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Assessment of the Hygienic Practices and Microbial Quality of Broiler Meat and its Contact Surfaces From Poultry Retail Outlet and Cold Room in Rivers State Nigeria

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Abstract

Poor hygiene and sanitary practices among poultry meat sellers can lead to the contamination of meat. This contamination can occur as a result of contamination from the contact surfaces in the cold room and retail outlet. The aim of the present study was to assess the sanitary quality of Broiler meat and its contact surfaces (apron, butcher hand, butcher table, bowl, butcher knife and weighing scale) in cold room and retail outlet. Swab samples were assessed for total bacteria count, total coliform count, total staphylococcus count and total fungal counts using Standard Microbiology methods. Mean Total viable count of each sample ranged from Log $_{10}$ cfu/cm^2/g 3.64 to7.94 and 3.14 to 4.75 from the retail outlets and Cold-room respectively. Mean Total Staphylococcus count. of each sample ranged from Log $_{10}$ cfu/cm^2/g 1.67to 4.67 and 2.01 to 3.87 from the retail outlets and Cold-room respectively. Counts from the retail outlets were significantly higher than counts in the cold room. Organisms isolated included ; *Staphylococcus* sp, *Bacillus* sp, *Escherichia coli*, *Proteus* sp, *Salmonella* sp, *Aeromonas* sp, *Pseudomonas* sp, *Klebsiella* sp and *Enterobacter* sp. Fungi isolated was *Aspergillus* sp, *Saccharomyces* sp, *Penicillium* sp and *Rhodotorula* sp. Antibiogram was carried out on the isolated organisms it was observed that *Klebsiella sp* and *Enterobacter sp* were resistant to most of the antibiotics used. In order to prevent cross-contamination of meat with isolated bacteria, appropriate cleaning and sanitization steps are required. According to the study, meat contact surfaces that were not thoroughly cleaned before usage, could function as a source of cross contamination. It is recommended that meat sellers especially in developing countries need proper education and training on good hygiene practice. Regulating agencies are also advised to ensure strict compliance by meat sellers to safety standards by embarking on routine inspection at retail outlets and market places.

Keywords: *Cold-Room, Contact Surfaces, Hygiene, Broiler Meat, Retail Outlets, Microbial Contamination*

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I. INTRODUCTION

In spite of the numerous difficulties encountered, Nigeria's poultry production has increased consistently over the past century The four west African nations of Ghana, Nigeria, Cote d'Ivoire, and Benin have the greatest potential for the expansion of the chicken industry in terms of rising retail demand and the financial and nonfinancial incentives available (Armah *et al.,* 2010). Broilers are expected to be dressed, cooled or frozen, and prepared for supply when thinking about broiler retail and storage. Storage can refer to holding items in the manufacturing facility before distribution, at the retail location or the main distribution hub, or even at home. If processed broiler chicks are not packaged individually and kept in a cool room, cross contamination may occur, increasing the number of salmonellae in a batch. Distribution and storage practices for processed broilers can also affect the number of bacteria present in the meat (Marmion *et al.,* 2021). A cold room is a space designated for the preservation and protection against contamination of chicken products. One of the most lucrative businesses to start at any time of year is the cold room company, often known as the frozen food industry in Nigeria. According to the sun news online, several Nigerians who invested in the cold room industry became multimillionaires. People nearly never eat a meal without adding poultry, fish, or meat to it, therefore Nigeria will always require more cool rooms to store the frozen food that is consumed there every day. To keep this

