



## Evaluation of physical facilities and processing operations of major abattoirs in North-western states of Nigeria

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### Abstract

The study was carried out to evaluate the physical facilities of four major abattoirs in North-western states of Nigeria these are: Mayanka abattoir in Kano, Kara abattoir in Sokoto, Zango abattoir Zaria and Kawo abattoir in Kaduna. The facilities of these abattoirs were evaluated based on their presence and functional status. Pictures were taken using digital camera to document conditions of the infrastructure and activities of the butchers. The present study showed that the basic components were in a deplorable state. The dilapidated conditions of the abattoirs were as a result of failure to enforce the use of standard facilities in carrying out abattoir operations and general maintenance in the understudied abattoirs. It was similarly observed that there was no proper record keeping, no formal ante-mortem and post-mortem meat inspection. Hygiene and sanitation were largely absent in these abattoirs. Diseases such as tuberculosis, contagious pleuropneumonia, fasciolosis and hydatidosis were most frequently encountered during the study. The results of focus-group interaction revealed that only 40% of butchers supported the use of standard operating facilities during operation, while the remaining rejected the idea. It was concluded that all the major abattoirs in Kaduna, Kano and Sokoto states of North-western Nigeria were in a deplorable state and the dilapidated infrastructure could not support the production of safe and wholesome meat and meat products for human consumption.

**Keywords:** Abattoir, Butcher, Meat, Physical facilities, Public health, Standard operating procedures .

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### Introduction

Abattoir is defined as any premises that is approved and registered by the controlling authority in which animals are slaughtered and dressed for human consumption (Codex Alimentarius, 1993). The purpose of an abattoir is to produce hygienically prepared meat by the humane handling of the animal using hygienic techniques for slaughtering and dressing (FAO, 1992). At the same time, it enables proper meat inspection to be carried out. The resulting waste materials are thus suitably handled to remove any potential danger or meat-borne infectious agents reaching the public or contaminating the environment (FAO, 1992). The safety situation of animal food products in Nigeria by Okoli *et al.* (2006) highlighted the fact that the

production, handling, sales and consumption of poor quality animal food products constitute serious public health problems in the country. This is traceable to the influence of the under developed status of livestock producers, marketers, meat processors, quality regulating agencies' staff and consumers at different segments of the country's livestock industry. In abattoir operation, certain prerequisite programmes have to be considered to provide basic environmental and operating conditions that are necessary for production of safe food. These prerequisite programmes include good manufacturing practices, good hygiene practice and standard operating procedures (Declan *et al.*, 2004). Hence, in considering these prerequisite

programmes, certain fundamental factors have to be considered in construction of abattoir and components of an abattoir. A suitable site in construction of conventional abattoir should have the following: main portable water and electricity, main sewage, contiguity with uncongested road and rail system, proximity with public transport, proximity to supply of varied labour, freedom from pollution from other industries, odours, dust, smoke, ash (Gracey *et al.*, 1999). In addition are the needs for remoteness from local housing and other developments to avoid complaints about noise and smell, good quality stock nearby, soil suitable for good foundations including pilling, freedom from flooding, and sufficient space for possible expansion are important factors (Gracey *et al.*, 1999). The components of an abattoir and other services should include the following; lairage, slaughter hall, gut and tripe room, detained meat room, offal room, condemned meat room, hide and skin room. Others include cutting room, refrigeration room, supply of hot and cold water under pressure, veterinary inspection room, disinfection facilities, personnel welfare room, veterinary office, and facilities for condemned meat offal or carcass disposal; incinerator, chemical treatment and disposal. Sub-standard and unmaintained abattoir infrastructures seriously hamper standard operations for the production of safe and wholesome meat and meat products human consumption, thereby, posing problems of meat hygiene and thus, endangering human health.

This study was carried out to evaluate the physical conditions, and functional status of infrastructure as well as the process operations of four major abattoirs of the North-western states of Nigeria.

## Materials and methods

### Study area

The study was carried out in selected states of North-west geopolitical zone of Nigeria. The zone was conditionally, for the purpose of this work, divided into 3 sub-zones. These included sub-zone A which comprised of Kaduna and Katsina states, sub-zone B comprised Kano and Jigawa states, while sub-zone C was made up of Sokoto, Zamfara and Kebbi states. The sub-division was made based on previous 19 states structure, due to their closeness and similarity in geopolitical location, culture and farming practices of the people. The parent states of Kaduna, Kano and Sokoto were chosen for the study. The abattoirs in the parent states were the oldest in the sub- zones and established about the

same period. Kano abattoir was established in 1963, Sokoto 1962, Kawo 1978 and Zango 1978 in Kaduna state. Kano is located between latitudes  $12^{\circ} 00'N$  and longitude  $8^{\circ} 31'E$ , Sokoto covers latitude  $13^{\circ} 17' N$  and longitude  $5^{\circ} 25'E$  while Kaduna covers  $10^{\circ} 11'N$  and  $7^{\circ} 8'E$ .

