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Common Micro-Organisms Found on Frozen Fish Seller Tables in Mubi-North, Adamawa State Nigeria

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Abstract

A study was carryout on 10 frozen fish sellers in Mubi Adamawa State to determine the types of microorganism found on their cutting tables. Six different types of bacteria were isolated during the course of the research, these include; *Bacillus cereus, Staphylococcus aureus, Shigella species, Streptococcus species, E. coli,* and *Salmonella typhi*. *Staphylococcus aureus* has the highest number of isolate 5.00±3.1 sample 1 and 10 followed by *Streptococcus spp* and *Bacillus spp* with 4.00±2.04 sample 5, 9 and 1 respectively. The least isolate was *E. coli* 1.00±0.19. Most of the organisms contaminated the table of frozen fish sellers through human handling, and air. This entire organism is of public health important. Most of the organisms contaminate the frozen fish probably during selling operation. However, potentially pathogenic organism isolated from the frozen fish seller table showed the need for proper hygienic conditions during handling and distribution of the frozen fish.

Keywords: Micro-organism, Frozen fish, Fish seller Table**,** and Mubi.

Introduction

Fish is one of the cheapest sources of animal protein and it is being used increasingly because of its availability, palatability and health provisions (Azam *et al*., 2004; Akinwumi, 2011). Fish is one of the highly perishable goods, in tropical conditions, fish spoils quite rapidly within a few hours of landing if there is no adequate handling and storage (Akinneye *et al*., 2010). The rate at which fish spoilage occur varies with species of fish, sanitary conditions, methods of handling and storage (Flowra *et al*., 2012). The rate of spoilage is temperature dependent and lowering the temperature will reduce the rate of spoilage. Different species of fishes have different shelf life depending on the oil levels, duration of rigor mortis, intrinsic conditions of the fish, how it was captured and handled. Shelf life of most marine fishes have been observed to range between 2-24 days in ice, 5 days at 5°C and 3 days at 10°C (Ababouch, *et al*., 1996).

The quality of fish and fishery products has become a major concern in fish industry all over the world (Huss *et al*., 2003). Fish quality is a complex concept involving a whole range of factors, that include, safety, nutritional quality, availability, convenience, integrity, freshness and eating quality (Abbas *et al*., 2008; Jinadasa, 2014). Freshness is one of the most important attributes of fish quality. However, it can be measured by different analytical methods. These methods can be divided into two categories, namely: sensory methods using the quality index method and instrumental method such as chemical, physical and bacteriological analysis. Spoilage bacteria are characterized by their ability to produce Hydrogen Suiphide (H_2S), reduce Trimethlyamine Oxide TMAO to Trimethlyamine TMA and convert urea to ammonia. Marine fish is characterized by the presence of an odourless compound called TMAO. TMA is produced in fish muscle slowly at first then at greater speed in fish stored at ambient temperature, in ice or in refrigerated seawater. TMA, ammonia and hypoxanthine are chemical compounds produced by bacterial action (Carlos, 2008; FAO, 2013). Spoilage of fish and fish products can be due to chemical, enzymatic or microbial activities. Chemical deterioration and microbial spoilage are responsible for 25% loses of gross primary agricultural and fishery products every year (Baird-Parker, 2000). The spoilage rate of fish may be reduced by good handling practices and effective temperature control immediately they are harvested (Carlos, 2008; FAO,

2013). Spoilage set in rapidly after fish is caught from the way it is processing and handled from sellers to the buyers. Flies settle on the equipment used for processing fish before selling, and in the process of cutting for consumers microorganisms can get into the fish and contaminate it, thus become harmful to the consumers. Marketing of frozen fish in Mubi is mostly carried out by local fish sellers who have little or no knowledge of contaminating microorganisms that may constitute serious health hazard to the consumers. Since frozen fish are processed in open place where contaminated equipment and other disease carrying organisms such as flies are found, this research focuses on some of the microorganisms found on these frozen fish sellers tables that are of economic importance and their health hazards to humans.

Materials and Methods

The research was conducted at the Department of Fisheries and Aquaculture Laboratory, Adamawa State University Mubi. Samples were collected from Mubi main market by using sterile swab stick to swab the cutting tables of 10 frozen fish sellers selected randomly, in the market.7g of nutrient agar and 7g of marconkey were used to prepare the media. The weighed media were mixed with water in the conical flask, and autoclaved for 15 minutes and left to cool. The top of the conical flask was wrapped with foil to prevent contamination and wire loop was flamed before and after use. All isolates were sub-cultured and gram staining was carried out. Grams staining of the various isolates glass were washed and air dried. Normal saline water was placed on the slide, using a flame inoculation wire loop; a small amount of inoculum was taken and smeared on the drop of normal saline on the slide. The smear was flooded with crystal violet for a minute. Lugols iodine was added for another one minute and this served as a mordant. This was later rinsed and cleaned with distilled water. Alcohol was added as a decolorizer and rinsed immediately with clean water. A counter stain, safranin was added and allowed to stand for a minute and then rinsed with clean water. This was allowed to dry before observing under oil immersion at x10 objective microscope. Identification of isolate was carried out based on method described by Sakazaki and Shimad (1986), Collins *et al.* (1989) and Cheesbrough (2002). Data collected were subjected to one way analysis of variance (ANOVA). Means were separated using Duncan multiple range test at ($p \leq 0.05$). Duncan (2006).

