Therefore, the study aims at evaluating abattoir waste management strategies in the Ota abattoir. A structured questionnaire, personal observation, and one-on-one interviews were used to gather data for the study. Waste generated includes blood, dungs, rumen fluid, carcasses, blood, hoofs, and blood. Findings from the study revealed there is no proper strategy put in place for the management and treatment of abattoir waste within the study area and the recycling potential of the waste product is not explored. The current disposal method utilised in the abattoir were unsatisfactory, not hygienic, contributes to global warming, and does not meet up to global standard. The study, therefore, recommends that Stakeholders, individuals, and government agencies need to explore the recycling potentials of animal waste for the production of valuable products, job creation, sustainable environment, wealth creation, a reduced waste product, and economic growth. Built professionals should also be employed in planning, designing, and setting up an abattoir facility to ensure all checklists are met.

Index Terms- Abattoir, environment waste, waste management, and recycling.

I. INTRODUCTION

In an attempt to continuously increase livestock production, animal protein, and human per capita consumption, a key pivot in the achievement of the SDG (Sustainable Development Goal) 2, there are related environmental and health issues associated with livestock waste generation (Koul, Yakoob, & Shah, 2022). Failure to adhere to strict Good Manufacturing Practices (GMP) and Good Hygiene Practice (GHP) within the abattoir facility gives rise to pollution. In Nigeria, slaughterhouses are usually littered with non-meat products and waste which needs to be explored for recycling into valuable by-products for domestic, agricultural, and industrial use (Daniel, John, Yusuf, & Onyedikachukwu, 2021). Some of which include biogas production from dung and rumen fluid, biodiesel from animal fat, biomethane filtration from bones, and blood processing (Adebowale, Oziegbe, Obafemi, Ahuekwe, & Oranusi, 2022).

Abattoir operations generate different types of highly organic waste at different levels involved in the process right from animal arrival to meat packaging (fig.1). The Abattoir facility has various waste and waste generation points and handling options. But in many countries, the abattoirs are not just crude but the wastes generated are not treated before disposal. Also, the regulatory bodies are never up to their duties to monitor the processing activities and the disposal of the waste (Hantoko, et al., 2021).

Abattoir wastes consist of several pollutants such as faeces, blood, bone, hone, fat, animal trimmings, paunch content and urine from operations, stunning or bleeding, carcass processing, and by-product processing (Vinayak, et al., 2021). These abattoir wastes can be classified as solid, liquid, and gas. Solid wastes include manure, intestinal contents, hairs, horns, hooves, gallbladders, trimmings, internal organs, bones, condemned carcasses or body parts, paper, cartons, and plastics. The liquid waste slaughterhouse consists of urine, blood, and wastewater from the slaughter processes. Odors and emissions on the other hand are the forms of slaughterhouse gaseous nutrient input for agricultural production including waste (Pandit, et al., 2021).

Abattoir waste can be detrimental to public health, animal health, and the economy of the country if they are not properly and effectively managed and controlled (Odjadjare & Ebowemen, 2020). Abattoirs often have difficulties in

disposing of, treating, and processing these wastes in an environmentally acceptable mode (Obigiegwu, Chineke, Ubajaka, & Adogu, 2019). Due to these reasons, there is a high risk of environmental pollution like underground water pollution, air pollution, nuisance, odour, soil pollution, and public health risks through the transmission of zoonotic diseases to humans (Alayu & Yirgu, 2018).

Abattoir wastes are considered potential polluters of the surface, underground waters as well as air quality, which pose health challenges to the residents living in the abattoir’s vicinity (Dada, Odufuwa, Badiora, Agbabiaka, Ogunseye, & Samuel, 2021). Such a health problem can be spread to the general populace if care is not taken. There is little or no attention paid to SH waste management by the operators, policymakers, and the government. Ogun state is not even close to exploring the recycling of abattoir wastes despite the existing potential. There seem not to be any strategy in place for waste management and recycling. Therefore, the authors explored the healthiest possible slaughterhouse waste management practices and strategies and see it can be **implemented in Ogun state and Nigeria at large.**



