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Assessment of Facilties and Operations in Cattle Abbatoirs in Kampala, Uganda

Jesse Patrick Joseph Nyandebo[1], Victor Patrick Bagla[2], [2]Francis Ejobi[3], Roland Suluku[4], Sanpha Kallon[5]

[1, 2. 4. 5]Animal Science Department, School of Agriculture and Food Sciences, Njala University

[3]College of Veterinary Medicine Animal Resources and Biosecurity, Makerere University, Kampala, Uganda

Abstract: ***Abattoir slaughter facilities and inspection processes are relevant and meant to provide wholesome meat that are free from diseases and contamination but the absence of adequate and functional slaughter facilities and processes possess a public health concern especially with the transmission of zoonoses. Despite this important function of abattoir and high daily slaughter load recorded, no study has yet been conducted in Uganda to assess abattoir's facilities, inspection and slaughter waste management. The study was carried out between December 2015 and July 2016 to assess physical facilities and operations in four abattoirs in Kampala city, Uganda. The abattoirs studied were: Kampala Capital City Authority (KCCA) abattoir, Uganda Meat Industry (UMI) abattoir, Nsooba Slaughterhouse Ltd and Kishiita Young Farmer's Abattoir. Data were collected using a checklist and key informant interview with meat inspectors and abattoir workers, focus group discussions and direct observations. The facilities and processes of the abattoirs were evaluated based on observation of their existence and functional status, and were graded as good (1) or bad (0). The basic physical operational facilities in most of the abattoirs were inadequate for compliance to standard and humane slaughter of food animals. Inspection of food animals and carcasses were not rigidly followed especially in the abattoirs located at Kalerwe (Nsooba and Kishitta). Also, a lot of human traffic was observed in the processing and inspection areas. Hygienic and sanitary conditions were also inadequate with the exception of the UMI abattoir. Stunning was not practiced and animal welfare prior to and during slaughter was not observed. High slaughter load with limited number of meat inspectors (11 in all the abattoirs) were also observed in all the abattoirs except the UMI abattoir. There was no form of record keeping for ante and post-mortem meat inspection findings. Fasciolosis, taeniasis, tuberculosis, contagious bovine pleuro-pneumonia, were most frequently encountered at post-mortem inspection. All meat inspectors supported improving abattoir's operational facilities and increasing the number of inspectors. It was concluded that all the Kampala abattoirs do not comply with standard slaughter facilities, inspection, hygiene and sanitary conditions for the production of safe and wholesome meat and meat products for human consumption.***

Keywords: Abattoir, slaughter house, paunch, pluck, carcass, stunning, offal's, effluence, dressing

1. Introduction

An abattoir is considered as any approved premise, registered by the controlling authority for the purpose of hygienic slaughter and inspection, processing, effective preservation and storage of meat products for human consumption (Alonge, 1991). Proper handling of animals is a huge concern aimed at preventing zoonotic disease transmission as well as issues of meat quality. This is important because animals and their products are most often contaminated by microbial organisms living within the animals, natural environment or entrance there-off such as may occur during processing operations (Lewicki, 1993). Hence the scrutiny of animals intended for consumption are required to be examined for unusual signs, lesions or specific disease (Alton et al, 2010). Pre-slaughter handling Shandling of animals starts from the farm, through marketing and end at the abattoir activities (Adzitey, 2011).

Apart of from the abattoir being a place for production healthy meat and clean meat, thatis safe for human consumption (Cadmus, 2009), it can also serve as a source of information on the epidemiology of diseases on livestock, extent to which the public is at risk as well as financial losses incurred through condemnation of affected organs and carcasses (Jiba*et al*, 2008). To achieve this, stringent measure such as ante-mortem and post-mortem inspection must be consistently practiced, toidentify clinically diseased animalsas well as prevent their entrance into the food chain. Furthermore, the inappropriate handling of animal's results in poor meat quality and as a consequence, it's processing properties, and functional and eating qualities that may likely make it less acceptable by consumers (Ferguson and Warner, 2008).

