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Assessment of Microbiological Quality of Fresh Meat from Slaughtering Points and Meat Shops

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Abstract

Microbiological quality of fresh meat available at slaughtering point and meat shops was evaluated from different areas of district muzaffargarh using standard microbiological techniques. Chicken, beef (Cattle, Buffalo) and mutton (Sheep, Goat) meat samples (n=350) were collected from various slaughtering points (n=150) and meat shops (n=200). All the samples were subjected to the aerobic plate count (APC), enumeration of *E. coli*, *S. auerus* and *salmonella* isolation. APC of sheep, goat and beef meat from the slaughtering points (5, 5 and 8log10CFU/cm^2 respectively) were significantly lower as compared to APC values of meat shop (11, 7 and 5log10CFU/cm^2 respectively). Mean APC of chicken meat from poultry meat shops was 5.75 log10 CFU/cm^2.Percentage (%) E. coli count from the positive samples for the sheep, goat and beef meat from the slaughtering points and meat shops were 70, 30, 48, 20, 50 and 44 while *S. aureus* counts (%) were 70, 24, 44, 38, 70 and 46 respectively. Percentage (%) *E. coli* and *S. aureus* counts for poultry meat shop were 40 and 54 respectively. There were no significant differences ($p \leq 0.05$) between the *E. coli* and *S. aureus* percentage for the slaughtering point and meat shops of sheep, goat and beef meat. The *E. coli*, *S. aureus* and *Salmonella* were detected from total of 43.14%, 49.42% and 16.85% samples respectively. Contamination occurs through microbes during its transportation and subsequent processing.

1. Introduction

Meat is an excellent source of protein being used for human consumption. Different microbes are involved in the contamination of meat during slaughtering and subsequent processing.They get microbes while processing from inside and outside the body of animal before human consumption. These microbes causes meat spoilage and food borne infections in human (Ahmad et al., 2013).These microbes produce bad odors and slime production (Danilo Ercolini et al., 2006). Various types of microbes will be present on fresh meat but some become dominant depending on pH, temperature, humidity, texture, composition and hygienic status of meat (Adu-Gyamfi et al., 2012). Entry of these microbes occurs during its processing. Meat is the best media for the growth of both spoil aging and pathogenic bacteria because it contains sufficient quantity of water, fat and protein but low in the carbohydrate contents. The most common microbes that cause spoilage of raw meat are Enterobacteriaceae family members, *Pseudomonas spp.*, *Brochothrix* and *Shewanella* (Ahmad et al., 2013). Raw meat has contamination with pathogenic bacteria that cause food borne in human being. Pathogenic bacteria are *E. coli*, *Salmonella spp.*, *Yersinia enterocolitica*, *Campylobacter jejuni/coli*, *S. aureus* and *Listeria monocytogenes* (Norrung et al., 2009). When microbial load exceeds from 10^7–10^9CFU cm^2, meat produces cheesy to fruity smell (Danilo Ercolini et al., 2006). The meat available at meat

shops come after different steps of processing. During processing and transport, major bacteria come in contact with meat that causes contamination of meat. During dressing of carcass, mostly meat become contaminated (Gill CO et al., 2000). To control these microbes contamination, hygienic measures should be adopted otherwise these microbes not only contaminate the meat but also changes detrimental changes that makes unfit for human consumption. The present study was designed to assess the microbiological load of fresh meat from both slaughtering points and meat shops.

2. Materials and Methods

3. Experimental Design

A total no 350 of meat samples were collected from various slaughtering points (n=150) and meat shops (n=200) of district Muzaffargarh. The samples were taken after dressing and washing through swabbing on carcass. Then swabs were transferred into screw capped test tube containing sterilized maintenance media of NaCl and peptone (0.1% Peptone+85% NaCl) (M. U. D. Ahmad*et al.*, 2013).These test tubes were shifted to the microbiology laboratory for microbiological investigation under refrigeration (3-4C).

3.1 Aerobic plate count (APC)

APC was made as described by Dutta and Bell (1997). 0.1ml of appropriate dilutions was spread on the agar plates. It was kept at 37C for 24 hours for incubation. After that no of colonies was counted and expressed in the colony forming unit (CFU) per unit area.

3.2 E. coli Enumeration

Eosin methylene blue agar was used for enumeration of *E. coli*. After plating with dilutions of sample, plates were kept at 25C for 72hours.After incubation all the blue colonies with or without gas production were enumerated as *E. coli* and were expressed as CFU per unit area.

3.3 S. aureus Enumeration

S. aureus were isolated and enumerated first through sub culturing the colonies on the nutrient agar to obtain pure culture. After spreading of dilutions of sample on agar, plates were kept on 37C for 48 hours for incubation. Morphological characteristics of colonies, gram staining and biochemical tests were used for further confirmation of *S. aureus* (Obeng et al., 2013).

