CATTLE HANDLING, HYGIENE AND SLAUGHTERING TECHNIQUES IN SELECTED CATTLE MARKETS IN ABEOKUTA AND ENVIRONS, OGUN STATE, NIGERIA

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ABSTRACT

The handling, hygiene and slaughtering techniques of cattle in selected cattle markets of Atokun, Randa and Odo-Eran in Abeokuta and environs, Ogun state, Nigeria were assessed. Questionnaires were administered with personal visits to cattle handlers to assess the handling practices and relevant information relating to cattle welfare and slaughtering. Data obtained from this study on the cattle handlers, showed that the literacy level of the rearers and butchers was low, with majority (48.90%) having primary education. The general sanitary conditions at the cattle markets in addition to hygienic practices by the butchers were generally poor. Handling of cattle from the lairage to slaughter slabs was unethical, with the employment of humane practices in the rearing, handling, transporting and slaughtering of cattle rarely observed across the cattle markets. High range of total bacteria count of 6.50 and 8.40 x 10^5cfu/g and coliform counts of 4.28 to 4.85 x 10^5cfu/g were observed in the thirty (30) beef samples collected across cattle markets with major isolated organisms being *Staphylococcus aureus* and *Bacillus spp.* across the abattoirs under study. Results of this study suggest that the welfare of animals in the selected cattle markets is inadequate due to poor housing facilities, inadequate feeding, low medical attention and low literacy level of handlers as well as indiscriminate slaughtering resulting to contamination of beef cuts of the carcass from which they are derived.

Keywords: Cattle, handling, hygiene, slaughtering, beef, microbial count, Abeokuta

INTRODUCTION

The role of cattle in the Nigerian economy is important because the livestock sector accounts for about 5% of the GDP, to which cattle contributes 40% of meat and virtually all milk (Talabi *et al.,* 2003). More than 80% of the 20 million heads of Nigerian cattle are basically managed under the pastoral system of production (Sulieman *et al.,* 2015), serving as a source of food, employment and income to those who rear them, representing a vital technology that connects range, resources and people's livelihood. Slaughtered cattle are a good source of protein. Bone and blood meal are used in the livestock industry, while horns and hooves are used for fertilizers and buttons with hides and skin further processed and used in the leather industry. Despite the role of cattle in the livelihood of people, it is also a source

of food - borne infections if not well managed (Mukhopadhyay *et al.*, 2009). Studies have documented a variety of contaminants, microbial agents and health effects to those that consume beef and its products (Adeyemo *et al.*, 2002, Adesemoye *et al.*, 2006).

The effect of pathogen load and increase in microbial shedding on or in live animals depends on environmental exposure to contaminants, the health of the animal and situations stressful to the animal such as inadequate access to feed and water, transport, handling and contact with other animals (Galland, 1997), Also, the poor management and unhygienic situation of Nigerian slaughter slabs has exposed beef from slaughter cattle to contamination (Adeyemo *et al.*, 2009). Moreover, to enjoy the numerous benefits cattle provide, the cattle rearers as well as the government agencies have the responsibility to ensure that the welfare of these animals is not compromised and proper handling and abattoir management is employed. Hence, this study investigates the handling, hygiene, slaughtering techniques and microbial contamination of beef from cattle slaughtered in three selected cattle markets in Ogun State, South west Nigeria.

MATERIALS AND METHOD
Study area
Three cattle markets namely Atokun, Odo-Eran and Randa in Abeokuta and environs, Ogun State, Nigeria were selected and sampled for the study. Atokun cattle market is located in Ayetoro, Yewa north local government area, Ogun State, Nigeria and characterized by substantial number of Hausa – Fulani migrating herdsmen. Odo – Eran cattle market located at Obantoko, Odeda local government area, Ogun State is made up of large number of Yoruba herdsmen.

Randa cattle market- located along Ayetoro road, Abeokuta and is made up of nomadic Fulani men and substantial number of Yorubas. Data on handlers, cattle stock, hygienic condition of the environment and general sanitation in the handling and slaughtering as well as sale of beef at retail points within the cattle markets were observed and assessed using questionnaires with occasional visits and personal discussion.