Since the primary reason for post mortem examination of carcasses is for protection of public health (DARD, 2008), the design of an abattoir should ensure correct sequence of operation that encourages efficiency while discouraging contamination and cross-contamination (Igwe and Yakubu, 2000; Igwe 2005). The components of an abattoir, staffing requirements and other services have been outlined by some authors (Ikeme, 1990; Gracey *et al.*, 1999). They include and are not limited to qualified personnel, state-of-the-art equipment, lairage, adequate and potable water supply, good drainage and efficient sanitation system.

In Uganda, as of the year 2009, total direct use benefits derived from livestock, including financial benefits, amounted to about $989, 000, 000 US dollars (ICPALD Policy Brief Series 2013). A targeted effort, including surveillance and eradication programmes, can eradicate or significance reduces the prevalence of livestock diseases as well as the risk to public and animal health. Recent studies in Uganda have focused on the analysis of food safety management Systems in the beef meat processing and distribution chain in Uganda (Siya*et al*, 2021), roles and operations of actors in the beef value chain (Kyayesimira*et*

al, 2018), compliance to post-harvest handling practices of beef along the beef value chain (Kyayesimira*et al,* 2019) and the pollution of Mpanga river by the activities of the kabundaireabattoir effluents (Businge*et al,* 2021).

However, despite the high livestock population, high daily slaughter load and consumption, huge potential in the growth of the livestock industry and the need to provide wholesome meat that is free from diseases, no study has yet been conducted and documented in Uganda to assess facilities, and operations in abattoirs where cattle are slaughter, dressed and inspected. This study was thus conducted to fill that void.

2. Materials and Methods

Inspection schedule
This study was conducted between December 2015 and July 2016 in four abattoirs in Kampala, Uganda. The efficiency of routine abattoir inspection and facilities were validated in comparison to different abattoir carried out by inspectors in the different abattoirs for compliance to standards slaughter procedures/practices, inspection and hygiene. Each of the abattoirs was visited twice a week in two shifts; 04: 00-11: 00 for slaughter and 17: 00-19: 00 for ante mortem inspection and inspection and offloading on arrival. The components of the abattoirs were evaluated based on both their presence and functional status.

Selection of abattoirs for the study
The abattoirs were purposely selected based on their representativeness to the prevailing slaughter procedures/ practices, inspection and hygienic practices, geographic location, and proximity to adequate consumer's market for meat. Detail information of each abattoir is presented as follows:

Kampala City Abattoir
The abattoir is located at Bugolobi close to the Uganda internal affairs ministry and was established in 1935. It has two separate slaughter houses, with a capacity of 1000 heads of cattle per day. The abattoir is largest in-terms of land space and holding capacity. It is operated by Kampala city council authority (KCCA) and the Kampala cattle trader's association (KCTA) andis used mainly for cattle, small ruminants and poultry with separate entity, for either of the specie. The abattoir accounts for approximately 40% of the daily beef supply in Kampala (as observed by the slaughter load per day) with most of the cattle slaughtered been "Ankole" and "Ankole"-Friesian crosses. The abattoir has adequate electric light and water supplies as well as facilities to dispose condemned carcasses and offal's.

Uganda meat industry abattoir
The abattoir is also located at Bugolobi approximately 100m from the Kampala city abattoir. It was established in 1963 by a Greek national by the name of Ballman with the sole aim of targeting high class customers like political elites, diplomats, tourists and possibly exportation of beef. The abattoir has evolved over years, and in the late 1960's, it was taken over by the Government through the nationalizion of most businesses and renamed Uganda meat packers. Government privatization and liberalization led to the change of ownership with Hudda Kanm as the owner from 1995-2000 and renamed Uganda meat industry. In the year 2000, the ownership of the facility again changed hands to the current owner Hassan Bassajalaba. The abattoir has adequate lightening, water supply and offal disposal facilities. It is the only abattoir that can be describe as modern with respect to design and availability of operational facilities for humane slaughtering of animals although most of the facilities are non-operational at present due to neglect. There is adequate lairage with separate compartments/pens for ante-mortem suspects. Facilities within the abattoir includes a weigh bridge (not functional), foot bath to the stunning area, slaughter and bleeding hall, automated hoist for carcass, separate area for evisceration and handling of visceral organs, automated flaying and longitudinal splitting machines, and a separate area for inspection, handling of condemned carcasses and a meat market. The abattoir handles` mainly cattle with low slaughter load per day as was observed despite having a carrying capacity of 250 heads of cattle per day.