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poultry product from spoiling and being contaminated, a cool room is crucial. Once the items are installed, they can be sold to retailers and wholesalers. Meat is regarded as the most perishable of all vital foods because it provides enough nutrients to promote the growth of microbes (Magnus, 1981). The contamination may be a result of the presence of bacterial pathogens on surfaces and equipment used in the processing of chicken (Omorodion and Odu, 2019). The condition and cleanliness of contact surfaces and the safety of water used in retail processing typically from a municipal source of wells used to clean meat contact surfaces are the main common sanitary issues that arise during the handling of poultry meat. It is widely acknowledged that the microbiological quality of the meat influences the microbial loads on surfaces and equipment in different poultry factories and cold rooms (Evans *et al.,* 2004). Most of these bacteria are already known to produce a matrix biofilm on moist surfaces (Costerton *et al.,* 1999). Since the majority of these bacteria are capable of creating biofilms, it is vital to remove them from contact surfaces in order to prevent further damage from occurring. As its contamination can contribute to the cross-contamination of non-infected poultry meat, this meat handling equipment should be maintained and kept in a way that will limit the likelihood of meat getting contaminated. Once inside the wood, microorganisms may stay in the internal structure. Cutting knives and weighing scales that have not been thoroughly cleaned may also contain bacterial biofilms. As mentioned, if such equipment is not completely sterilized, it may continue to contaminate food (Costerton *et al.,* 1999; Hassan *et al.,* 2010). Hence, uncontaminated poultry meat will become contaminated by the time it comes in contact with such surface. On the other hand, contaminated meat is able also to disseminate food-borne pathogens to clean contact-surfaces. Contamination of pathogenic bacteria in poultry processing such as Salmonella (Foley *et al*.,2008), *Listeria Monocytogenes* (Lawrence and Gilmore 1994; Omorodion and Odu 2019) have been studied extensively and is been associated with poultry processing, poultry products, or both. In the processing of birds, microbial contamination can occur from processes such as bird-to-bird contact, handling of the carcasses by employees, contact with processing equipment or tools etc. Cleaning of equipment and contact surfaces is important to remove these contaminants and prevent the development of extra polymeric biofilms, which protect bacteria and allow them to multiply on equipment surfaces unless removed by a combination of chemical and mechanical treatments (Carpentier and Cerf 1993). Because equipment that comes into contact with poultry products might get contaminated, equipment and contact surfaces have been recognized as an essential tool for assessing the performance of sanitation systems both before and during operations. Meat contamination may be caused by bacterial contamination found on surfaces and equipment used for processing chicken (Pradhan *et al*., 2018). It is widely acknowledged that the microbiological quality of the Food influences the microbial loads on surfaces and equipment in different food plants (Evans *et al*., 2004). The majority of bacteria are previously known to develop biofilm on moist surfaces (Costerton *et al*., 1999). The majority of these bacteria have the capacity to produce biofilms, which shield them from harm from the outside and allow them to attach tenaciously to surfaces with which they come into contact. Therefore, it is important to clean and preserve this food handling equipment in a way that will reduce the likelihood that food will become contaminated, as their infection can result in cross-contamination of poultry meat that isn't contaminated. Once inside the wood, microorganisms may stay in the internal structure. Cutting knives and weighing scales that have not been thoroughly cleaned may also contain bacterial biofilms. As mentioned, if such equipment is not completely sterilized, it may continue to contaminate food (Costerton *et al*., 1999; Hassan *et al*., 2010). Therefore, when uncontaminated poultry meat comes into contact with such a surface, it will become contaminated. On the other hand, tainted meat has the ability to spread microorganisms that cause food poisoning to clean contact surfaces (Gorman *et al.,* 2002). The aim of this study is to determine the sanitary condition of the contact surfaces in retail outlets and cold rooms in Port Harcourt, Rivers State

II. Materials And Methods

A. Samples collection

A total of 48 swab samples of which 12 swabs samples were taken from each location twice. From cold room and retail outlet swabs samples were collected from the tables, knives weighing scales, bowls, aprons, butcher hands and the chicken samples collected, aseptically using sterile polythene plastic bags. Swab samples were taken in an area of 1cm using sterile swabs soaked into a 0.1% saline solution. Samples were then transported to the University of Port Harcourt, Microbiology Food laboratory using an icebox (4°C) for immediate analysis.

B. Preparation of samples

Before processing, the tubes containing swabs were vortexed for 30 seconds to maintain uniformity in distribution of microorganisms. Meat samples were homogenized, using a stomacher. The total count so obtained was multiplied with the average number of colonies in a particular dilution with the dilution factor ISO (2009) and expressed as the number of organisms or colony forming unit (CFU) of each sample and calculated into its log value. The microbiological data were expressed in log cfu/cm2 and log cfu/g in case of swab and meat samples, respectively.

