

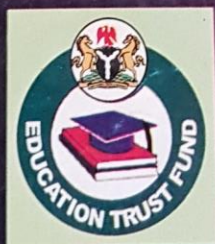
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Evaluation of Growth Inhibitory Activity of Maize "Ogi" Subjected to Continuous and Discontinuous Fermentation on Selected Diarrhoeal Bacteria.	2129
Adebolu, T.T. and Adaramola, O.B.	
Effect of Inhibitory Spectrum and Physical Conditions on The Production of Antibiotic Substance From <i>Bacillus laterosporus</i> ST-1	2134
Kalpana. S., Bagudo A. I. and Aliero A. A.	
Identification of Wild <i>Ganoderma</i> species Indigenous to Nigeria Using its Region of The rDNA	2140
Oyetayo, V.O and Yao, Y.J.	
Microbiological Quality and Aflatoxin B ₁ Level In Poultry and Livestock Feeds	2145
Adebayo-tayo, B. C. and Ettah, A.	
Studies on Anti -Bacterial Activities of <i>Fomes lignosus</i> -a Nigerian Mushroom.	2153
Olawuyi, O.J., Jonathan, S.G., Aina, D.A. and Baysah, G.I.	
Study on The Use of Monoculture and Multispecies on Bioaugmentation of Crude Oil Contaminated Agricultural Soil.	2160
Ogbulie, T.E., Nwigwe, H.C., Iwuala, M.O.E. and Okpokwasili, G.C.	
Cultural Conditions Necessary For Optimal Cellulase Yield by Cellulolytic Bacterial Organisms as They Relate to Residual Sugars Released in Broth Medium	2168
Otajevwo, F.D and Aluyi, H.S.A	
Ethidium Bromide Induced Mutation Effect on Susceptibility of <i>Staphylococcus aureus</i> and <i>Pseudomonas aeruginosa</i> Strains Isolated From HIV/AIDS Patients' Tears to Commercially Available Soft Contact Lens Solutions	2183
Ajayi, B.O., Otajevwo, F.D., and Diolu-Ajayi, A.	
Sensitivity of Bacteria Isolated from Jewelry to Linear Alkylbenzene Sulfonate (LAS)	2193
Kayode-Isola, T.M., Eniola, K. I. T., Awe, S. and Ademiju, J. A.	
* Microbiological Assessment of Some Selected "Tsire" Samples, A Roasted Meat Snack sold in A Town in Kwara State.	2197
Balogun, M. A., Kolawole, F. T. and Nwandilibe, J. O.	
Effect of Time and Relative Humidity on The Microbial Load and Physical Quality of Cashew Nuts (<i>Anacardium occidentale L</i>) Under Storage	2201
Igbinadolor, R.O. and Onilude, A.A	
Effects of Quarry Plant Rock Dusts on Soil Phosphate Solubilizing Bacteria and Enzyme Activities in Ishiagu, Ebonyi State, Nigeria	2207
Etok, C.A., Asamudo, N.U., Onwuchekwa, I.S. and Nwaugo, V.O.	
Distribution of Pathogenic Bacteria in Fresh Water Fishes (<i>Chrysichthys negrodigitatus</i> and <i>Synodontis robbianus</i>) in Oku-Iboku River, Akwa Ibom State, Nigeria.	2214
Ekpo, M.A., Nyandou, Y.M.C., Ating, M. and Anele, C.C.	