Kalerwe Abattoirs: Kalerwe is one of the largest, cheapest and most popular markets within Kampala Township. Due to its low price of feed stuff items, most consumers especially those residing in the outskirts of Kampala and neighbouring district Wakiso flock to this marketing centre for their essential food items. There are two abattoirs at the back of Kelerwe market that are directly opposite each other approximately 150 meters from the northern bypass highway. These abattoirs combined, handled cattle and small ruminants and approximately supply 60% of the total ruminant meat to Kampala and Wakiso districts inhabitants. The overall sanitary environment in the abattoirs is below the requirements of good hygiene practices (GHP) in slaughterhouses. There are poor internal facilities and sanitary conditions with no facilities for wastewater treatment. The untreated waste slaughter water and fluids empty into the nearby channel that subsequently empty into Lake Victoria.

Nsooba slaughter house
The abattoir was established in 1998 by a private business man Semakula Adam who was the owner of the land property. He teamed up with cattle traders in the area to erect the abattoir. Daily slaughter load is approximately 200 heads of cattle per day.

Kishiita young farmers
The abattoir was established in the late 1970s after the privatization and liberalization by Government. It is own by Mr Ahmed Kezeala who work in conjunction with the cattle traders. Daily slaughter load is approximately 200 heads of cattle per day.

Data Collection
Data wascollected through personal observation of on-going practices (inspection) and existing facilities such as water and electric light supplies, sewage and waste disposal facilities in the various abattoirs. Each of the parameters evaluated was coded and allotted a score of 1 for availability and functionality and 0 for non-availability. Informal discussions with veterinarians attached to the abattoir and individual public health inspectors. Furthermore, a

purposeful check list for abattoir inspections addressing routine abattoir procedures was designed and administered to eleven (11) abattoir residence meat inspectors most of whom comprised of veterinarians and public health inspectors,

Data Analysis

Data were entered, stored and analysed using both Microsoft Excel sheet 2010 using a score of 1 for availability and functionality and 0 for none availability of physical operational facilities. The excel work sheet data was entered in statistical package for social scientists (SPSS) version 20. Descriptive statistics (frequencies) was used to ascertain compliance to standards slaughter procedures, inspection and hygiene amongst Kampala abattoirs.

Ethical Consideration

Informed consent was obtained from the management of the respective abattoirs was well as respondents (residence abattoir inspectors) in the study to interview meat inspectors.

3. Results and Discussion

3.1 Results

Availability of facilities at the abattoirs

Table 1 presents summary of the findings of availability of recommended facilities in the respective abattoirs. A total of 15 abattoir parameters were assessed. Uganda Meat Industries abattoir had the higher number of recommended facilitates, while Kashiita Young Farmers abattoir had the least. The table also shows the detailed scores for each parameter. Uganda Meat Industry abattoir had 80% (n=12) of the 15 parameters while Kampala City abattoir had 53.3% (n=8), Nsooba Abattoir 33.3% (n=5) and Kishiita Young Farmers 20% (n=3). All the abattoirs had hoisting and bleeding hall. However, none of them had meat processing plant. Animals are not stunned and waits amidst slaughter of other animals, greatly compromising animal welfare issues. Kishiita young farmers slaughter house was the only abattoir without a lair age and was observed to rely on that of the neighbouring Nsooba slaughter house abattoir. Good off-loading ramps were present in both Uganda meat industry abattoir (UMI) and Kampala city abattoir but absent in Nsooba abattoir.