C. Bacteriological analysis

Total microbial counts of the samples were determined using serial dilution and standard plate count method (AOAC, 2000). Twenty-five grams (25 g) of the meat samples shall be weighed and transferred to a stomacher bag under aseptic conditions. The samples were then diluted to 10^{-1} using 225 ml peptone water and homogenized for 2 min by using a

Stomacher. Following homogenization, serial dilutions were made using sterile peptone water. On the other hand, each tube containing swab samples (10 ml of 0.1% saline water) was vortexed to ensure a mixture of the sample. A tenfold serial dilution was prepared by transferring 1 mL of the homogenized sample (both meat and swab) to 9 ml diluents. The swab samples were taken from, tables bowl, apron, butcher hand and knives, weighing balance, and cutting tables with an area of 1cm^2 using sterile swabs soaked into a 0.1% saline solution. From appropriate serial dilutions, a 0.1 ml aliquot was plated on plate count agar for total bacteria count, MacConkey agar for total coliform count, mannitol salt agar for total Staphylococcus count and Salmonella Shigella. Agar for Salmonella count and the plates were incubated at 37°C for 24 hrs. Using a sterile wire loop, random colony was pick from each culture and subculture on a freshly prepared sterile nutrient agar and incubated for 24hours for the bacteria while potato dextrose agar is used to incubate fungi for 5days to obtain pure colony was done as described by Gurmu, and Gebretinsae (2013). Bacterial Isolates were identified based on colonial morphology and cultural characteristics on growth media which include: colony size, color, opacity, consistency, colony pigmentation elevation, odour, swarming, identification materials, reagents and protocols were according to Holt *et al.* (1994) and Cheesbrough (2005).

D. Total fungi count

Potato dextrose agar supplemented with 0.1 g of chloramphenicol as an antibacterial agent. 0.1 ml from the appropriate dilution was spread plated on PDA. Incubation at 25°C for 3–5 days, identification of Fungi was done by colonial morphology (colour, size and texture) and the cell morphology (mycelium, hyphae) of the fungi using lactophenol blue. A piece of mycelium from the petri-dishes was mounted on a clean grease-free slide using a sterile wire loop and was cove red with a cover slip/ a drip of lactophenol cotton blue was added and allowed for few minutes before examining under the microscope. The fungal isolates were characterized and identified according to Samson and Von Reen-Hoekstra (1988) and Onions *et al.* (1981).

E. Determination of antibiogram

Antibiotic sensitivity patterns of all the confirmed isolates were performed by standard disk diffusion method according to Kirby-Bauer on Mueller-Hinton agar (Titan, Biotech Ltd, Indian) following the procedures recommended by CLSI (2013). Ten different commonly used antibiotics (µg/disc) (Table 1) were tested for the Gram-positive and Gram-negative bacteria. Briefly, from an overnight culture of all isolates, 0.5 MacFarland turbidity standards bacterial culture was prepared in sterile saline, from which 0.1mL was inoculated onto Mueller Hinton agar, after which antibiotic discs were carefully and aseptically placed on the surface of the agar. The plates were incubated at 37ºC for 24h. Zone of inhibition was measured in millimeter a ruler as described by Okekeaji *et al*., (2018).

F. Statistical analysis

The collected data, microbiological findings from swab samples, were entered into a Microsoft Excel spreadsheet and analyzed using a one-way ANOVA with Statistical Package for Social Sciences (SPSS) version 16 statistical software A 95% confidence interval at P value 0.05 and less than 0.05 was considered statistically significant.

Table 1. Antimicrobial agents used in the current study

No	Antibiotics used for gram negative bacteria			Antibiotics used for gram positive bacteria		
	Antibiotic	Code	µg/disc	Antibiotic	Code	µg/disc
1	Trimethoprim sulfamethoxazole	SXT	30	Trimethroprin sulfamethoxazole	SXT	30
2	Ciprofloxacin	CPX	5	Ciprofloxacin	CPX	5
3	Amoxicillin	AM	25	Amoxicillin	AM	25
4	Gentamycin	GEN	10	Gentamycin	GEN	10
5	Pefloxacin	PEF	5	pefloxacin	PEF	5
6	Streptomycin	S	10	Streptomycin	S	10
7	Ofloxacin	OFX	5	Ceftriaxone	AXO	30
8	Cephalothin	CH	30	Azithromycin	Z	30
9	Spiramycin	SP	100	erythromycin	E	30
10	Augmentin	AU	30	Rifampicin	RI	30

III. RESULTS

The bacteriological analysis showed that the bacterial count was varied according to the location of samples. It was found that mean total bacteria count of contact surfaces of poultry retail outlet and cold-room which ranges from Log_{10}cfu/cm^3 3.64-7.94 and Log_{10}cfu/cm^3 3.14 - 4.8 respectively (Figure 1). In addition, it was found that the mean total staphylococcus count of contact surfaces of poultry retail outlet and cold-room which ranges from Log_{10}cfu/cm^3 2.13-4.67 and Log_{10}cfu/cm^3 2.01 - 38.7 respectively (Figure 2). The highest percentage occurrence organisms isolated from the contact surfaces was Staphylococcus (25%) and the lowest one was *Aeromonas sp* (2%) (Figure 3).

