

Annual Engineering Conference

Federal University of Technology, Minna.



Book of Proceedings

Engineering and Technology for Wealth
Creation in the Spirit of NEEDS

Date: 15th - 17th June 2005

Edited by:

Dr. O. K. Abubakre, Dr. E. N. Onwuka and Dr. B. A. Alababan

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Micro Organisms Associated With Spoilage of Smoked *Clarias Angularis* Sold in Beji Market, Bosso Local Government Area, Niger State

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Abstract: The micro organism associated with spoilage of smoked dried *Clarias angularis* sold at Beji market were evaluated using viable count method. The microbial load of *Clarias angularis* sampled was 3.06×10^4 and 7.06×10^4 cfu/g for bacterial and fungi respectively. The micro organism isolated and identified were species of *micrococcus aureus*, *salmonella enteritidis*, *staphylococcus aureus* for bacteria while those of fungi were *Aspergillus flavus*, *Rhizopus stolonifer* and *penicillium notatum*. The pH of 6.9, environmental temperature of 27°C and moisture content of the fish samples offered favourable condition for the growth of the micro organisms. The study reveals that smoke drying can not hinder the growth of micro organisms.

Keywords: *Clarias angularis*, smoke drying, Beji market, Bosso LGA and Niger state

I INTRODUCTION

Fish is one of the most highly nutritious but perishable item of human diet. It is easily digested and when cooked, contributes tremendously to the dietary balance of meals. In spite of the nutritional excellence of the fish, it will be consumed inadequately and quantity. If it is palatable (Adeniyi, 2004). One of the methods of preserving fish in Nigeria is by smoke drying which is to improve desirable organoleptic qualities, reduce moisture contents and extends shelf-life (Oguguwa, 2004). He also reported some effect of bacteria and mould infestation on dried

smoked fish and documented some new packaging technology to improve pathogen control. Acceptability of such products before the defects become obvious is an important variable and is prone to subjective evaluation (Adeniyi, 2004). The objective of this study was to evaluate and reveal the micro organism responsible for the spoilage of smoked *clarias angularis* sold at the Beji market, Bosso local government area of Niger state.

II MATERIALS AND METHOD:

This was in accordance with the methods of Idiogede et al (2003) who work on fungi infestation of commercially important fishes in selected ponds and fish market in minna. Thirty samples of *clarias angularis* were randomly bought from Beji market in Bosso Local Government Area, Niger state between October to December, 2004. samples were identified with powdery whitish, blackish, brownish powdery substances on their body. They were kept in polythene bags that have been treated with Clorox (disinfectant) and transported to FUT, Minna microbiology laboratory for microbial evaluation and analysis. The ambient temperature at the market was measure by mercury-in-bulb thermometer and recorded. Tissues were cut from each samples and homogenized. Moisture content was determine by ashing sub samples of each species in a muffle furnace to determine the weight of sampling and weight of ash content. One gram of

homogenised fish tissue was weighed and added 9mls of sterile distilled water and agitated and serially distributed to 10^5 concentration. The solution were inoculated into nutrients agar (NA) and potato dextrose agar (PDA) plates in duplicates. One set was incubated at 37°C for 24 hours for bacteria analysis. The second set was incubated at 28°C for 72 hours for fungal analysis according to the method of Eyo (1980). The colonies were counted with a stuart colony counter and multiplied by the dilution factor.

The sub culturing was done onto media of NA and PDA in mccartney bottles and the morphology and characterization of the individual culture were properly assessed as described by Fawole, et al, (1988). Analysis of variance (ANOVA) was used for statistics

III RESULTS

Tables 1-5 present the results obtained from this study

TABLE 1: FREQUENCY AND % OCCURRENCE OF BACTERIA ISOLATED AND IDENTIFIED.

Organism	Occurrence in <i>Clarias angularis</i>	% occurrence
Micrococcus rosen	42.0	80.0
Salmonella enteritidis	36.0	52.0
Staphylococcus aureus	22.0	40.0

TABLE 2: FREQUENCY AND % OCCURRENCE OF FUNGUS ISOLATED AND IDENTIFIED.

Organisms	Occurrence in <i>Clarias angularis</i>	% occurrence
<i>Aspergillus flavus</i>	50	70
<i>Rhizopus stolonifer</i>	40	66
<i>Penicillium notatum</i>	38	55

TABLE 3: TOTAL MICROBIAL LOAD.

Organism	Mean bacterial load	SEM	Mean fungal load	SEM
<i>Clarias angularis</i>	$3.06 \times 10^5 \text{ cfu/g}$	± 0.73	$7.6 \times 10^4 \text{ cfu/g}$	± 1.30

TABLE 4: ANOVA FOR BACTERIA AND FUNGAL ISOLATED FROM FISH SAMPLES.

Parameters	1	2	3	+ SEM
Bacteria species	1.08 ± 1.16^a	1.70 ± 1.03^a	3.09 ± 1.45^b	1.26
Fungi species	1.71 ± 2.43^a	1.71 ± 2.06^a	3.19 ± 4.63^b	1.14

SEM = standard error of means

= standard deviation

fu = colony forming unit.

TABLE 5. TEMPERATURE, MOISTURE CONTENT AND pH OF SMOKED FISH SAMPLES ANALYSED.

Mean temperature	Mean moisture content	Mean pH
27°C	28%	7.4
29°C	24%	7.6
34°C	26%	7.3
30°C mean	26% mean	7.4 mean

IV DISCUSSION OF RESULTS

The micro organisms isolated were species of *micrococcus*, *rosen salmonella enteritidis*, *staphylococcus aureus* for bacteria (Table I). *Aspogillus flavus*, *Rhizopus stolonifer* and *penicillium notatum* for fungi (Table II). Total microbial load for both bacteria and fungi (Table III). Analysis of variance (ANOVA) for bacteria and fungi isolated from the fish samples (Table IV). Temperature, moisture content and pH of smoked fish samples and analysed (Table V). the high microbial load of 3.06×10^5 and 7.6×10^4 cfu/g for both bacteria and fungi respectively can be attributed to the prevailing conditions of the fish sellers. Okagwe (1986) reported the presence of species of *staphylococcus*, *micrococcus* and *Aspogillus* as the common microbial contaminants of locally processed fish. *Aspogillus flavus* isolated in the study have been associated with gastrointestinal disorders and food poisoning (forgas et al 1962). *Staphylococcus aureus*, *salmonella enteritidis* and *micrococcus rosen* also isolated have been associated with diarrhoea and typhoid (Bojuwoye, 2004). The mean pH of the samples 7.4 which was very close to neutral (pH 7.0) which is ideal pH for growth of many moulds (Chalea et al, 2002) the temperature and moisture content of 30°C and 26% offered favourable condition for fungal growth as most mould grow well between the temperature of 25 and 35°C (Chalea et al 2002).

V CONCLUSION AND RECOMMENDATIONS:

Fish consumers are advised to be wary of the smoked fish bought from Beji market and other markets. If organisms (bacteria and fungi) that are associated with gastrointestinal disorder and diarrhoea / typhoid are discovered, there is need for the followings.

- "codes of Best practices" on the farm and in marketing channels for livestock, poultry and fish;
- Improvement in environmental sanitation especially sanitary disposal of faeces and garbage;
- Avoidance of indiscriminate defecation in areas close to fish market;
- Making sure that handler of fish made for public consumptions are routinely screened every three months to ensure that they are free of pathogenic organisms.

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