Table 1: Availability of facilities in abattoirs

Parameters assessed	Abattoir			
	Kampala City Abattoir	Uganda Meat Industry	NsoobaAbattoir	Kishiita Young Farmers
Lairage	1	1	1	0
Water in lairage	0	0	0	0
Adequate lighting	0	1	0	0
Clean & adequate water	1	1	1	1
Stunning hall	0	0	0	0
Bleeding hall	1	1	1	1
Flaying hall	0	1	0	0
Hoisting	1	1	1	1
Conveying rails	1	1	0	0
Meat processing plant	0	0	0	0
Chilling hall	0	1	0	0
Good sanitation	0	1	0	0
Incinerator	1	1	1	0
Tripe room	1	1	0	0
Off-loading rump	1	1	0	0
Total	53.3% (n=8)	80% (n=12)	33.3% (n=5)	20% (n=3)

1 = Yes **0** = No

Compliance to standard routine and extended ante and post mortem inspection procedures

Table 2 presents results of compliance to standard ante-mortem procedures. Kampala City Abattoir and Uganda Meat Industry complied with standards of performing daily routines and have separate pens for suspected and condemned animals. However, they do not perform extended routine activities for both ante and post-mortem inspections. Nsooba slaughter house and Kishiita Young Farmers abattoir did not comply with standard by not performing daily regular routines and lack separate pens for suspected and condemned animals.

Table 2: Compliance to standard ante-mortem inspection procedures

	Abattoir			
Standard activities	Kampala City Abattoir	Uganda Meat Industry	Nsooba Abattoir	Kishiita Young Farmers
Traditional method	1	1	1	1
Extended routines	0	0	0	0
Separated pens for suspected animals	1	1	0	0
Separated pens for condemned animals	1	1	0	0
Total	75% (n=3)	75% (n=3)	25% (n=1)	25% (n=1)

Table 3 presents assessment results of post-mortem activities. All the abattoirs still practice traditional method (visual, palpation and incision) of post-mortem inspection on the shrunk carcass. This was observed in all the abattoirs

with inspectors focussing on incision of the pre-scapular lymph nodes and to some extent the pre-femoral. No thorough inspection was done to detect *Cysticercusbovis* in muscles. In addition, none of the abattoirs practice modern or risk-based post mortem activities like laboratory inspection for micro-organisms, zoonoses and level of drug residues (antimicrobial). Furthermore, none of the abattoirs condemn whole carcasses, although all of them condemn organs. The major gross pathological findings in all the abattoirs were: fascioliasis, tuberculosis, taeniasis and Contagious Bovine Pleuro-pneumonia (CBPP). It should be worth noting that separate pens for suspected and condemned live animals do exists in Kampala city abattoir and Uganda meat industry abattoir.

Table 3: Assessment of compliance to standard post-mortem inspection procedures

	Abattoir			
Activities	Kampala City Abattoir	Uganda Meat Industry	Nsooba Abattoir	Kishiita Young Farmers
Traditional/Conventional	1	1	1	1
Carcass	1	1	1	1
Pluck	1	1	1	1
Head	0	1	0	0
Intestines	0	1	0	0
Trotters	0	0	0	0
Risk base/Modern	0	0	0	0
Condemnation of carcass	0	0	0	0
Condemnation of organs	1	1	1	1
Major gross pathological findings	A, B, C & D	A, B, C & D	A, B, C & D	A, B, C & D

1 = Yes, it practices, 0 = No, doesn't, A = Fascioliasis, B = Tuberculosis, C = Taeniasis, D= CBPP

It was observed that traditional slaughter routine was adopted by all the abattoirs with inspection done on the shrunk carcass (pre-scapular and pre-femoral lymph nodes) and the pluck. In addition, all the abattoirs do condemn whole organs like the liver for example. Furthermore, UMI in addition also carryout inspection on the on the head and intestine as they are predilection sites for many pathological findings.