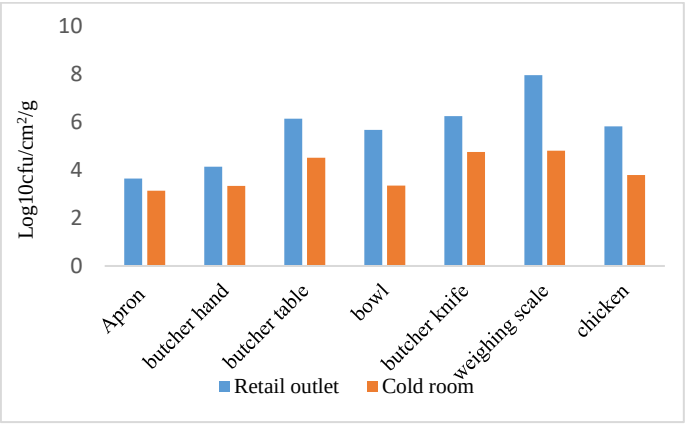

Figure 1. Bar chart of mean total bacteria count of contact surfaces of poultry retail outlet and cold room.

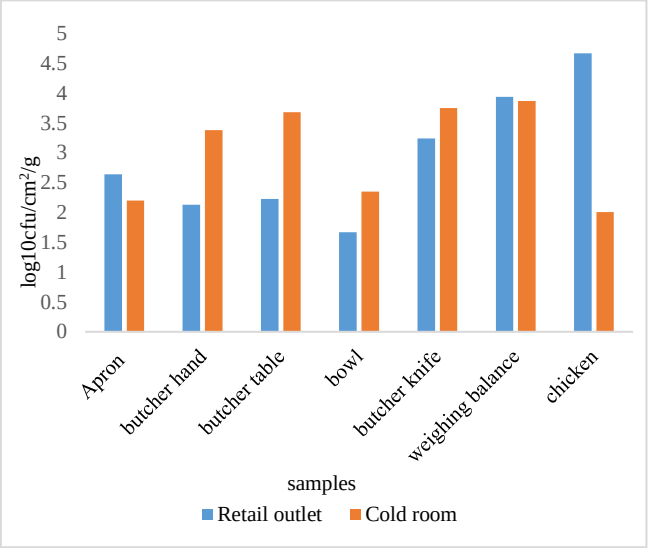

Figure 2. Bar chart of Mean Total Staphylococcus count of contact surfaces of poultry retail outlet and cold room.

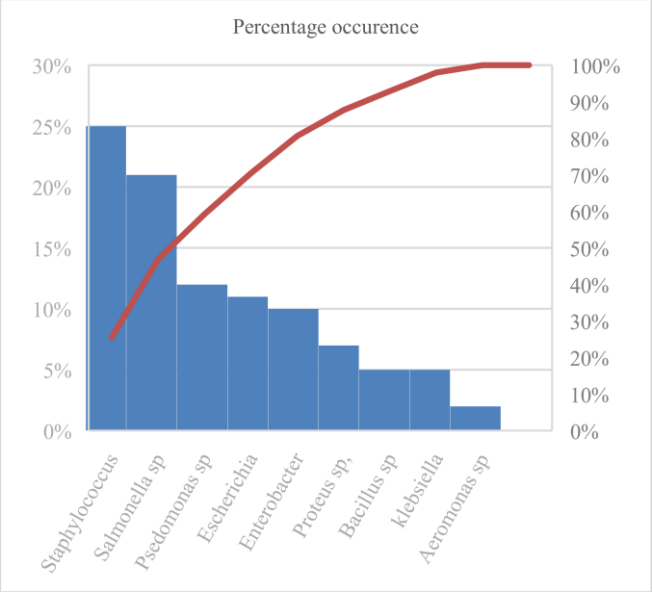

Figure 3. Percentage occurrence of organisms isolated from the contact surfaces.