MICROBIOLOGICAL ASSESSMENT OF SOME SELECTED "Tsire" SAMPLES, A ROASTED MEAT SNACK SOLD IN A TOWN IN KWARA STATE

*Balogun, M. A.¹, Kolawole, F. T.¹ and Nwandilibe, J. O.²

¹ Department of Home Economics and Food Science, University of Ilorin, Nigeria

² Department of Food Technology, Federal Polytechnic, Offa, Nigeria

Abstract

The microbiological assessment of some selected *tsire* samples sold in a town in Kwara State was determined. Four samples each from three selected locations and a laboratory prepared sample (control) were examined for microbial contamination over a period of four weeks using standard methods. The methods included total aerobic, total mould and coliform counts. The results obtained showed that the samples were contaminated with various species of bacteria and fungi. The bacteria isolates were *Bacillus* sp. and *Staphylococcus aureus*, while fungal isolates included *Aspergillus niger*, *Aspergillus fumigatus*, *Penicillium notatum* and *Saccharomyces cerevisiae*. The mean total plate and mould counts varied from 5.4×10^4 cfu/g to 8.2×10^4 cfu/g and 6.4×10^4 cfu/g to 9.3×10^4 cfu/g respectively. Coliform bacteria were confirmed present in all the three sample collection points except the control sample. Coliform counts for the samples were in the range of 6.0 and 7.5×10^1 cfu/ml over the period of analysis. The hygienic condition of the *tsire* selling points should be of concern to the community because of the many residents (students and indigenes) that patronize them therefore adequate preventive measures must be taken by the meat processors to avoid the multiplication of these organisms as this may pose a health hazard to consumers.

Keywords: *Tsire*, Roasted, Meat, Kwara

*Corresponding author: E- mail: bmutiatadebanke@yahoo.com

Introduction

Meat is defined as the flesh of animals which are suitable for use as food (Forest *et al.*, 1975). This includes all processed or manufactured products which might be prepared from these tissues. Nigerians depend mainly on domestic animals and aquatic organisms and to some extent on game animals and birds as sources of meat (Ihehoronye and Ngoddy, 1985). This is true of the urban as well as the rural communities. Meat is one of the most nutritious foods used for human consumption. It is an excellent source of high quality protein and also contain large amount of minerals and essential vitamins as well as fats and carbohydrate for energy. The actual composition of meat depends however on the breed, age, sex, nutrition and state of health (Aurang *et al.*, 1987). Meat must be modified through processing to obtain an edible product. This will involve changing the properties of the meat by one or more procedures such as grinding, chopping, addition of seasoning, heat treatment or alteration of colour (Forrest *et al.*, 1975). Examples of processed meat include; suya, *tsire*, stick meat, bacon, ham, corned beef and different varieties of sausage. *Tsire* is a traditional stick meat product commonly produced by the Hausas in Nigeria (Adesokan *et al.*,

2008). It is roasted boneless meat of either mutton, beef or goat that is cooked around a glowing fire in which the meat pieces are stacked on wooden sticks and spiced with peanut cake, spices, vegetable oil, salt or other flavourings (Alonge and Hiko, 1981). It is one of the ready to eat smoked indigenous Nigerian meat which is processed, served or sold along streets, in club houses, picnics, restaurants and within institutions (Igene and Mohammed, 1983). The primary purpose of smoking meat is to preserve, create new products, protect from oxidation, develop of colour and flavour (Issenberg *et al.*, 1971). Smoking of meat has contributed to the development of different groups of meat products. Most of the stages of *tsire* preparation, materials used in its preparation and packaging, the handlers and the surrounding environment can serve as source of contaminants to the meat product (Uzeh *et al.*, 2006). The tremendous growth in the production and consumption of *tsire* product has excited a great deal of concern regarding the microbiological quality since it is susceptible to contamination from raw materials (animal guts, handlers and equipment used during processing). Other conditions may include re-contamination during storage and sale. This study is therefore aimed at assessing

the microbiological quality of *tsire* in a town in Kwara State.