### Assessment of abattoir facilities and operations

Each of the abattoirs was visited twice a week for a period of one month from 6:00am to 11:00am. The components of the abattoirs were evaluated based on both their presence and functional status. Pictures were taken using digital camera to document conditions of the infrastructures and procedures of the abattoir operations. The status of abattoir facilities was graded on a scale of 1-3 as follows: Grade 1(Good) - facilities are present and functional and in conformity with standard conventional requirements, grade 2 (Satisfactory) - facilities are present but not functional and grade 3 (Poor) is a scale when the facilities are present but dilapidated and subsequently not functional. There was no routine formal meat inspection in the abattoirs. Joint prospective meat inspection was carried out during visits together with meat inspectors to detect disease of economic and public health importance.

### Focus-group interaction

Data was generated from the visits with aid of personal interview targeted at focus-groups. The focus-groups were made up of 8-12 participants and consist of meat inspectors, butchers, administrative personnel and casual labourers. The interview was conducted separately for each focus-group to highlight their perceived problems on process operations and management of the abattoirs and ways of improving them.

## Results

The result of the assessment of abattoirs showed that most of the facilities present were not in functional state and thus were graded either as poor or satisfactory (Table 1). In all the abattoirs there was no regular supply of portable water and electricity. Water was usually obtained from truck pushers, who sold water from unidentified sources for carcass washing. Occasionally the butchers sourced water from nearby stream because the water supply from their state water boards was often not regular. The butchers sometimes washed the carcasses with water from within the drainage system of the slaughter hall (Plate I). The result of

this work pointed out that none of the lairage was used for its primary purpose (Plate II). They were either overgrown with grasses, turned to animal markets or just abandoned. The hanging rail systems in all the abattoirs were non-functional (Plate III) except in Kaduna abattoir, where the hanging rail system is fairly in good condition but however, not being used, rather slaughtering and processing of carcass was done on the floor adjacent to the main building of the abattoir on a slaughter slab. The cold rooms in all the abattoirs were not functional except in Kano abattoir that has functional cold room (plate IV). The common disease encountered in slaughtered cattle during joint meat inspection and available official records of the abattoirs were tuberculosis, hydatidosis and cysticercosis. However, because the records were scanty not consistent and unreliable analysis was not carried out.

During the focus-group interviews, meat inspectors complained about government's insensitivity and lack of concern towards general management of

abattoir such as maintenance of infrastructures and release of funds for payment of utility bills. The government attitude has resulted into inability of meat inspectors to inspect meat for wholesomeness by applying relevant laws in production of wholesome and safe meat to the public. For instance there was scarcity of water in Zango abattoir and the butchers used water from nearby streams to wash carcasses. The meat inspectors could not stop them due to inability to provide them with alternative source of portable water. When a suggestion was made to the butchers during focus group interview to adapt the use of hanging rail system in slaughter and processing of carcasses as was formerly done in these abattoirs, three decades ago, only 40% of the butchers accepted the need for use of the line dressing, while 60% rejected the idea. During joint prospective meat inspection the common disease lesions encountered in the abattoir were tuberculosis, fasciolosis and contagious bovine pleuropneumonia.

**Table 1:** Assessment of four abattoirs based on availability of facilities and their functional states in northwest Nigeria

Components of abattoir	Abattoirs			
	Zango	Sokoto (kara)	Kano (mayanka)	Kawo
Lairage	3	3	-	2
Slaughter hall	3	3	3	2
Rail system	3	3	3	2
Gut & tripe	-	-	-	3
Cold room	-	-	2	-
Detained meat room	-	-	2	-
Condemned meat room	3	3	3	3
Cutting room	-	-	-	-
Drainage system	2	3	2	2
Veterinary laboratory	-	-	2	-
Water supply	-	-	-	-
Electricity supply	-	-	-	-
Hide & skin room	-	-	2	-
Disinfection facilities	-	-	-	-
First aid room	-	-	2	-