The microbial population revealed that Cold room butcher table (CRBT) and retail outlet butcher table (ROBT) had Coliform, Salmonella and Fungi counts. However, the other contact surfaces showed different counts and existence of the microbial population (Table 2).

The susceptibility of the bacterial isolate from the contact surfaces toward ten different antibiotics were screened. In gram negative bacteria, all isolates showed susceptibility to different antibiotics. However, *Klebsiella sp* and *Enterobacter* were with resistant toward most tested antibiotics (Table 3). On the other hand, among the gram-positive bacteria, there were variable sensitivity of all isolates toward the tested antimicrobial agents (Table 4).

Table 2. Enumeration of the different microbial population on the samples.

Samples	Fungi Count cfu/cm^2/g	Coliform count cfu/cm2/g	Salmonella Count cfu/cm^2/g
RO/AP	Nil	1.0x10^3	Nil
RO/BH	Nil	Nil	Nil
RO/BT	Nil	2.4x106	7x10^2
RO/CH	Nil	2.3x105	Nil
RO/BK	Nil	2.6x103	Nil
RO/WS	Nil	Nil	1.0x10^3
RO/NY	Nil	Nil	Nil
RO/AP	Nil	1.4x10^3	Nil
RO/BH	Nil	1.0x10^3	Nil
RO/BT	3.0x10^3	1.6x10^4	5x10^2
RO/CH	2.2x10^3	3.8x10^4	Nil
RO/BK	Nil	Nil	Nil
RO/WS	6.1x10^5	5.2x10^5	Nil
RO/BO	Nil	Nil	Nil
CR/AP	Nil	Nil	Nil
CR/BH	2.4x10^4	Nil	Nil
CR/BT	1.3x10^4	7.6x10^3	4.5x10^3
CR/CH	1.8x10^3	1.7x10^3	Nil
CR/BK	8.2x10^3	7.3x10^3	Nil
CR/WB	5.7x10^3	8.1x10^2	Nil
CR/BO	1.3x10^2	Nil	Nil
CR/AP	Nil	Nil	Nil
CR/BH	7x102	Nil	Nil
CR/BT	1.7x10^3	1.2x10^3	2x10^2
CR/CH	1.5x10^3	1.0x10^3	Nil
CR/BK	6.1x10^3	6.6x10^3	Nil
CR/WS	3.3x10^3	4.2x10^3	Nil
CR/BO	Nil	Nil	Nil

Legend; Cold room-CR, Retail outlet-RO, Butcher Knife-BK, Butcher hand-BH, Butcher Table-BT, Weigh scale-WS, Bowl-BO, Apron-AP, Chicken-CH

Table 3. Antimicrobial sensitivity for gram negative bacteria isolated from the contact surfaces (mm).

Organisms	SXT	CH	SP	CPX	AM	AU	GEN	PEF	OFX	S
E. coli	18	24	26	30	16	14	24	30	30	30
Proteus sp	30	28	32	34	36	32	34	30	30	32
Salmonella sp	30	28	28	30	30	32	28	32	30	30
Aeromonas sp	22	18	24	28	22	Nil	20	22	28	22
Pseudomonas	10	14	26	24	20	Nil	20	26	30	20
Klebsiella sp	0	18	0	20	0	0	0	0	0	26
Enterobacter	26	28	0	0	0	0	0	0	0	20

Legends: Trimethoprim sulfamethoxazole (SXT), Cephalothin (CH), Spiramycin (SP), Ciprofloxacin (CPX), Amoxicillin (AM), Gentamycin (GEN), Augmentin (AU), Pefloxacin (PEF), Ofloxacin (OFX), Streptomycin (S).

Table 4 Antimicrobial sensitivity for gram positive bacteria isolated from the contact surfaces (mm).

Organisms	PEF	GEN	AXO	Z	AM	RI	CPX	S	SXT	E
Bacillus sp	32	28	34	26	34	24	20	24	24	30
Staphylococcus	22	14	22	20	24	24	20	20	22	30
Staphylococcus	29	18	27	20	24	26	15	31	26	34
Bacillus sp	22	20	24	28	29	27	18	29	26	27
Staphylococcus	10	14	26	24	20	0	20	26	30	20

Legends: Pefloxacin (PEF), Gentamycin (GEN), Ceftriaxone (AXO) Azithromycin (Z), Amoxicillin (AM) Rifampicin (RI), Ciprofloxacin (CPX), Streptomycin (S), Trimethoprim sulfamethoxazole (SXT), Erythromycin (E).

