

MICROBIAL QUALITY ASSESSMENT OF FROZEN POULTRY MEAT (CHICKEN AND TURKEY) SOLD IN ILARO ENVIRONS

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Abstract:

This study evaluated the microbial assessment of frozen poultry meat sold in Ilaro environs. Four samples were analyzed and the total plate counts ranged from 32×10^4 cfu/g to 57×10^4 cfu/g, Coliform count ranged from 7×10^4 cfu/g to 55×10^4 cfu/g, Staphylococcus count range from 4×10^4 cfu/g to 36×10^4 cfu/g, Salmonella counts ranged from 8×10^4 cfu/g, to 46×10^4 cfu/g and Fungi count ranged from 5×10^4 cfu/g to 15×10^4 cfu/g. Microorganism isolated were Staphylococcus spp, Salmonella spp, Bacillus spp, Pseudomonas spp, Escherichia. coli, Rhizopus and Saccharomyces spp. In all the four samples, there was low fungi count, high Staphylococcus in sample D but lesser number of coliform count in sample A. The statistical analysis shows significant difference ($p > 0.05$) in the analysis. Sample A and C contains more microbes than B and D apart from Staphylococcus. The analysis shows that the counts exceeded recommended limits for all the pathogens. Poultry meat obtained from these cold rooms should therefore be properly cooked to eliminate these pathogens in order not to pose health risks to the consumers.

Keywords: Microbial, quality, frozen, poultry meat, chicken, turkey.

INTRODUCTION

Poultry is a category of domesticated birds kept by humans for the purpose of collecting their eggs, killing them for meat or for feathers. These most typical are members of the super order *Galloansera* (fowl) especially the others such as chicken, turkey and quails belong to order *Galliformes* and the family *Anatidae* (in order *Passeriformes*) (Jacob, (2015); Miranda *et al.*,

(2008)). The European community was banned from the use of antimicrobials as growth promoters in poultry farming in January, 2006 because of the risks of increased resistance (Miranda *et al.*, 2008) but demand and imports of poultry meat into Nigeria has increased over the years. Nigeria annually produces an average of 11,829 tons of chicken spending about 8 million US dollars to import chicken meat in 2005 alone (Alabi and Alabi, 2009).

Chicken (*Gallus gallus domestics*) is a type of domesticated fowl/bird kept on a farm for its eggs or its meat or the meat of this bird that is cooked and eaten. There are more chickens in the world than any other bird or domesticated fowls (Perry *et al.*, 2015). The prevalence of chickens is due to almost the entire chicken being edible and the ease of raising them. In developed countries, chickens are usually subjected to intensive farming methods (Sims, 2003).

Turkey (*Meleafris gallopavo*) is a large bird grown for its meat on farms. The flesh of this bird used as food (Dickson, 2000). Turkey provides 20% of the world's animal protein at a reasonable price. There are many firms supplying suitable housing and equipment designed for the best welfare of the birds and advances in veterinary research ensure that healthy stock is normal (Sherwin, 2010).

Poultry meat can be contaminated with variety of microorganism including those capable of causing illness due to mishandling of the remains the organisms of greatest global concerns in the respect, others present include the more recently reported *Arcobacter* and *Helicobacter spp* and occasionally, *Verotoxigenic Escherichia coli*. While poultry is by no means the only source of the causative organisms, it is widely recognized as a major reservoir in each case due to symptomless carriage in the live bird. The microbiological hazards are well known and are often difficult to control effectively because of the technological limitations in the process that can lead to cross contamination of the carcasses being processed. (Pooni and Mead, 1984)

The microbiological safety of quality of poultry meat are equally important to producers, retailers and consumers and both involve microbial contaminants on the processed product. Two quite different groups of microorganisms are relevant: on the hand certain food borne pathogens and on the other hand, organisms that are generally harmless to human health but being psychotropic are able to multiply on the product during chill storage (Mead, 2004). Spoilage results mainly from “off-colour” development and product shelf-life is determined both by the number of organisms present initially and the temperature history of the product at all stages of production and subsequent storage and handling (Pooni and Mead, 1984; Chaiba *et al*, 2007). The importance of the study is to safeguard the health of the consumer to ensure that it does not contain pathogenic microbes and to ascertain the microbial load of the poultry meat. Therefore, the objective of the study is to determine the microbial count of frozen poultry meat (chicken and turkey) and to identify any pathogenic microbes in the poultry sample.

MATERIALS AND METHODS

Materials

Four samples of frozen poultry meat (chicken and turkey) were brought from two (2) cold rooms in Ilaro, Ogun State.

Sample Preparation

The frozen poultry meat was suspended in a known amount of sterile distilled water after mashing the samples aseptically using mortar and pestle. It was homogenized, then the samples were serially diluted under aseptic condition.