Collection of beef samples
Thirty fresh beef samples of about 30g each from the loin of thirty animals out of those slaughtered were aseptically collected from each market. Collection was done within 6hrs post slaughter with the cooperation of the butchers and samples were transferred into sterile containers, transported in a cooler packed with ice to prevent spoilage/ contamination. Samples were immediately taken to the laboratory for analysis. The microbial analysis of meat samples involving total bacteria count, coliform count and isolation of bacteria, were carried out at the Microbiological laboratory of the College of Veterinary Medicine, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. The total bacteria count and coliform count were carried out using the pour plate technique. The microbiological media used were the nutrient agar for the estimation of total aerobic bacteria and MacConkey agar for the isolation of coliforms. After culture and incubation, standard microbiological techniques including cellular morphology and staining were used to identify the organisms isolated, using gram staining techniques.

The identification of bacteria was done using gram staining techniques as described by Cheesbrough (2003). The staining procedure involves making a slide of cell sample to be stained with crystal violet and incubated for

1 minute. Gram's iodine was added for 1 minute as a mordant that fixes the crystal violet to the bacterial cell wall and then rinsed with acetone which serves as a decolourizer for 3 seconds. There will be sample decolourization if it is Gram negative, removing the crystal violet.

The secondary stain, safranin, was afterward added to the slide and incubate for 1 minute and washed with a gentle stream of water for a maximum of 5 seconds. Gram positive bacteria retains the crystal violet colour, causing it to look violet/purple under a microscope, while the Gram negative bacteria loses the primary stain, causing it to appear pinkish when viewed under a microscope.

Data Analysis
Tables, bar chart and plates were used to present the result of the study.

RESULTS AND DISCUSSION
The mean personal data of the cattle handlers basically made up of the rearers and butchers at the selected cattle markets showed that 100% of the handlers were males with majority being within a range of 31 to 40 years and 82.20% married (Table 1). The literacy level was very low, with majority (48.90%) having primary education, 26.67% having non – formal education, while quranic and secondary education were 11.10%, and 13.33%, respectively. This suggests the poor welfare attitude observed among the cattle handlers to animals. This could be ascribed to the lack of knowledge on proper management, disease control, animal handling, meat processing and standard abattoir practices which could affect negatively the welfare of animals and the quality of meat produced. Alonge (2005) reported that in developed countries where education is emphasised for these positions, animal handlers practice good husbandry having a caring attitude towards the animals and their welfare, but in Nigeria, the contrary is the situation.

Table 1: Mean personal data of cattle handlers at the three cattle markets

Personal record	Frequency	Percentage
Sex		
Male	45	100.00
Age		
15-20	4	8.90
21-30	7	15.60
31-40	25	55.50
41-50	4	8.90
>50	5	11.10
Marital status		
Single	8	17.80
Married	37	82.20
Educational status		
No formal	12	26.67
Quranic	5	11.10
Primary	22	48.90
Secondary	6	13.33
Cattle population (n= 164)		
Sokoto gudali	24	14.63
White Fulani	116	70.73
Red bororo	15	9.15
Ndama	9	5.49

During this study, 164 cattle of various breeds were recorded across the cattle markets and these breeds include the Sokoto Gudali (14.63%), Red Bororo (9.15%), N'dama (5.49%) with the most prominent breed being white Fulani (70.73%). This is similar to the reports of Daodu et al., (2009) that white Fulani cattle accounted for 80 percent of the herd composition of pastoralists and this was attributed to its faster growth rate, ease of management, high marketability and ability to consume a variety of forages. Also, the prominence of the white Fulani breed of cattle could be attributed to its ability to travel long distance trekking in search of food and water as these animals have a leggy appearance which helps it to withstand long distance trekking (Tawah and Rege, 1996).

However, the source of cattle in the selected cattle markets (Table 2) were majorly from the northern part of the country with few animals being brought from neighbouring countries of Niger, Benin and Mali to the Atokun market. This corroborates earlier reports of Adubi and Aromolaran (1998) that over 80% of cattle slaughtered in Nigeria originate from the northern parts of the country. These animals were majorly transported in lorries in an unpleasant situations where animals are usually over-crowded in vehicles and are mishandled during loading and off- loading. Fraser (2008) described most of the methods used in Nigeria for transporting ruminants from the north to the south of the country being against standard animal welfare procedures for the safety and welfare of the animals. This is because most times the animals are under undue stress as they are overcrowded in trailers for mass transport making them sustain traumatic injuries and stress that affect their health and productivity (Minka and Ayo, 2007).