Figure 1: Animal Slaughter Process and Waste Generated (Guardian, 2018)

II. METHODOLOGY

The study was undertaken to establish waste generation and strategies utilised for disposal and management of abattoir waste in Ota, Ogun State, Nigeria. The methods involved in achieving the study aim are explained below;

2.1 Research Design

This study was designed to take opinions and draw inferences on the need to take into account the various types of waste generation, disposal, and management methods in designing a sustainable abattoir. The cross-sectional study approach was used in this study. The stud utilized both quantitative and qualitative study approaches and the theoretical study was based on what was found in existing pieces of literature. The cross-sectional study was used to find out the prevalence of the situation in the abattoir by taking representative samples (Meshi, Cotten, & Bender, 2020).

2.2 Study Area

Ota town is located within Ado-odo/Ota Local Government Area of Ogun State, South-West Nigeria. Ota is located on the latitude 6°40'29.57"N and longitude 3°11'52.99"E. It is bounded in the south by Agege and Alimoso in Lagos state, in the North by Ifo and Agbado of Ifo local government of Ogun state, Owode Idi-Iroko, a border town to the Benin Republic forms the boundary in the west (See fig. 2).

Ota has the third-largest concentration of industries in Nigeria. It also possesses a large market and an important road junction, found just north of the tollgate on the Lagos - Abeokuta Expressway. Ota. Historically, Ota is the capital of the Awori Yoruba tribe.

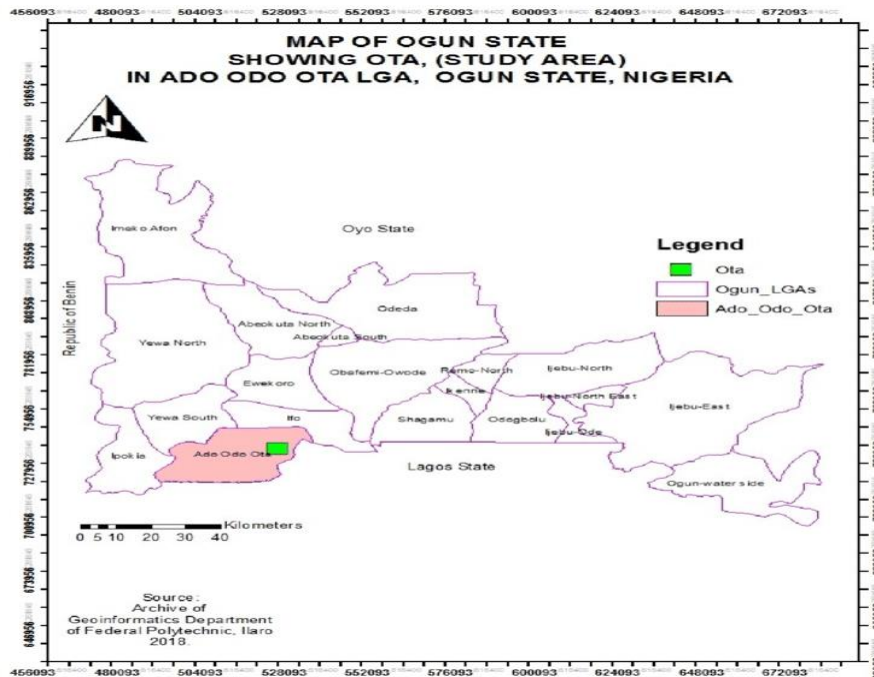


Figure 2: Map of Ota, Ogun State, Nigeria (Ajala, 2019)

2.3 Study Population

The target population for this study was abattoir operators, that is business owners and workers within the abattoir. The study sampling aimed at gathering deep information about the research. Two abattoirs were considered in the study area.

2.4 Instrumentation

The instruments used for data collection were; observations, interviews, and questionnaires. The non-participant observation type was used. The questionnaire was made up of questions that responded to the study goals which included both closed-ended and open-ended questions (Krosnick & Presser, 2009), the close-ended question form is used for specificity and to make a comparison of results possible (Krosnick & Presser, 2009), the open-ended questions add richness to issues that appear difficult if not impossible to approach with close-ended questions (LaDonna, Taylor, & Lingard, 2018). A structured interview was conducted to gather additional information related to the types and management of wastes in the selected abattoirs.

