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Microfloral evaluation of processed Sundried and Smokedried Catfish obtained from Custom market, Maiduguri, Borno State

A.M. Idi-Ogede, Musa, M. A.,Yakubu, S.O., Ogah, I.O.S. and Nda, A. A.
Department of Fisheries and Aquaculture
Federal University, Gashua, P.M.B.1005, Gashua, Yobe State
E-mail: a.midiog@yahoo.com

ABSTRACT

Processed sundried and smokedried catfish were obtained from custom market, Maiduguri, Borno State. A total of 100 fresh *Clarias* species were purchased. 50 fish samples were sundried while the remaining 50 samples were smoke dried. Two weeks later, fifty each of the sundried and smoke dried products were re-sundried and re-smokedried respectively. Both samples were checked for microfloral infestation after 30 days of storage at room temperature. The mould and bacterial counts of smoked fish were found to be higher than that of the sundried fish samples. A recommendation was made for a good storage facility to ensure long shelf lives for dried fish products.

Keywords: Catfish, microfloral, evaluation, smoked and sundried.

INTRODUCTION

Borno state in the North-Eastern part of Nigeria is naturally endowed with abundant supply of fish products due to its ecology and presence of large bodies of water, such as Lake Chad, lake Alao and River Yobe (Kyari, 1996). Most part of Borno State prefers processed sundried and smoked fish products due to their long shelf lives (Shurka, 1990).In the Lake Chad district, processed fish are packaged in perforated cantons and stocked temporarily in houses until whole sales arrive to evacuate them (Kyari, 1996). Drying is the removal of water from fish through evaporation (Arsdel, *et.al.*, 1973). Drying is one of the oldest methods of food preservation (Desrosien and Desrosies, 1978). Preservation by drying has been practiced for a long time in many parts of the world. It is common process in many developing countries (Corpio, 1981). The

process of drying results in considerable changes in the quality of fish which might reduce its acceptability to consumers; also as a result of fermentation the external surface of the fish losses its bright shine and colours and become covered with a thicken slime which grows increasingly(Gowong, 1981). Research has shown that fish-techno fermentation has not kept pace with other areas of fermented food processing (Bacus and Brown, 1981). Fish deteriorates quickly during handling because of bacteria, enzymes and chemical reactions(Arsdel, *et.al.,* 1973).*Clarias species* is the most common fish species sold in Borno and its Environ (Kyari, 1996). Fish protein is cheaper than animal protein and is of high quality and nutritive value (Tagbon, 1985).

Nutritionally, fish protein is noted for a very high degree of digestibility and is as good as red meat with respect to essential amino acids, total protein of about 18-22%, fat content of about 0.5-5%, moisture content of about 74-84%(Vaveen, 1953). Majority of fish are processed and preserved by smoking and sundrying (Osuji, 1977). Smoking of fish products could be done in two methods (cold smoking or hot smoking). Smoking at 30° C or slightly high temperature is of referred to as cold smoking while smoking at elevated temperature up to 80° C or higher is termed hot smoking (Igene, 1986). All sea foods are subjected to rapid deterioration even under reasonable condition and in the tropics the spoilage is usually more rapid (Townsend, 1977). In the hot damp tropical climate fish are highly susceptible to spoilage by micro-organisms which flourish under these conditions; this considerably reduces the storage (Vaveen, 1953). There are evidence that appreciable amount of fish can be lost due to fragmentation and might be a major cause of loses in some inland African Fisheries where hot-smoking and drying is popular method of fish processing (FAO, 1981). Osuji, 1977 (1977) suggested that better temperature control is required during traditional hot-smoking procedures in order to avoid the nutritional damage to the product caused by excessive temperatures. Smoking offers one of the easiest and commonest local preservation techniques for fish in developing countries

like Nigeria. However, in most developed countries smoke curing as a technique for food preservation has lost its importance due to the rapid advances in freezing and cold storage techniques (Abolagba and Osifo, 2004). Drying and other techniques can render the interior of fish inhospitable to bacterial while the smoking gives vulnerable exterior surfaces an extra layer of protection (Abolagba and Odiko, 2005).It is common that the drying and smoking of fish are ancient processes.

Archeologist and Anthropologist have stated that drying and smoking were probably developed shortly after the discovery of fire and before man learnt to make pictographs on rocks (Corby, 1991). The mycological studies of smoked fish products with moisture contents below 25% are significant for determining the distribution of the mycotoxin producing fungi, because these metabolites have been detected in many foods (Miguel, *et.al.,* 1986). Trucksess, *et.al,* (1985) observed aflatoxin accumulation in their diets. The objective of this study was to investigate the microfloral (mould and bacteria) loads on both sundried and smoked dried processed fish samples obtained from Custom market, Maiduguri, Borno State.