Level of sanitation and hygiene in the abattoirs

Poor hygiene and sanitation were generally observed. Animal were slaughtered outside slaughter hour in Kalerwe abattoirs (Nsooba and Kishitta) which did not allow for the inspection of such carcasses. High congestion of humans was also observed in theslaughter and inspection areas of the abattoirs except for that of UMI. Poor slaughter waste management was further observed in all the abattoirs especially liquid waste and effluence while carcases were dressed on unhygienic slaughter floor and were not washed.

Personal Protection and Awareness of the Existence of Zoonosis

Finding show that all meat inspectors were aware of the existence of zoonosis and workers in the facilities including the inspectors wore personal protective gears in the form of overalls and gumboots. Meat Inspectors, in addition wore hand gloves, helmets and very strong polyethene apron.

4. Discussion and Conclusion

Abattoir's Operational Facilities

The increase in population the world over has given rise to urbanization, income and a high demand for meat and it's by product. As such, the supply of meat to meet the demand of the populace requires rigorous processes in order to prevent a public health disaster. Human infection by microorganism can occur through the food chain by ingestion of infected meat and meat products. It is therefore important that the safety of the public is protectedagainst food borne pathogen. This study thus assessedpractices within selected abattoirs in Kampala that ensure safe and health meat delivery to consumers.

As regards the abattoirs operational facilities, in general, findings reveal the lack adequate operational facilities for slaughter, dressing and inspection of bovine carcasses. The adequacy of a Lairage is a very important factor since it should have facilities for animal welfare such as watering points which were either non-functional or lacking in all the lairages' visited. In addition, Kishiita Young Farmers abattoir did not have a Lairage as opposed to those of UMI and Kampala city abattoir that had lairage with concrete floor. The lack of a lairage in Kishiita Young Farmers abattoir that rely on lairage f neighbouring Nsoobaabattoir that also lacks concrete floor is opposed to standards specified by the (UNBS, 2007) . This lack can predisposeto contaminants from cattle dung, urine and dirty slaughter floor. The Lairage for UMI and Kampala city abattoir were somehow ideal since they are equipped with separate pens for isolation and condemned animals. The concrete floors in these facilities will ensure easy cleaning and disinfection. Adequate water supply for animals is a prime requirement for drinking as well as for sanitary purposes and was in line with recommended standards (UNEP, 1995, 1996, 2004) . The drainage of the waste water must not compromise food safety (UNBS, 2007) , as well as served as a contaminant to other animals. The UMI and Kampala city abattoir have separate facilities like pens for sick or suspect animals with locks, off-loading ramp and adequate walk way for the animals to the slaughter hall.

Lighting was observed to be present in all the abattoirs. However, findings indicate the lighting system in 75% of the abattoir to be inadequate for thorough inspection which is inline by the World Bank (2008). The Uganda meat industry abattoir was the only abattoir that had adequate lighting facilities for thorough and effective slaughter, dressing and inspection of the carcasses and organs. The importance of adequate lighting facility in abattoirs cannot be over emphasize especially with regards to thorough inspection of carcasses and organs (World Bank, 2008) especially in

most African settings that still rely on the traditional method of inspection (visual, palpation and incision) which is solely practiced in Uganda abattoirs.

High daily slaughter load was observed in all the abattoirs except UMI. The Islamic method of slaughter is practiced by all the abattoirs. This method of slaughtering animals consists of a swift, deep incision with a sharp knife on the neck, cutting the jugular veins and carotid arteries on both sides but leaving the spinal cord intact. Stunning of animals before slaughter (a prerequisite for humane slaughter of food animal and animal welfare issues) is not practiced by all the abattoirs in Kampala. Animals were observed to wait in line to be slaughtered amidst those slaughtered. This finding is in line with previous reports World Bank (2008) which reported that in developing countries stunning is generally not practiced for (all species) and animals wait amidst slaughter operation which greatly compromise animal welfare issues. The usual slaughter practice that was observed involved throwing the animals down, with the four limbs tied together and automatic slitting of the neck. The animals suffer and struggle until they finally die. However, it is worth noting that there is a stunning facility in UMI abattoir that is in working condition but has not been put into use. Furthermore, the poor transport conditions (inappropriate vehicles, congestion, long travel distance etc.) also greatly compromised animal welfare issues.

