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Microbial Contamination of Fresh Meat Processed in Public Abattoir and Slaughter Slab System of Operations

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ABSTRACT

The comparison of microbial contamination of fresh meat processed was carried out in public abattoir and slaughter slab system of operations. The meat samples were analyzed for Aerobic plate counts, coliform yeast and mould. The results indicate that the counts were significantly ($p < 0.05$) higher than the standards. The mean Aerobic plate counts (APC), Conliform, mould and yeast counts after 4 hours in the abattoir was 2.0×10^5 cfu/gm, 3.6×10^3 cfu/gm and 1.2×10^2 cfu/gm for public abattoir. While 6.0×10^3 cfu/gm, 4.2×10^3 cfu/gm and 5.0×10^5 cfu/gm for APC, conform and mould and yeast counts, in slaughter slab. The high counts are indications of contamination through poor hygienic practices which could be through slaughtering, cutting process, unsterile knives and cutlass, handling of meat using dirty hands, cloths and utensils, sneezing, coughing, dirty floor and tables etc. Adequate cleanliness of all the surfaces and sterilize equipment used for slaughtering and processing will reduced microbial activities in fresh meat.

Keywords: Microbial contamination, abattoir, slaughter, fresh meat, environment, hygienic.

INTRODUCTION

Meat is defined as the flesh of animals which are suitable for use as food (Forrest *et al.*, 1975). It is one of the most nutritious foods used for human consumption and an excellent source of high quality protein. It also contains large amounts as well as fats and carbohydrate for energy (Ikeme, 1990). Meat serves as an excellent medium for microbial contamination, growth and spoilage. The degree of bacterial contamination of the carcass depends only when the initial bacterial counts is low. The contamination of meat could be sourced from the air, environment of the operations, the slaughter slabs, unsterile knives and cutlass, equipment and utensils, clothing and hands of personnel, the hides and hooves, the gastrointestinal tract of the animals, the wash water, butchers and from poor hygienic practices (Johanson *et al.*, 1983).

According to Patterson and Gibbs (1978), heavily contaminated sites in an abattoir are the water supply to the lair age, animal hair, blood, rumen contents, soil and fecal materials from hooves in abattoirs. Johansson *et al., (*1983) have found *E. Coli, Proteus SPP, Streptococcus faecatis* and *Cl. perfringens* in all effluent samples. Strains of Y. enterolitica were reported by Newton (1979) from sampling of meat - works environment. Obanu (1980) describes a typical situation in Nigeria, the abattoirs are usually located in the open market, a centre of activity, where air is strikingly polluted and heavily charged with spoilage and pathogenic bacteria, yeast and moulds. Skinning, evisceration and cutting up of the carcass are often carried out on filthy slaughter floor or on equally filthy platforms and tables.

Usually, many more hands than necessary are involved in these operations, each hand being a source of contamination the stinking odor and nauseating environment of these persons and places are familiar. It is against this background that this study was carried out to compare the level of microbial contamination of fresh meat processed in public abattoir and slaughter slab system of operations.

MATERIALS AND METHODS

For the purpose of meat sampling in abattoir, two sample sites were selected for the study site X - Ughelli main market (public abattoir system) and site Y- Agbarho meat market (slaughter slab system). A total of twenty samples of 250 g each were collected from public abattoir and fifteen samples of 250 g each were collected from slaughter slab at intervals of 2 hours each using sterile beakers and immediately placed in ice cooler while being transported to the laboratory for analysis. Twenty-five grams of representative stock samples meat were weighed aseptically and homogenized in 225 ml of 0.1 % peptone water using a blender to give 1:10 or 10" Dilution tend fold serial dilutions were made and the dilutions plated. The plates were incubated at 37°C for total viable count, 30°C for mould and 28°C for yeast and coliform counts (Maikai *et al.*, 2005).

The meat samples were analyzed for total viable bacteria using nutrient agar, yeast and mould using malt agar and McConkey agar for coliforms (Harrigan and MacCance, 1976). Representative colonies on nutrient agar plates were picked with sterile wire loop. They were streaked into nutrient agar plates and incubated at 37°C. This procedure was repeated till pure colonies were obtained using heat fixed smears the morphology and grams reaction were examined under the microscope and the isolated cultures inoculated into nutrients agar slants and incubated for 24 hours before identification test, congulase test, motility test, spore staining, indole, methyl red, vogest-proskauer and citrate utilization test were done (Harrigan and McCance, 1976).