MATERIALS AND METHODS

Sample Collection

One Hundred (100) samples of fresh *Clarias species* were purchased from Maiduguri Custom market and were thoroughly washed and coiled/bent into Tonkoso. Fifty samples were sundried while the other fifty were hot smoked. After two weeks, twenty-five of the sundried samples were re-sundried while twenty-five of the smoked dried samples were also re-smoke dried respectively. Each sample were packed in duplicates in canton and stored at room temperature for fifteen days and were used for the experiment.

Media Preparation

Potato-dextrose agar (PDA) and Nutrient agar (NA) were prepared separately and used as described by Collins and Lyne (1970).

Plate Count

The percent occurrence of mould and bacteria were determined as described below:

One gram of the ground fish sample was introduced into 9mls of sterile distilled water. A serial dilution of this was done. The treatment was given to other samples. Each dilution was plated in duplicates on sterile petri-dishes. Molten nutrient agar was poured on the samples introduced in the plates. The plates were gently rocked to ensure uniformity and allowed to set. These were then inverted and incubated for about 24 hours at a temperature of 30^{Oc} for aerobic or bacteria count as described by Collins and Lyne (1970). Similarly the samples were treated with potato dextrose agar (PDA) that had been supplemented with chloramphenicol to check bacteria growth. The plates in this case were incubated for 48 hours at30^{Oc} temperature for mould count. A control was also set up for the two media.

STASTISTICAL ANALYSIS

Data collected were analyzed with one-way analysis of variance (ANOVA) procedure using Statistical Product for Service Solution (SPSS Version 16.0) for window. The statistic parameter used for the ANOVA was P-value of 5%.

RESULTS

Mould and Bacteria Count

There were differences in mould and bacteria counts in the processed sundried and smoke dried fish samples (Tables 1 and 2).

Table 1: Mean total mould and bacteria plate of sundried fish samples

Samples	Mould Count/g	Bacteria Count/g
SD	2.0×10^2	2.1×10^4
RSD	1.0×10^2	1.6×10^4

The level of significance is 5%: P>0.05
SD- Sun dried
RSD-Re-sundried

Table: Mean total mould and bacteria plate of smoke dried fish samples

Samples	Mould Count/g	Bacteria Count/g
SM	5.0×10^2	4.4×10^4
RSM	1.0×10^2	1.6×10^4

The level of significance is 5%: P>0.05
SM-- Smoke dried
RSM-Re-smoke dried

The total mean mould count of the sundried fish samples ranged from 1.0×10^2 to 2.0×10^2 while the total mean bacterial count ranged from 1.6×10^4 to 2.1×10^4 respectively. The smoked dried samples had a higher mould and bacteria count of 1.0×10^2 to 5.0×10^2 and 1.6×10^4 to 4.4×10^4 respectively.

DISCUSSION

Results from this study showed the presence of both bacteria and fungi in both smoked and sundried fish sampled. The total counts (in CFU/g) of the microbes present in the smoked fish were high. The total bacteria counts for all the samples ranged from 1.6×10^4 to 4.4×10^4 while the total fungi counts ranged from 1.0×10^2 to 5.0×10^2. According to International Commission on Microbiological Specification for food (ICMSF, 1998), the maximum recommended bacteria count for good quality product is 1.0×10^2 (7LogCFU/g). The bacteria load obtained from the smoked fishes were higher than the recommended value. Therefore, the fishes are not suitable for human consumption. The level of growth of microorganisms on the smoked fish depends on the amount

of water which has been expelled from them (Oyewole*et al.,* 2006). Some microbial populations have the ability to grow at water activity of less than 0.99.The presence of the microorganisms could also be as a result of handling when smoking and also cross contamination during storage after smoking and handling during sales of the already smoked ones. Idi-ogede and Hassan (2005) observed microbes on smoked *Clariasanguilaris* sold in Beji market, Bosso Local Government Area, Niger State. Idiogede and Tsadu(2007) also observed microbes in some smoked fish sold in Bida central market, Niger State.

CONCLUSION

The study shows tremendous evidence of mould contamination in the processed smoked and sundried fish products which might have been brought about by post processing contamination or the effect of processing method which led to the appearance of the moulds after processing in the fish products.

RECOMMENDATIONS

1. Efforts should be made to provide good protective covering to fish products.
2. Effort should be made to correlate the level of microbial growth and mycotoxin production in dried fish products so that a threshold on critical values for mycotoxin production may be established.
3. Need for good storage facility to ensure long shelf lives for dried fish products.

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