2.5 Data Analysis

Data from this research work was analysed using descriptive and narrative analysis following the research objectives and questions. The descriptive analysis made use of position measures like percentage and frequency.

III. RESULT AND DISCUSSION

3.1 Respondents Profile

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<http://dx.doi.org/10.29322/IJSRP.12.08.2022.p12810>

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A total of 48 responses were received out of 60 questionnaires shared within 2 abattoirs in Ota, Ogun State (Arobieke abattoir, Idiroko and Iyesi Abattoir, Iyan Iyesi). Table 1 shows the distribution of respondents according to their gender and age group. 46 respondents were male and just 2 were female. The result tallies with existing works of literature on the male gender being the predominant in the abattoir operation process (Ogunseye, et al., 2021). The highest number of respondents were between 31-40 years of age (29.17%). The table shows that the youth are greatly involved in abattoir operations which is similar to findings from Adeolu et al., (2019) and Obidiegwu et al., (2019).

Table 1: Distribution of Respondents According to Gender and Age Group

	Category	Frequency	Percentage (%)
Gender	Male	46	95.83
	Female	2	4.17
	Total	48	100
Age Group (years)	Below 20	2	4.17
	21-30	13	27.08
	31-40	14	29.17
	41-50	10	20.83
	Above 50	9	18.75
	Total	48	100

Table 2: Distribution of Respondents According to Education Level, Marital Status, and Tribe

	Category	Frequency	%
Education	No education	12	25
	Primary	26	54.17
	Secondary	9	18.75
	Tertiary	1	2.08
	Total	48	100
Marital Status	Single	9	18.75
	Married	38	79.17
	Divorced	1	2.08
	Widowed	0	0
	Total	48	100
Tribe	Yoruba	37	77.08
	Igbo	1	2.8
	Hausa	7	14.60
	Others	3	6.35
	Total	48	100

Table 2 shows the respondents' educational level, marital status, and tribe. The majority of the abattoir operators were married (79.1%) and most of them belong to the Yoruba tribe, this could be linked to the study area. Ota is a southwestern state in Nigeria dominated by the Yoruba. Other tribes include; Hausa, Igbo, and Fulani.

Over half of the respondents (54.71%) had primary education and 25% had no education. This indicates that the majority of the abattoir workers are not well read and the work carried out with the abattoir doesn't require education. For example, respondents sampled were engaged as cow owners/sellers, labourers, butchers, and cleaners (fig. 3). Fig. 4 shows that most of them receive a monthly income of between #30,001 to #90,000. This indicates that the majority of the abattoir operators receive more than the Nigerian Government allocated minimum wage of #30,000.