Results and Discursion

Six different types of bacteria were isolated during the course of the research, these include; *Bacillus cereus, Staphylococcus aureus, Shigella specie, Sstreptococcus specie, E.coli*, *Salmonella typhi*. (Table 1)

From the result, *Staphylococcus aureus* has the highest number of isolate 5.00±3.1.In samples 1 and 10 followed by *Streptococcus spp* and *Bacillus spp* with 4.00±2.04 in samples 5,9 and 1 respectively. The least isolate was *E. coli* 1.00±0.19. These organisms may have contaminated the table of frozen fish sellers through human handling and air. The presence of this organism on the table of frozen fish sellers might be due to increase in moisture content and also favorable temperature which favors the growth of these organisms. *E. coli* and *Salmonella spp* are fecal borne pathogens and they could occur as a result of contamination from handlers (Alexander, and Austin 1986). The contamination of frozen fish with *E. coli* suggested that one or more of enteric pathogen have gained access to the fish. *E. coli* particularly is an indicator of contamination through mishandling of fish when appeared in large numbers. (Silliker and Gabis, 1976). Adelaja *et al*., (2013) reported that *E. coli* causes diarrhea and kidney damage as well as in complicated community acquired urinary tract infections.

The highest number of *Staphylococcus spp* isolated showed that the natural flora of the fish environment was contaminated with organisms associated with man such as *Staphylococcus aureus* which can grow well at 30 – 37^{o}C according to Ababouch, *et al*., (1996). The isolate is significance because it has been incriminated with food-borne intoxication and infection. Survival of this organism was related to its ability to survive high salt level. *Bacillus spp* and *Salmonella spp* also can cause food borne illnesse. It is usually occur through cross contamination as a result of poor food preparation and handling practices. *Salmonella spp* causes gastroenteritis and typhoid fever (Adelaja *et al*., 2013).

Table 1: Microorganism isolated from tables of 10 frozen fish seller in Mubi main market

	Samples										
Micro-organism	1	2	3	4	5	6	7	8	9	10	LSD
Shigella	2.00±0.93^{b}	1.00±0.93^{b}	1.00±0.93^{b}	1.00±0.93^{b}	1.00±0.93^{b}	1.00±0.93^{b}	1.00±0.93^{b}	1.00±0.93^{b}	1.00±0.93^{a}	1.00±0.93^{b}	2.00
Salmonella	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	2.00±0.19^{a}	2.00±0.19^{a}	2.00
Streptococcus	3.00±2.04^{b}	2.00±2.04^{c}	3.00±2.04^{b}	3.00±2.04^{b}	4.00±2.04^{a}	3.00±2.04^{b}	4.00±2.04^{a}	3.00±2.04^{d}	4.00±2.04^{a}	2.00±2.04^{b}	3.00
Staphylococcus	5.00±3.1^{b}	3.00±3.1^{c}	2.00±3.1^{d}	3.00±3.1c	3.00±3.1^{c}	4.00±3.1^{b}	3.00±3.1^{c}	4.00±3.1^{b}	3.00±3.1^{c}	5.00±3.1^{a}	4.00
Bacillus	4.00±2.9^{a}	3.00±2.9^{b}	3.00±2.9^{b}	3.00±2.9^{b}	1.00±2.9^{d}	1.00±2.9^{d}	3.00±2.9^{b}	2.00±2.9^{c}	1.00±2.9^{d}	2.00±2.9^{d}	1.00
E-coli	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00±0.19^{b}	1.00

Mean in the same row having the same superscript do not differ significantly P≤ (0.05).
1, 2, 3…..10 number of frozen fish seller in Mubi were the samples were collected.

Most of the isolates organisms contaminate the frozen fish probably during selling operation. However, potentially pathogenic organism isolated from the frozen fish seller table showed the need for proper hygienic conditions for distribution of products (Brooks *et al*., 2004). One of the main sources of food- borne toxicant associated with microorganism in humans is through eating contaminated food. Proper handling of fish and fish products at all levels of marketing can reduce contamination.

Conclusion

There is need for proper hygienic condition of the entire frozen fish sellers in Mubi. All the areas where frozen fish are sold should be screened with wire mesh to prevent flies from accessing the tables. Frozen fish sellers should always disinfect their tables before and after sales. It is therefore recommended that proper processing of frozen fish should be carried out before consumption.

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