Microbial Analysis

Ten (10) grams of each poultry meat samples was diluted in 9 ml of sterile distilled water in a conical flask to get the aliquot, a tenfold serial dilution was carried out. An aliquot of 1 ml from selected dilutions of each sample was inoculated aseptically into labelled duplicate agar plates of media (Nutrient Agar for total viable count, MacConkey Agar for total coliform, Baird parker Agar for *Staphylococcus* count, Bismuth sulphite Agar for *Salmonella* count) using standard pour plate method and incubated at 35°C±2°C for 24 to 48 hours. Potato Dextrose Agar was incubated at 28 °C±2 °C for 3 to 5 days for isolation of fungi. Colonies were enumerated at the end of incubation period using digital colony counter (Gallenkamp England). (Lynne, 2003)

RESULTS AND DISCUSSION

Table 1: Microbial analysis of the frozen poultry meat samples sold in ilaro environs

Sample	Total plate Count (cfu/g)	Coliform Count (cfu/g)	Staphylococcus Count (cfu/g)	Salmonella Count (cfu/g)	Fungi Count (cfu/g)
A	57×10 ⁴	55×10 ⁴	7×10 ⁴	46×10 ⁴	5×10 ⁴
B	38×10 ⁴	20×10 ⁴	4×10 ⁴	16×10 ⁴	7×10 ⁴
C	39×10 ⁴	8×10 ⁴	7×10 ⁴	8×10 ⁴	14×10 ⁴
D	32×10 ⁴	7×10 ⁴	36×10 ⁴	13×10 ⁴	15×10 ⁴

Values are means of duplicate determination. Key: A – frozen chicken meat (raw) from Orita, B – frozen chicken meat (raw) from Town, C – frozen turkey meat (raw) from Orita, D – frozen turkey meat (raw) from Town

<i>Pseudomonas</i>	Rod	-ve	+ve	-ve	+ve	+ve	+ve	+ve	Acid/gas
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DISCUSSION

According to the analysis carried out on the samples, it was observed that sample A contain 7×10^4 cfu/g *Staphylococcus sp*, 46×10^4 cfu/g *Salmonella*, 55×10^4 cfu/g Coliform, 57×10^4 cfu/g TPC and 5×10^4 cfu/g for Fungi. Sample B contains 38×10^4 cfu/g for TPC, 4×10^4 cfu/g for *Staphylococcus spp*, 16×10^4 cfu/g *Salmonella*, 20×10^4 cfu/g Coliform and 7×10^4 cfu/g Fungi. Sample C contains 39×10^4 cfu/g TPC, 7×10^4 cfu/g *Staphylococcus spp*, 8×10^4 cfu/g *Salmonella*, 8×10^4 cfu/g Coliform and 14×10^4 cfu/g Fungi. The sample D was observed to contain 32×10^4 cfu/g for TPC, 36×10^4 cfu/g *Staphylococcus spp*, 13×10^4 cfu/g *Salmonella*, 7×10^4 cfu/g Coliform and 15×10^4 cfu/g Fungi. Sample A contains more microorganisms except in the case of *Staphylococcus spp* in sample D which is very high. However, it was observed that sample C contains lesser microorganisms, then followed by sample B and A. The high level of microorganism in sample D could be due to contamination of the carcass during processing and handling.

The organisms isolated in this study was *Salmonella spp*, *Staphylococcus spp*, *Escherichia. coli*, *Lactobacillus spp*, *Pseudomonas spp*, *Streptococcus spp*, *Bacillus spp* *Rhizopus spp* and *Saccharomyces spp*. Nzovaneku *et al*, (2010) reported that the absence of *E. coli* in poultry meat can be considered fit for human consumption there poultry meat from cold rooms should be properly cooked to denature toxin produced by the organism as well as the organism itself such that consumption will not pose health risks to human population.

ICMSF (International Commission for Microbiological Specification of Foods) recommended that the number of microbial count for poultry meats (frozen) must not exceed 5×10^6 for total plate count, 5×10^2 for *E. coli*, 5×10^2 for *Staphylococci*, and absence of *Salmonella* in 25g of the frozen poultry meat. Generally, frozen poultry products are safe at 5×10^7 as stated by ICMSF. Therefore, it can be deduced that this study revealed how unsafe frozen poultry meats are for consumption because number of organisms obtained exceeded the limits recommended.

CONCLUSION

In conclusion, the results obtained in this study showed that poultry meats (chicken and turkey) sold in the selected area contained number of microorganisms higher than the specified limits recommended by ICMSF (International Commission for Microbiological Specification of Foods). Therefore, it can be concluded that freezing temperature does not totally inhibit the growth of microorganisms in a frozen product although proper cooking would kill most of the microorganisms present. The growth of *Escherichia coli*, *Staphylococcus* and *Salmonella* is of great concern as this may pose health risk to the consumers.

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