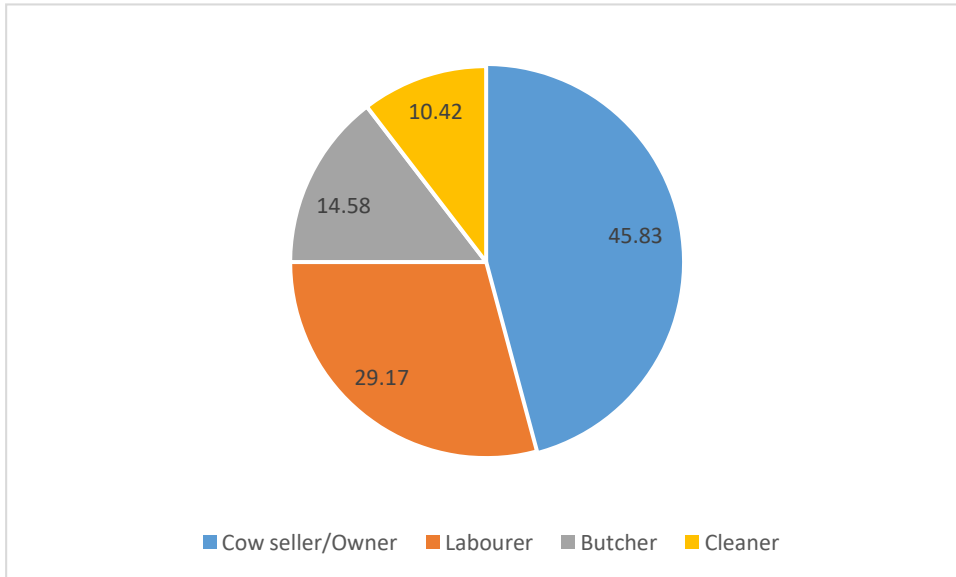


Figure 3: Operators' Nature of Work Involvement (%)

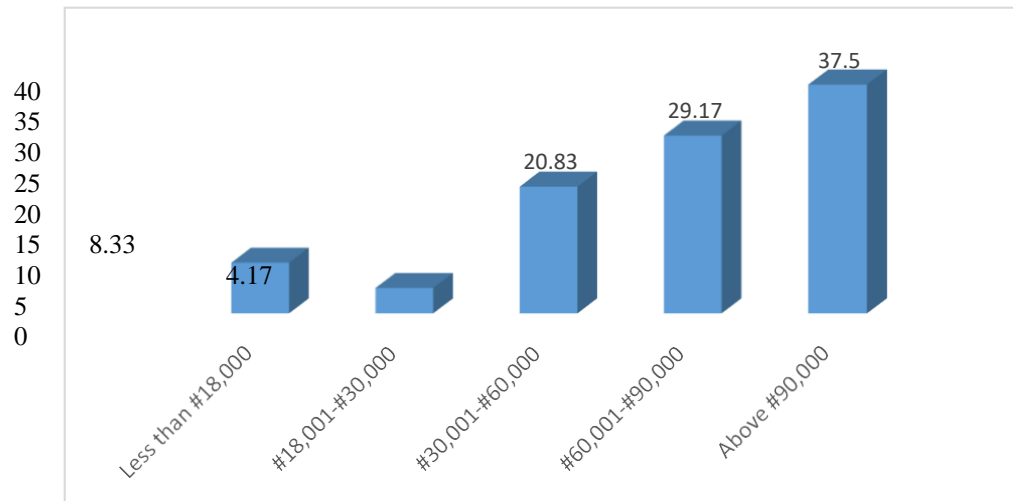


Figure 4: Operators' Monthly Income (%)

A very good percentage of the abattoir operators have more than 5 years of experience (figure 5) indicating that they are well aware of the abattoir operational practices. This implies that the operators stand in good stead to provide information regarding waste management practices within the abattoir facility.

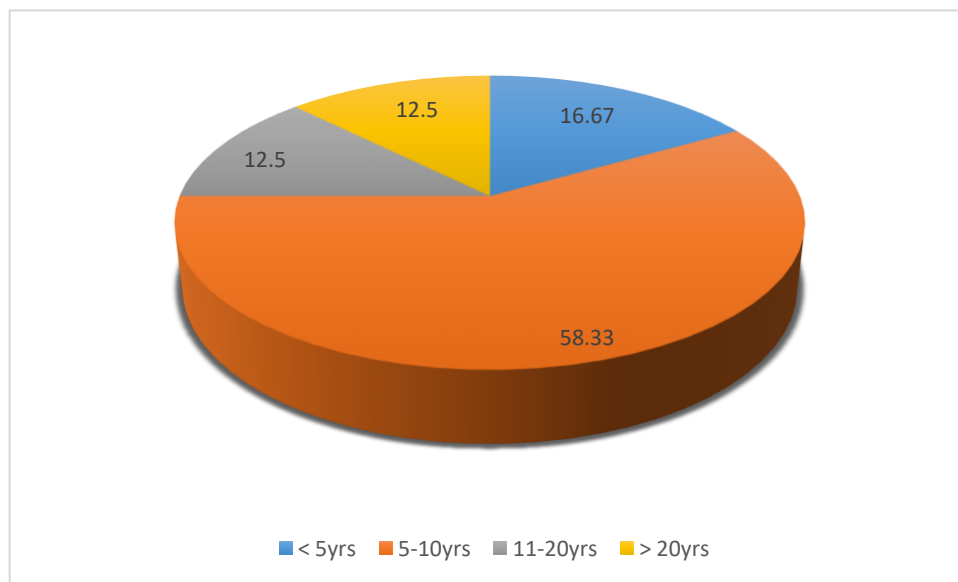


Figure 5: Operators' Years of Experience (%)