RESULTS AND DISCUSSION

Table 1 presents the changes in microbial level of fresh meat processed 4 hours during slaughtering operations.

The mean Aerobic plate count (APC), coliform, mould and yeast counts are 2.0×l05 cfu/gm, 3.6×103 cfu/gm and 1.2×102 Kcfu/gm respectively. While slaughter slab system at the end of 4 hours had the mean Aerobic plate count (APC), coliform, mould and yeast counts of 6.0×103 cfu/gm, 4.2×103 cfu/gm and 5.0×105 cfu/gm respectively (Table 2).

Table 1: Changes in Microbial Content of Fresh Meat in Public Abattoir Situated at Ughelli main Market

Time in hrs	APCAt 37°Ccfu/gm	Coliform Coun cfu/gm	Mould & Yeast Count cfu/gm
0	1.3×104	1.2×102	3.0×103
2	4.0×l03	2.2×103	4.2×103
4	2.0×105	3.6×103	1.2×102

Average of means of three counts APC = Aerobic Plate Count

Microbiological standard for fresh meat should not exceed 1×105 cfu/gm, for APC and 1×102 cfu/m for coliforms as reported by Jay (1978). The use of coliform count in assessing the microbiological safety and quality of food (meat) was also reported by Mossel *et al.*, (1962).

Table 2: Changes in Microbial Content of Fresh Meat in Slaughter Slab Situated at Agbarho Meat Market

Time in hrs	APCAt 370C cfu/gm	Coliform Count cfu/gm	Mould & Yeast Count cfu/gm
0	3.6×10^3	2.0×10^4	4.1×10^3
2	2.8×10^4	2.2×10^3	3.0×10^4
4	2.0×10^3	4.2×10^3	5.0×10^5

Average means of three counts APC = Aerobic Plate Count.

Comparing the changes in microbial levels in public abattoir system with the microbial contamination standards, it was discovered that the counts are higher than the given standard in the literature. Slaughter slab also had higher counts. These results tend to agree with Makai et al. (2005), reported that there was higher counts of microbial levels in Kawo and Tudun wada abattoirs in Kaduna, and Zango abattoir in Zaria.

But the mean of APC (6.0×103 cfu/gm), coliform (4.2×103 cfu/gm) mould and yeast (5.0×105 cfu/gm) counts respectively in slaughter slab was higher than public abattoir system. This can be attributed to the fact that operations performed during slaughtering, cutting process and handling of carcass were under poor hygienic conditions.

In slaughter slab system, the increase in counts after 4 hours could also be as a result of microbial contamination through the closet river water (Agbarho river) used, the air environment, the unsterilized areas of operation, unsterile knives and cutlass, the hides and hooves, the gastrointestinal tract of the animal, perching of flies, sneezing and coughing can introduce this micro-organisms in the meat surface.

The lower counts in public abattoir compared to slaughter slab system of operations, may be as a result of facilities provided by the local government council for the smooth operation and veterinary personnel under the supervision of sanitary control of the site. The initial microbial contamination of meat in public abattoirs may also results from the introduction of microorganisms into the vascular system for failure to sterilize their knives and cutlass during the process of sticking and bleeding. Since blood continues to circulate for a short period of time following sticking, the introduced micro-organisms may be disseminated throughout much of the animal body.

CONCLUSION AND RECOMMENDATIONS

From the findings, we therefore conclude that fresh meat provide highly favorable media for the growth and multiplication of micro-organisms. Apart from the external surface and the gastrointestinal and respiratory tracts, the tissues of living animals are essentially free of microorganisms. During slaughtering, the defensive barrier of the skin and mucous membrane is loss and the meat gets contaminated with various microorganisms from external sources such as type of wash water, unsterile knives, rumen content, environmental polluted air, equipment and utensils, clothing's and hands of butchers and poor hygienic practices contribute to bacteriological contamination of meat-works environment. This contamination occurs in almost every operation performed during the slaughtering, cutting, processing and handling of carcass.

It is recommended that careful instruction for cleaning the environment, tools and equipment, and utensils should be followed appropriately. Recommendations for good sanitizing agents and disinfectants may be necessary in some instances. Adequate cleanliness of all the surfaces and equipment use before and after slaughtering and processing is also necessary. The local Government and community authority should provide the necessary facilities and chemical (repellant) to eliminate houseflies. These are only sure ways of enhancing the quality of meat and the overall well-being of the consumers.

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