Table 2: Source of cattle managed and slaughtered in the three cattle markets

Cattle market	Source
Atokun	Northern Nigeria, Mali, Niger and Benin Republic
Randa	Northern Nigeria
Odo – Eran	Northern Nigeria

Across the cattle markets, there was no special housing provided for the animals. At Atokun and Odo – Eran cattle markets, animals were kept in fenced open yards while at Randa, animals were kept outside the cattle market and displayed for sale (Figure 1) during the day and in the evening they are moved to fenced open shed (Figure 2).

The observation on the feeding pattern shows that all animals in the three cattle markets are fed solely on grasses. At Atokun and Randa, animals were exposed to grass sourced through the cut and carry system (Figure 3). A large number of the animals were made to trek long distances under the supervision of the herdsmen in search of forages and water, while weak animals and animals awaiting slaughter were not taken out to graze but left behind in the cattle market. Grasses were cut in bails and provided in a wooden box/ trough for the animals that are left behind or isolated in the cattle market. The feeding system employed at Odo - Eran cattle market was only grazing. There was no provision of feed for animals not taken out to graze.

Figure 1: Cattle kept at open yard at Atokun

Figure 2: Open fenced yards at Odo - Eran cattle market

Figure 3: Cut and carry feeding system at Randa cattle market

The general sanitary conditions at the cattle markets in addition to hygienic practices by the butchers were generally poor. Various levels of heaps of stale animal dungs were observed across cattle markets where animals were kept; this explains the reason for the observed high population of flies. The public health significance of these flies in the transmission of important zoonotic diseases has reported by Christensen, (1996) as exposing human consumers to associated health risk. The assessment of hygiene in the cattle markets vary and was rated bad, worse or worst from one cattle market to the other as shown in Table 3.

**Table 3: Hygiene level in the management of cattle at the markets**

Cattle market	Level of hygiene	Characteristics
Randa	Bad	Moderate level of stale animal dung
Atokun	Worse	Heap of stale animal dung
Odo – Eran	Worst	Excessive heaps of stale animal dung

Observation made across the slaughter slabs revealed discharge of waste-water directly into surface waters during cattle slaughtering and the fresh blood discharged coagulated in the gutter. This emitted bad odours resulting in sanitary and environmental problems with a number of serious human health hazards implications. The poor management and unhygienic situation of slaughter slabs which is a common feature in Nigeria could be attributed to the fact that slaughter houses are public enterprises, lacking adequate supervision and funds to maintain quality operations (Adeyemo *et al.,* 2009). A review of animal food products safety situation in Nigeria (Okoli *et al.,* 2005) highlighted that the production, handling, sales and consumption of poor quality animal food products causes serious public health problems; traceable to the influence of the underdeveloped status of livestock producers, marketers, meat processors, quality regulating agencies staff and consumers on different segments of the country's livestock industry.

The employment of humane practices in the rearing, handling, transporting and slaughtering of cattle were rarely observed across the cattle markets. Handling of cattle from the lairage to slaughter slabs is unethical. Animals were dragged on slippery floor in the slaughter house and even made to see carcasses of previously slaughtered animals which are a violation to animal rights and welfare (Figure 6). Broom and Johnson (2000) reported that an animal is in a good state of welfare if it is not suffering from unpleasant states such as pain, fear, and distress.

In addition, the mean values for total bacteria and coliform counts from beef samples were high across the cattle markets ranging from 6.5 to 8.4 $\times 10^5$cfu/g and 4.2 to 4.8$\times 10^5$cfu/g, respectively (Figure 5). This values exceeded the permissible value of 5.7 $\times 10^5$ cfu/g and 2.7 $\times 10^5$ cfu/g, respectively (Ajogi *et al.,* 2005), which are indicative of heavy contamination.