3.4 Isolation and Identification of Salmonella spp

Salmonella spp. were isolated by inoculating 1ml of sample dilutions with SS agar then incubated at 37C for 24hours. Pure colonies were identified with colonies morphological characteristics, gram staining and different biochemical tests.

3.4 Gram staining and biochemical tests

Biochemical tests that were performed for isolation and identification of different bacteria included as catalase, oxidative fermentative, furazolid one and bacitracin susceptibility, sugar fermentation, citrate fermentation, oxidase, indole, urease and motility tests. Procedure of biochemical tests and gram staining were followed as described by De, (2007).

Statistical analysis

ANOVA was performed for statistical analysis.

4. Results and Discussion

The results of mean APC of chicken, sheep, goat and beef is presented in the table 1. Mean APC of sheep, goat and beef meat from the slaughtering points (5, 5, 8) were significantly lower as compared to aerobic plate count of meat shops (11, 7, 5). Meat APC of chicken was 5.75. Mean APC of sheep, goat and beef from the slaughtering points were not significant ($P < 0.05$). Similarly, the APC from the meat shops did not differ significantly ($P < 0.05$). Lower mean APC for the slaughtering points as compared to the meat shops shows that improper transportation, storage and supportive environment of meat shops are conducive for microbial contamination. Higher level of APC in this study is similar with the previous study (Hassan et al., 2010).

4.1 E. coli Count:

Total *E. coli* count shows the hygienic status of meat (Table). Out of total 350 meat samples, *E. coli*positive sample were 151(43.14%) samples including gslaughtering (47) and meat shops (104) that shows unhygienic status (Alvarez-Astorga et al., 2002). Similar results have also been reported for fresh chicken meat in Australia(Pointon *et al.*, 2008). *E. coli* positive samples (%) for the sheep, goat and beef meat from slaughtering points and meat shops were 70, 30, 24, 10, 25 and 22 respectively. *E. coli* counts were higher for sheep meat shops as compared to sheep slaughtering points(70% vs 30%), goat meat shop as compared to sheep slaughtering point (48% vs 20%), and beef meat shop as compared to goat slaughtering point (50% vs 44%). The 40% of chicken meat samples collected from poultry meat shops were also

positive for *E.coli.* The presence of *E. coli* strains in the meat and their products have also been reported by AduGyamfi et al., (2012).

4.2 S. aureus counts

The percentage *S. aureus* counts for the sheep, goat and beef meat available at the meat shop and slaughtering point were 70, 24, 44, 28, 70 and 46 respectively as presented in the graph. *S. aureus* was isolated from the(51%) samples, which shows the poor sanitary management of slaughtering points and meat shops. *S. aureus* counts were higher for sheep meat shops as compared to sheep slaughtering points (70% vs 24%), goat meat shops as compared to goat slaughtering points (44% vs 38%), and beef meat shops as compared to beef slaughtering points (70% vs 46%). The 54% of the chicken meat samples available at the poultry meat shops were also positive for *S. aureus*. Significantly higher percentage of sheep, goat and beef samples from meat shops were positive for the *S. aureus* as compared to samples from the slaughtering points. The findings of the present study are similar with the previous results of Tassewet al.,(2010). Higher level of microbiological contaminations including *S. aureus* of meat from slaughtering points and meat shops has also been revealed by Voidarou et al., (2011) previously.

4.3 Salmonella Count

A total of 59 (16.85%) samples were found positive for salmonella out of 350 samples. The positive samples of *salmonella* were not different significantly for sheep meat shops as compared to sheep slaughtering point (34% vs 10%), while goat meat shops positive samples were equal to goat slaughtering points (10 % vs 10%), and beef meat shops positive samples were higher than to goat slaughtering points (24% vs10%) respectively. The 20% of the chicken meat samples available at meat shops were also positive for *Salmonella*. The high prevalence of *Salmonella is due* to the unhygienic water used at the slaughtering points for carcass washing. *Salmonella* has been commonly isolated from the slaughtering points environments and GIT of allanimals, particularly in poultry (Norrung*et al.*, 2009).

Table 1: APC of Chicken, Sheep, Goat and Beef meat (log10 CFU/cm^2)

Table 1: APC of Chicken, Sheep, Goat and Beef meat (log10 CFU/cm^2)

Log CFU/cm^2	Chicken	Sheep		Goat		Beef		Total
		M.Shop	S.Point	M.Shop	S.Point	M.Shop	S.Point	
	(n=50)	(n=50)	(n=50)	(n=50)	(n=50)	(n=50)	(n=50)	(n=350)
	n_a^2(%)	n_a^2(%)	n_a^2(%)	n_a^2(%)	n_a^2(%)	n_a^2(%)	n_a^2(%)	
3	3 (6)	11(22)	2(5)	5(10)	2(5)	3(6)	6(12)	32(27.71)
4	5(10)	13(26)	3(6)	6(12)	5(10)	4(8)	6(12)	42(37.71)
5	7(14)	10(20)	4 (8)	9(18)	6(12)	8(16)	10(20)	54(46.85)
6	11(22)	10(20)	12(24)	8(16)	6(12)	5(10)	9(18)	61(54.57)
Mean± S.D	5.75 ±2.21	11 ±1.0	5 ±5.0	7 ±2.0	5 ±2.0	5 ±2.0	8 ±2.0	47.25 ±12.84