Materials and Methods

Sample Collection and Preparation

Four *tsire* samples each were collected at one-week interval over a period of four weeks from three major locations within the town; location 1 (A), location 2 (B) and location 3 (C). All the samples were transported aseptically to the laboratory under ice cubes and promptly stored in a house hold refrigerator at 4°C for 30 minutes prior to analysis. A control sample (X) was prepared from boneless beef in the laboratory using a modified traditional method described by Onilude et al., (2002). The meat was washed in 5% sterile saline water and cut into pieces. The meat pieces were spiced with pepper, onions, groundnut, flavourings and seasonings. They were later stacked on wooden sticks and grilled at 80°C for 45 minutes. Groundnut oil was sprinkled during grilling to prevent burning. After grilling, the *tsire* sample (control) was allowed to cool down prior to analysis. All the laboratory equipment was obtained from the department of Food Technology, Federal Polytechnic, Offa.

Isolation of microorganisms

The serial dilution procedure was used for the isolation of microorganisms from lg-macerated samples. Nutrient agar was used to isolate bacteria, while potato dextrose and yeast extract agar were used to isolate fungi. The spread plate method was used for the isolation. Plates were incubated at 30°C for 3-5 days for fungi while incubation was at 37°C for 24-48 hours for bacteria isolates. Coliforms were detected using the presumptive, confirmatory and completed tests as described by Fawole and Oso, (2004). Colonies were counted and representative colonies taken for identification.

Identification of the isolates

Each isolate was examined in pure cultures, subjected to morphological and biochemical tests (indole, catalase, coagulase, motility, MRVP, citrate, sugar fermentation) and identified by consulting appropriate literature such as Buchanan and Gibbons,

(1974); Speck, (1984) and Fawole and Oso, (2004).

Results and Discussion

Result from this study detected the presence of *Bacillus* sp., *Staphylococcus aureus*, *Escherichia coli*, *Aspergillus niger*, *Aspergillus fumigatus*, *Penicillium notatum* and *Saccharomyces cerevisiae*. These organisms isolated are similar to those obtained by Chukwu and Mokekwu, (2001) in their study of microbial contaminants in *suya* meat. Table 1 shows the total aerobic plate count of the samples within the four weeks of analysis. Of these samples, sample C had the highest value of 8.2×10^4 cfu/g while sample B had the lowest value of 5.4×10^4 cfu/g. Sample C also had the highest value of coliforms (7.5×10^1 cfu/ml) while sample B had the lowest value of 2cfu/ml over the period of analysis (Table 4). No growth of microorganisms was isolated in the laboratory prepared samples. The values obtained for the three samples were within recommended safe limits. According to International Commission on Microbiological Specification of Food (ICMSF), (1978) bacterial safe limit for meat products is 10^7 cfu/g and that of coliform is 4×10^2 cfu/g. The state of abattoirs and slaughter houses and the slaughter procedures may result in contamination of meat and its products.

Processing ready-to-eat beef products especially *tsire* with contaminated meat may lead to contaminated products, as the processing time and temperature may reduce significantly the microbial load but will not totally eliminate the contaminants (Frazier and Westhoff, 2006). These contaminants may multiply during the holding time of the *tsire* samples. Survey of collection points of all the three samples showed that they either had refuse dumps or gutters around the processing areas. Foods prepared around such dirty conditions could easily get contaminated. This suggests that contamination of the processed meat may be attributed to poor sanitary and unhygienic conditions of the area. Table 2 represents the total fungal count of the *tsire* samples. *Tsire* sample from Location 1 had the highest fungal count 9.5×10^4 cfu/g while that of