Key: (-) – absent, good 1, satisfactory-2, poor-3



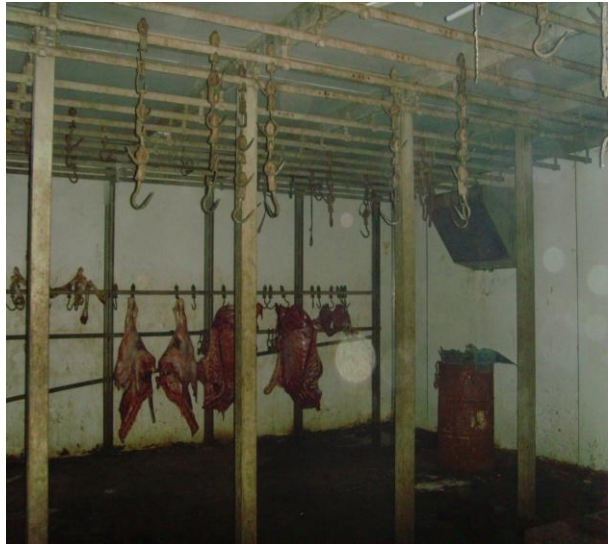
**Plate I:** Zango abattoir showing butcher washing meat in gutter



**Plate II:** Zango abattoir: showing non-functional lairage overgrown with plants



**Plate III:** Sokoto abattoir: vandalized rail and hoisting system which are non-functional



**Plate IV:** Kano abattoir: functional cold room

### Discussion

The non-functional facilities and level of dilapidated infrastructures recorded in this work could not have supported standard operating procedure and good hygiene practices in the abattoirs and this situation may pose danger to the public health as pointed out by Adeyemo (2002) in Bodija abattoir in Ibadan, Nigeria. Considering the fact that lairage plays an important role in the abattoir, where resting of animals take place and ante-mortem inspection undertaken prior to slaughter, however the findings of this work indicated dilapidated condition of the lairage (Plate II) was due to unwillingness of the workers or lack of enforcement to use it.

Consequently, no ante-mortem examination was carried out as recommended by the Codex Alimentarius Commission (1993). These findings are in agreement with the findings of Bello *et al.* (2008) who reported the absence of ante-mortem inspection in most abattoirs in Northern Nigeria.

In Kano, Sokoto and Zango abattoirs, flaying, evisceration and splitting of carcass were carried out on unhygienic floors (concrete), such practice increases chances of carcass contamination and consequently the production of unsafe meat. The cold rooms in Sokoto, Zango and Kaduna abattoirs were not functional except Kano abattoir where the

cold room was functional (Plate IV). There was no importance attached to cold room in these abattoirs for the reason that animals were slaughtered, processed into carcasses and marketed to consumers the same day and therefore, no meat is stored in the abattoirs except in Kano abattoir where most of the meat in the cold room were those not sold in the market and thus returned to be preserved for sale the next day. This seriously affects the quality and shelf life of meat products.

The water used for cleaning procedures must meet drinking standard (Fonseca, 2000). Supply of hot portable water in these abattoirs is important because of the fatty nature of products in the abattoir. Hot water with ordinary detergent facilitates easy and quality washing of abattoir floor and equipment. The use of non portable water by the butchers in this work might have contributed to carcass contamination as previously reported by Bello *et al.* (2011) who observed increase in *E. coli* counts and isolation of *E. coli* O157H7 from beef carcasses in some Nigerian abattoirs due to the use of non-portable water.

Electricity is required in the abattoir for use in automated dressing line of carcass dressing, refrigeration and lightening of slaughter hall for adequate visibility during operational activities and cleaning procedures. The absence of electricity and portable water supplies coupled with the poor status and unhygienic conditions of these abattoirs raise serious public health concern, as hygiene problem are not only limited to slaughtering but are also associated with incorrect processing (Akinro *et al.*, 2009).

During the focus-group interview, most of the problems highlighted by the butchers and meat inspectors were lack of government concern in providing basic infrastructures and amenities in the

abattoirs which resulted in the butchers using unhygienic methods in carrying out the processing operations in the abattoir. The reasons given by those that rejected the idea of use of hanging rail system is that many workers will be redundant if the line system is employed for carcass processing. Two persons are required for the line dressing, contrary to 5-7 personnel that are involved on processing of one carcass under the present system. Second reason is that the hanging rail system takes longer time to process one single animal slaughtered. Finally electricity is required for use of hanging rail system which are absent in these abattoirs. There is need for government intervention in providing these basic amenities and educating the butchers on the importance of using these facilities during operational activities. The common zoonotic diseases encountered (tuberculosis, hydatidosis and cysticercosis) were in agreement with findings of Cadmus *et al.* (1999) who also indicated high prevalence of zoonotic bovine tuberculosis in abattoir.

In conclusion this study has documented that all the major abattoirs in Kaduna, Kano and Sokoto state were dilapidated and that vandalized infrastructure could not support the production of safe and wholesome meat and meat products. This is mainly due to lack of standard operating procedures and lack of government commitment in maintenance of abattoir facilities. There is the need to rehabilitate all the abattoir facilities and enforce the use of standard facilities for abattoir operation in the region.

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