3.2 Abattoir Operations and Facilities

Abattoirs visited within Ota are managed by individuals with a production rate of between 7 to 12 cows slaughtered per day serving the locality since their inception. Activities carried out within the abattoirs include cow slaughtering, inspection, processing (stunning, deboning, meat washing, meat cutting), and meat marketing (buying and selling to residents for house consumption and food sellers). Fig. 6

For smooth operations at an abattoir, some basic facilities are not to be compromised such as water supply, electricity, and cold room for preservation. Water used within the facility is gotten from a borehole and well (fig.7). The abattoir visited within the study area does not have a cold room facility for storage, so leftover meat is stored outside the facility using generating sets.

The major source of electricity within the abattoir facility is via generators this is due to the lack of adequate power supply and high electricity tariff. The use of generating sets has an effect on the environment and people due to air pollution through the emission of carbon.



Figure 6: Slaughtering process



Figure 7: View of Slaughter slab. Water is Supplied into Water Tank Storage directly from the borehole.

3.3 Waste Generation and Management

Waste generated for the abattoir includes cow dungs, rumen fluids, bones, hair, blood, horns, and hooves. Observation also showed that there is no proper waste storage mechanism for the waste generated within the facility although some of the waste are been sold to intending buyers (farmers, horticulturists, and industries). Table 3 shows some waste generated and intended use by the buyers as documented by an interview conducted within the facility. Literature has also documented some potential use of different abattoir waste. Adebowale et al., (2022) utilised rumen fluid and corn stover for biogas production analysing that the rumen fluid from cows serves as the inoculum for the production of methanogenic bacteria that produces methane which is a major component of biogas. Biogas can be used at home as a source of cooking gas or electricity. Research from the biotechnology department SIR M VISVESVARAYA INSTITUTE OF TECHNOLOGY, BANGALORE produced biodiesel from slaughterhouse waste using animal fat.

Table 3: Abattoir Waste Products, Intending Use, and Frequency of Collection

S/N	Waste Products	Intending Use	Frequency of Collection
1.	Cow dungs	Mostly used as fertilizers by farmers and horticulturists.	At least twice a month
2.	Bones	Mostly sold to plastic manufacturers.	At least twice a month
3.	Cow horns and hooves	Used as animal feed, ceramics, buttons, etc.	Once a month
4.	Blood	Used as animal protein feed	Everyday
5.	Pancreas (oronro eran)	Serve as medicine for sickle cell patients.	Not sure

IV. CONCLUSION AND RECOMMENDATION

In conclusion, resolving issues attaining to waste management, disposal, and treatment in Ogun State, Nigeria should be collaborative involving the Government, individuals, abattoir operators, and management of abattoirs. This is important to attain specific needs involved in the planning and implementation of chosen alternative strategies. In addition, modernisation of abattoir structures, installations of basic facilities, treatment of waste, and best practices are required. The study validated the recycling characteristics of abattoir waste through the visit by farmers and industries to source waste products, process and convert them into valuable products (such as fertilizers, ceramics, and animal feeds). Therefore, the study recommends that Abattoir waste recycling methods should be explored towards creating a hygienic facility, increasing job opportunities, waste to wealth creation, and improved economic growth. There is a need for implementation of proper guidelines on setting up an abattoir, the guidelines should address issues about meat handling, hygiene, waste management, treatment, and recycling. Built professionals must be involved in the setting up process right from the design process to the full facility delivery this will ensure all checklists are met.

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