Location 2 had the lowest count of 6.2×10^4 cfu/g. Spores of moulds are ubiquitous and can be found around unhygienic areas (Frazier and Westhoff, 2006). This may be the reason for the presence of the three types of moulds in the samples. Table 4 shows that all the samples from the three locations are positive to coliform test. Sample C had the highest value of coliforms (7.5×10^1 cfu/ml) while sample B had the lowest value of 2cfu/ml over the period of analysis. According to Pace (1975) and Solberg et al. (1986), bacterial count exceeding 10^5 /g or coliform count higher than 10^2 /g in delicatessen food products are indicative of dangerous contamination. The incidence of *Escherichia coli* may be as a result of poor hygiene since *tsire-suya* is popularly sold along streets. *S. aureus* and *B. cereus* have been known to be implicated in food borne illness. *S. aureus* have been reported in the hands, noses and throats of food handlers (Sadiq and Abdullahi, 2008; Omoregbe and Igbinoia, 1992) and in more than 50% of healthy humans (Bergdoll, 1990). However, this organism may also have occurred in *tsire-suya* as a post-processing contaminant or as a result of poor processing. It could also be as a result of insufficient heat from the smoke to destroy sporulating organisms e.g. *Aspergillus flavus*. It is therefore necessary that proper heat treatment should be encouraged so as to reduce the likelihood of health problems related to food poisoning. The presence of coliforms from these samples is of great importance and should be of great concern to consumers. The presence of *Escherichia coli* in these products may be an indication of faecal contamination with an attendant risk of other pathogens like *Salmonella* species and parasites that may be transmitted through water or food (Sadiq and Abdullahi, 2008). This therefore implies that *tsire* samples from the three locations could pose serious health risks if adequate preventive measures are not maintained. The study suggests that contaminants could be prevailing in and around the areas where the meats were prepared or sold. Maintaining good and stringent hygienic condition during handling and processing of *tsire* meat samples is therefore very necessary,

so as to reduce the problem of food poisoning and infection.

Conclusion

The result from this investigation indicated that *Escherichia coli*, *Staphylococcus aureus*, *Bacillus* sp., *Aspergillus niger*, *Aspergillus fumigatus*, *Aspergillus flavus*, *Penicillium notatum* and *Saccharomyces cerevisiae* were isolated from the *tsire* samples. The bacterial load obtained in this investigation could be as a result of recontamination from handling of the samples. There is therefore the need to improve on the hygienic processing and handling of *tsire* product. This will not only prevent contamination, but will also prevent incidence of food infection and poisoning which may be fatal and have serious consequence on the society.

Table 1: Total aerobic plate count of *Tsire* Samples

Sample	1 st week	2 nd week	3 rd week	4 th week
Values (cfu/g)				
A	7.5×10^4	7.6×10^4	7.4×10^4	7.5×10^4
B	5.6×10^4	5.4×10^4	5.5×10^4	5.5×10^4
C	7.6×10^4	8.2×10^4	7.8×10^4	7.9×10^4
X	Nil	Nil	Nil	Nil

A= Location 1

B= Location 2

X= control sample

C= Location 3

Table 2: Total fungal count of *Tsire* Samples

Sample	1 st week	2 nd week	3 rd week	4 th week
Values (cfu/g)				
A	9.2×10^4	9.3×10^4	9.5×10^4	9.2×10^4
B	6.5×10^4	6.6×10^4	6.3×10^4	6.2×10^4
C	7.2×10^4	8.8×10^4	7.6×10^4	8.1×10^4
X	Nil	Nil	Nil	Nil

Table 3: Coliform test

Sample	Presumptive	Confirmed	Completed
A	+	+	+
B	+	+	+
C	+	+	+
X	NA	NA	NA

+ = Positive

NA = Not Applicable

- = Negative

Table 4: Coliform count of *Tsire* samples

Sample	1 st week	2 nd week	3 rd week	4 th week
A	1.3×10^1	1.2×10^1	2.1×10^1	3.3×10^1
B	3	2	4	6
C	6.6×10^1	7.0×10^1	7.5×10^1	6.8×10^1

Table 5: Isolates from the samples

Samples	Isolated organisms
A	<i>Bacillus</i> sp, <i>A. niger</i> , <i>A. fumigatus</i> , <i>S. cerevisiae</i>
B	<i>E. coli</i> , <i>Staphylococcus aureus</i> , <i>A. niger</i>
C	<i>Bacillus</i> sp, <i>A. niger</i> , <i>A. fumigatus</i> , <i>E. coli</i> , <i>P. notatum</i> , <i>S. cerevisiae</i>
X	Nil

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