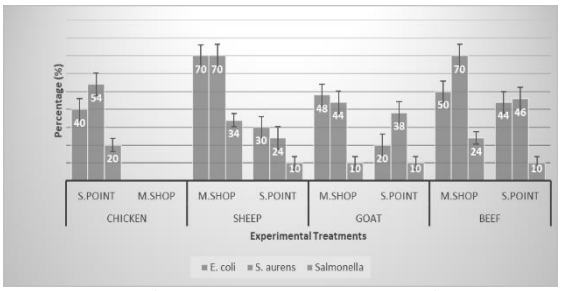

Figure 1. APC of Chicken, Sheep, Goat and beef meat at meat shop and slaughtering point

5. Conclusion

It is concluded that the microbiological load of the fresh meat from slaughtering points and meat shops is high due to improper management of transportation, storage. There should be proper monitoring services for adoption of hygienic conditions during slaughtering and subsequent processing.

References

Adu-Gyamfi A., Torgby-Tetteh, W., and Appiah, V., (2012). Microbiological Quality of Chicken Soldin Accra and Determination of D10-Value of *E.coli*. *Food Nutr. Sci.* 3 (5): 693-698.

Alvarez-Astorga M., Capita, R., Alonso-Calleja, C., Moreno, B., Del, M., and Garcia-Fernandez, C.,(2002). Microbiological quality of retail chickenby-products in Spain. *Meat Sci.* 62 (1): 45-50.

Dutta A, and Bell SP. (1997). Initiation of DNA replication in eukaryotic cells. Annu Rev Cell Dev Biol. 1997;13:293–332.

Bhandare S. G., Sherikar, A.T., Paturkar, A.M., Waskar, V.S., and Zende, R.J., (2007). A comparison of microbial contamination on sheep/goat carcasses in a modern Indian abattoir and traditional meat shops. *Food Control.* 18 (7): 854-858

Hassan A.N., Farooqui, A., Khan, A., Khan, A.Y., and Kazmi, S.U., (2010). Microbial contamination ofraw meat and its environment in retail shops in Karachi, Pakistan. *J Infect Dev Ctries.* 4 (6):382-388

De, R.K., (2007). Diagnostic Microbiology. *Jaypee Brothers Medical Publishers Ltd., New Delhi, India. 1st Edition*. pp. 53-131

Obeng, A.K., Johnson, F.S., Appenteng, S.O.,(2013). Microbial Quality of Fresh Meat from Retail Outlets in Tolon and Kumbungu Districts of the Northern Region of Ghana. *International Journal of Science and Technology*,2(6):2013.

Ahmad, M.U.D., Sarwar, A., Najeeb, M.I., Nawaz, M., Anjum, A.A., Ali, M.A., and Mansur, N., (2013). Assessment Of Microbial Load Of Raw Meat At Abattoirs And Retail Outlets. *The journal of animal and plant sciences*, 23(3):745-748.

Danilo, E., Federica, R., Elena, T., Paolo, M., and Francesco, V.,(2006). Changes in the Spoilage-Related Microbiota of Beef during Refrigerated Storage under Different Packaging Conditions. *Applied and environmental microbiology*, 72(7):4663–4671.

Norrung, B., Andersen, J.K., and Buncic, S., (2009). MainConcerns of Pathogenic Microorganisms inMeat Safety of Meat and Processed Meat. *F.Toldrá, ed. (Springer New York)*, pp. 3-29

Gill, C. O., Bryant, J., and Brereton, D.A., (2000).Microbiological conditions of sheep carcasses from conventional or inverted dressing processes. *J Food Prot.* 63 (9): 1291-1294.

Bell, R. G., (1997). Distribution and sources of microbial contamination on beef carcasses. *J ApplMicrobiol.* 82 (3):292-300.

Tassew, H., Abdissa, A., Beyene, G., and Gebre-Selassie, S., (2010). Microbial flora and food borne pathogens on minced meat and their susceptibility to antimicrobial agents. *Ethiop JHealth Sci*. 20(3): 137-143.

Voidarou, C., Vassos, D., Rozos, G., Alexopoulos, A., Plessas, S., Tsinas, A., Skoufou, M., Stavropoulou, Eand Bezirtzoglou, E., (2011). Microbial challenges of poultry meat production. Anaerobe. *Meat*,17 (6):341-343.