IV. DISCUSSION

The mean total bacteria count of contact surfaces of poultry retail outlet and cold-room ranged from Log $_{10}$ cfu/cm^3/g 3.64 to7.94 and 3.14 to 4.75 from the retail outlets and Cold-room respectively A higher total bacteria count was obtained from weighing scales Log_{10} cfu/cm^3 (7.84), knives Log $_{10}$ cfu/cm^3 (6.24) and Tables Log_{10} cfu/cm^3 (6.13) in this study from retail outlet. This is an indication of the repeated use of a single weighing balance for weighing kilos of chicken samples and the continuous use of a single knife in spite of contact with dirty or contaminated surfaces, insufficient cleaning, either before commencement or after completion of work and lack of good management practice (GMP) at the retail outlet. This is in accordance to the findings of Sudhakar *et al.,* (2009) and Omorodion and Odu (2019). The high TBC of table is an indication that the tables are not well cleaned with settling dust and meat remnant contributing to the bio-burden, as supported by the reports of Sudhakar *et al.,* (2009); Bhandare *et al.,* (2009) and Hassan *et al.,* (2010). Also, due to continuous used of wooden tables for cutting meats, the surface may become absorptive in nature providing favorable environment for growth and multiplication of microorganism. Proper cleaning and washing of tables with appropriate disinfectants is the utmost important to ensure good hygienic condition.

A high log_{10} cfu/cm^3 mean total bacteria count was observed for Weighing scales (4.8), tables (4.75), knives 4.51 from poultry cold room. According to Timm *et al*., (2013), contact surfaces with contamination level exceeding 4.0 log10 cfu/cm^3 is sufficient to initiate biofilm favoring microbial growth. Contact surfaces from the retail outlet had significantly higher mean TBC as compared to contact surfaces from cold room ($p<0.05$). This is similar to other studies (Tarwate *et al*., 1993; Omorodion and Odu 2019).

Figure 2 shows the mean total Staphylococcus counts for the retail outlet which ranged from Log_{10} cfu/cm^3/g 1.67 to 4.7 with chicken sample having significantly high Staphylococcus count ($p<0.05$) while the cold room samples ranged from Log_{10} cfu/cm^3/g 2.2-3.87 with the knives having the highest count. This was in accordance to the study of Zerabruk *et al.,* (2019) and Atlabachew and Mamo (2021). This could be due to inappropriate individual hygiene of meat handlers and cross-contamination from skin and utilities under poor sanitary conditions, *Staphylococcus spp*. count reported in the present study was slightly lower than the standard set by Codex Alimentary Commission (2005) (Gebeyehu *et al.,* 2013; Teshome *et al.,* 2020). According to the risk factors study by Adugna *et al*. (2018), Staphylococcus was highly prevalent from swap samples obtained from cutting tables, knives and hooks which supports the study. According to Okonkwo *et al*. (2008), and Iroha *et al.* (2011), the presence of Staphylococcus spp. on raw meat is a consequence of cross-contamination from meat handlers, their clothes as well as processing equipment to the raw meat which is true in the present study too. The ubiquity of *Staphylococcus spp*. lends more support or credence to this. A high incidence of *Staphylococcus spp*. may influence the taste, smell, and physical appearance of the meat. *Staphylococcus aureus* is an important food poisoning agent. In addition, some strains of *Staphylococcus aureus* produce enterotoxin. Staphylococcal enterotoxin is heat stable and can withstand boiling for thirty minutes. Ingestion of this toxin may cause sudden onset of illness within 3 to 4 hours, which is often characterized by nausea, vomiting, and diarrhea. Okonkwo *et al.,* (2008). According to FAO/WHO (2005) and Health Protection Agency (2009), meat and meat products are unaccepted for human consumption if coliform count is greater than 25 log_{10} CFU/cm^2 and 4 log_{10} CFU/g, respectively. The result of the present study, coliform count was greater than the prescribed limits in retail outlet and cold room (Bogere and Baluka, 2014; Hughes *et al.,* 2015). Observations indicated low adherence of meat seller in wearing protective clothing and the same people who handled meat received money and these could be the reasons for high microbial load contamination (Chepkemoi *et al.,* 2015). In a related study, hands were found to be a major source of infection from microorganisms in foodstuff (Kahraman *et al.,* 2010) weighing scales, and cutting tools washed after the days used this can be a source of contamination (Obeng *et al.,* 2013). In the present study, a significant number of meat samples obtained from retail outlets showed the presence of *Salmonella spp* . The presences of Salmonella in any sample could be due to poor hygiene and sanitary practices through all value chains of the meat supply and sales, and also further remarked that contamination of food with *Salmonella spp* could enormously exhibit high public health risk especially where consumption of raw meat is quite common with no and/or rudimentary surveillance system (Ferede *et al*., 2015; Zerabruk *et al*., 2019). *Salmonella* and *Staphylococcus* amongst others as noted are common contaminants of equipment used in processing of meat which are able to produce biofilm (Costerton *et al*., 1999). Their presence therefore on contact surfaces such as cutting knives, wooden or steel tables, weighing scales, and other stainless-steel equipment is an indicator of improper cleaning. *Salmonella sp* isolation from the wooden tables could be attributed to the fact that empty cartons of the poultry meat are placed on the tables instead of allowing direct contact between meat and table before cutting the meat into sizeable cuts. The cartons may or may not be are changed as often as the one being used is damaged which helped in reducing bacterial load or increasing the microbial load on the surfaces. However, prevalence of these organisms is a reflection of the fact that their microbial quality is poor. The rate of *Salmonella* isolation observed with weighing scales could be attributed to the fact that weighing scale are use throughout the day for sales without being washed. However, the knives used were not been changed for the entire day hence the higher microbial level due to the accumulation of microorganisms and biofilms on the surfaces. An indication of a possible source of recontamination in food handling and hygiene techniques (Clarence *et al.,* 2009). The fungi count recorded from the contact surface (2.54–3.67 log cfu/cm^3) in this study was lower than the study conducted in Jijiga (Ayalew *et al*.,