It was also observed that the Nsooba and Kishiita young farmer's abattoirs did not have a separate hall for flaying. Flaying is directly done on the dirty and congested bleeding hall at the exact location where the animal is bled. This leads to gross contamination of the carcass with microbes resulting from dirty and contaminated slaughter floor. Unfortunately, these carcasses are certified and pass for human consumption after inspection is done. It can also be emphasized that no further inspection (microbial inspection/risk based) is done on the carcass. Kampala city and UMI abattoirs however have separate areas for flaying although the area is not that ideal for Kampala city abattoir.

Hoisting of carcasses after flaying and dressing is practiced by all the abattoirs. However, the manner in which it is done greatly vary among the abattoirs. In Nsooba and Kishiita young farmers slaughter houses, the dressed carcasses are conveyed by the workers on their backs and tied on overhead corroded metal rails in the inspection hall. The practice is a bit improved in Kampala city abattoir where the hoisting is done manually on to conveying rails. The situation is however ideal in abattoir where each carcass is hoisted for flaying immediately after bleeding. UMI abattoir isthe only abattoir that has an automated conveying system along its slaughter line with no human contact with the carcass after evisceration until the time for inspection.

Splitting of carcass in UMIabattoirs is done by an automated machine located along the slaughter line for splitting the carcass when it reached that point. The rest of the other abattoirs manually use axe or butcher knives for this purpose. The non-availability of modern operational facilities in most of the abattoirs recorded in this work could not be supporting standard operating procedure and good hygiene practices in the abattoirs. This situation may pose danger to the public health as pointed out by Adeyemo (2002).

Various complains from inspectors were highlighted about governments and proprietor's insensitivity and lack of concern towards general management of abattoir such as availability of physical operational facilities as earlier suggested by World Bank (2008) report which pointed out that abattoir's administrator focus on profit rather than improving facilities. These attitudes, have resulted into the inability of meat inspectors to inspect meat for wholesomeness, and effectively implementing existing laws in production of wholesome and safe meat to the public (World Bank, 2008).

Routine ante-mortem inspection was observed on all animals at UMI and Kampala city abattoirs with the facilities having separate pens for condemned and suspect animals, which was not the case withNsooba and Kishiita young farmers slaughter houses for ante-mortem inspection especially when meat was scarce in the market. No extended ante-mortem inspection was observed in all the abattoirs, which contrast standard guidelines by FAO (2005).

Post-mortem inspection (PMI) of carcasses and organs on the other hand followed no rigid procedure as observed in all the abattoirs, which further contrasts the accepted norms (FAO, 2005; Savell and Smith, 1998) for thorough inspection of the carcass. In addition, none of the abattoirs were observed to undertake extended post-mortem inspection of carcass for drug residues and microbial contamination. However, the conventional method of inspection (visual, palpation and incision) in line with (FAO, 2005; Savell & Smith, 1998) specified guidelines was observed on the pluck in all the abattoirs.

With regards to parts of the carcasses inspected, post mortem was not observed to be conducted on the head, trotters and intestines in all the abattoirs except UMI where inspection of intestinal lymph nodes (mesenteric) and gastrointestinal tract (GIT) for parasites is practiced. This is a public health concern since the parts not inspected are predilection sites for pathogens and are included in the human food chain in the country. No condemnation of entire carcass in all the abattoirs was observed during the entire visits although entire organs like the liver and lungs were condemned and in certain instances trimmed (liver). The high human traffic observed in the inspection hall i. e., traders or animal owners and retailers was also observed to greatly compromised and influence the work of the inspectors especially in the abattoir located at Kalerwe (Nsooba and Kishitta young farmers).