Figure 5: Mean values for total bacteria and coliform counts in beef samples across the cattle markets
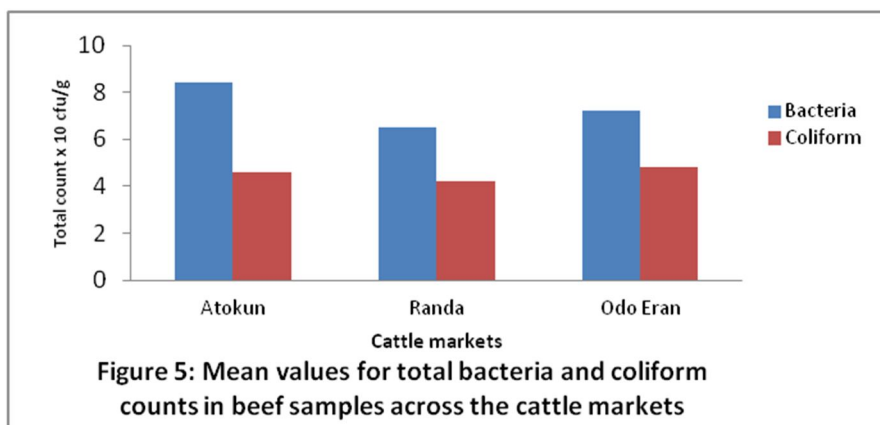
From this study, the high microbial load of beef may be due to the crude local mode of slaughtering which is the Muhammedian method (Figure 7) coupled with unhygienic slaughter equipment used in the cattle markets. Also, improper evisceration method, poor and unhygienic means of transporta-tion of beef to the meat stall, mainly through unsterilized jute bags, head pans and un-cleaned boot of vehicles and the dropping of carcasses on dirty ground which was ob-served to be the regular practices at the slaughter slabs/ meat markets could have also predisposed beef to contamination.

Figure 6: Pre slaughter procedures at Randa cattle market.

Figure 7: Muhammedian slaughtering at Randa

Lawrie, (1984) reported that external con-tamination of meat is a constant possibility from the moment of bleeding to consump-tion. Microorganisms could have contact with meat from the exterior of the animal and its intestinal tract as well as from knives, cloths, air, carts and equipment in general. Johansson (1983) reported that mi-croorganisms can easily be introduced either in the pre or post processing stages of meat processing which is a reflection of the unhy-gienic practices of meat processing in the developing countries (Bhandare *et al.,* 2007).

Adzitey *et al.,* (2010) whose findings are in line with this study reported that contamination resulting into high microbial population that comes in contact with fresh meat during slaughtering, handling, evisceration and dressing is a problem of the meat industry. Microbes especially coliforms can inhabit the carcasses and cause spoilage of meat and possible infections in humans (Adetunji and Odetokun, 2011).

Moreover, the act of smearing fresh blood on the beef carcasses in order to make beef fresher and more attractive in colour to consumers, observed among butchers and meat sellers across the slaughter slabs could be another possible source of contamination. It has been emphasized that the first impression to consumers of meat is its colour which is an extremely critical component of the appearance of fresh beef sold through retail (Morrisey *et al.,* 1998). However, Restall (1985) found that blood splash carcasses are rated high in microbial load and such action should be avoided.

Table 4 highlighted the isolated bacteria organisms in beef samples collected from the abattoirs in the cattle markets. The presence of these organisms in fresh beef depicts a deplorable state of poor hygienic and sanitary practices employed in the slaughtering and processing of beef.

The slaughter house has been observed to provide excellent opportunities for detecting diseases of both economic and public health importance (Ojo, 2004). Several authors (Sharma *et al.,* 1993, Abdalla *et al.,* 2009, Lawan *et al.,* 2011) also identified different organisms like *Staphylococcus aureus, E.coli, Bacillus spp.* etc. in beef carcasses across slaughter houses in developing countries.

Table 4. Isolated organisms in beef samples in selected cattle market abattoirs in Abeokuta and environs.

Cattle market	Isolated bacteria organisms
Atokun	Staphylococcus spp., Micrococcus spp., E. coli, Pseudomonas spp., Bacillus spp
Randa	Staphylococus spp., Micrococcus spp., E.coli, Pseudomonas spp., Bacillus spp.
Odo – Eran	Staphylococus spp., Micrococus spp., E.coli, Pseudomonas spp.

Some of the organisms isolated like *Bacillus spp. and Staphylococcus species* have been found to be among the general of pathogenic organisms to man and can cause foodborne illnesses to the consumers unless the cooking processes are effective enough to destroy these bacteria (Oluwafemi *et al.,* 2013, Kadariya *et al.* 2014). Schneider *et al.* (2004) reported that the easiest ways to prevent foodborne disease associated with *Bacillus spp.* is by ensuring that foods are cooked thoroughly and cooled rapidly.

CONCLUSION

In conclusion, the practices in the three cattle markets were characterized by low literacy level of cattle handlers, inadequate handling facilities, indiscriminate and unhygienic method of slaughtering, unhygienic processing conditions which had led to contamination of beef cuts from the carcass of slaughtered cattle. It is therefore recom-

mended that more stringent and effective inspection coupled with monitoring that would make cattle markets and slaughter slabs staff comply with existing Federal regulations regarding the implementation of standard sanitation procedures is recommended.

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