2015) and similar to the study conducted by Atlabachew and Mamo (2021) general, the high microbial load found on the contact surface may indicate the presence of significant cross-contamination among the contact surfaces during the sales. The presence of fungi in samples can be attributed to exposure of all the equipment used. Fungi spores can be blown away from the place of release to other places and also can grow in normal temperatures. A total of 62 microorganisms, Fungus present in the study were mostly *Aspergillus* spp, *Saccharomyces* spp, *Penicillium* spp and *Rhodotorula* spp. Bacteria include *Staphylococcus spp* and *Bacillus spp*, *Escherichia coli*, *Klebsiella* spp, *Aeromonas* sp, *Salmonella* spp, *Enterobacter* spp, *Proteus* spp, and *Pseudomonas* spp respectively. The organisms isolated was similar to other studies by Sudhakar *et al.*, (2009); Omorodion and Odu (2019) and Nurye and Demlie (2021).

Antibiotics susceptibility testing showed that most of the organisms were sensitive to the trimethoprim sulfamethoxazole, cephalothin, spiramycin, ciprofloxacin, amoxicillin, gentamycin, augmentin, pefloxacin , ofloxacin, streptomycin evident with vary degrees of zones of inhibitions except for *Klebsiella* spp and *Enterobacter* spp *that* were resistant to most of the antibiotics used except for Trimethoprim sulfamethoxazole, cephalothin, ciprofloxacin. A potential health hazard to consumers can be expected from resistant bacteria. If the organism is resistant to antibiotics, then initial treatment may be ineffective both in man and animals and an alternative treatment need to be applied (Cotterill *et al.*, 1977). Antimicrobial are used even in the absence of illness to prevent diseases when animals are susceptible to infection (Turtura *et al*. 1990). In slaughterhouse, resistant strains from the gastrointestinal tract may infect chicken carcasses and, as a result, chicken meats are often related to antimicrobial-resistant microorganisms (Reza *et al*. 2014). Therefore, these antimicrobial-resistant bacteria from poultry can infect humans directly and indirectly with food. Though rarely, these resistant bacteria may colonize in the human gastrointestinal tract and may also transfer resistance bacteria to human endogenous flora (Reza *et al*., 2014).

V. Conclusion

Based on the organisms isolated and counts obtained on different Contact surfaces, meat could be contaminated by contact with contaminated surfaces and equipments in the Retail outlet and cold-rooms enhance public health hazards. Microorganisms can easily colonize anything they see by forming biofilms.

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