Abattoir sanitation was observed to be poor with the exception of the UMI abattoir and to some extent the Kampala city abattoir that can be ranked as average. This was evident in Nsooba Abattoir and Kishiita young farmers slaughter houses, where the lack of concrete floor of their Lairage poseda huge challenge to the sanitation of their slaughter premises and slaughter floor in particular. Furthermore, the high human traffic of the slaughterers in and out of the slaughter hall with gumboots also accounts for immense cross and microbial contamination of the carcasses

as well as difficulty in ensuring good process control. This is in line with World Bank (2008) findings that reported high congestionof slaughter and processing areas in developing countries. It was also observed that the four abattoirs lack: foot bath or any form of disinfectant for personnel and equipment's during and after slaughter, hot water system for equipment that comes into contact with edible product is unhygienic situations especially the practice of butchers putting working knives in their boots and its subsequent use without washing and disinfecting. Changing roomswere observed to be only provided for inspectors but not the slaughterers. Furthermore, there were no hygienic envelope (open-air processing), facilities to keep edible material off the floor (particularly offal), facilities for collection, transport and disposal of pathological waste etc. all of which pose health and sanitation problem. These finding are similarly in line with World Bank (2008) report that pointed out that health and sanitation practices are non-existent or very rudimentary, posing greater hazards to public health than carcass products. However, efforts were observed to be made in cleaning of the slaughter floor in the abattoirs with water at the end of each day slaughter.

Liquid slaughter waste/effluence from UMI and Kampala city abattoir was observed to end up in the main sewage system of the national water and Sewage Corporation while those from Nsooba and Kishiita young farmers slaughter houses ended up in the nearby drainage channel leading to Lake Victoria. The existence of septic tanks in medium and large abattoirs in developing countries have been reported (MRC, 1995) , which is the case as observed with UMI and Kampala city abattoirs. The situation in Nsooba and Kishiita young farmers slaughter houses is in line with similar findings by some authors (Adelegan, 2002; Osibanjo & Adie, 2007b; Weobong, 2001) . The contamination of water bodies by slaughter waste/effluence can lead to nutrient build up, eutrophication and oxygen depletion as pointed out (Aina and Adedipe, 1991; Nwachukwu *et al.,* 2011) . No treatment and screening of liquid waste was observed for contaminant from intestinal tract, blood, and fifth quarter wash-water in all the abattoirs as reported in findings by Adeyemo (2002) in studies reported from elsewhere. It is however worth reporting that there was no visible solid waste discharge in the vicinity of all the abattoirs. These were piled and cleared at the end of the day slaughter to be disposed-off at the landfill site in Kiteze or sold to vegetable growers. It can be inferred that hygiene and sanitation are generally poor in Kampala abattoirs affecting wholesomeness of dressed carcasses and edible offals. Generally poor waste management was observed in all the abattoirs especially liquid waste and effluence. This can be attributed to the fact that no screening was done before it joins the main sewage system for (UMI and Kampala city abattoirs) and drainage channel forNsoobaAbattoirand Kishitta young farmers slaughter house abattoirs.

The study thus concludes the need for an improved system in the abattoirs that will foster high standard of hygiene and sanitation, waste management, adherence to meat inspection guidelines and humane slaughter of animals. These put together will ensure the supply of safe and healthy meat to consumers as well as protect the general populace from zoonotic and other food borne diseases.

Pictorial presentation of some abattoir's operations

Figure 1: Lairage of Nsooba slaughter house (Kalerwe)

Figure 2: A condemned carcass being processed in dirty hide processing area at Nsooba slaughter house but who know where the meat would possibly end. Aerial photo from the inspectors' block

Figure 3: Matured tape worm removed from intestine at UMI abattoir following inspection

Figure 4: Post-mortem inspection of pluck/red offal's at Kampala city abattoir

Figure 5: Carcass flaying and dressing at Kampala city abattoir

Figure 6: (a) Cleaning of bleeding hall after day's work and (b). Piled paunch at Kampala city abattoir

Figure 7: Hide and skin handling at Nsooba slaughter house

Figure 8: (a) Incinerator and (b). Drainage channel for effluence at UMI abattoirs

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