Microbiological Quality Assessment of Processed Meat "Tsire" Sold at Karshen Waya, Dorayi Gwale Local Government, Kano State

***Lambu,** Z. N[1]., Sadisu, **F. U**[2]., **Abdulwaheed, I.A**[3]., **Adamu, R. T**[4]., **Gaya, I. A**[5]., **Adamu,** S[6]., **Ado, A.** S[7].*

' Department of Microbiology, Faculty of Science Kano University, of Science and Technology, Wudil.

Abstract: A study was conducted to assess the microbiological quality of "Tsire" sold at Karshen Waya within a period of two months (January to February 2017). 10 samples of "Tsire" were analyzed microbiologically for determination of aerobic mesophilic count, *staphylococcal* count and total coliform count using pour plate technique. Detection of *Staphylococcus aureus* was also carried out. Results of the microbial analysis showed that aerobic mesophilic bacterial count is within the range of $1.80x10^8$ to $1.54x10^9$; for fungal count, $1.30x10^6$ to $7.6x10^7$ *staphylococcal* count 9.2E6 to $9.9x10^9$. Total coliform count 150 - < 2400 and 30% of the samples indicate the presence of pathogenic strains of *S. aureus.* The counts were found to be higher according to the Food and Agricultural Organization of the United Nations. It is therefore, recommended that hygienic practices should be used by the meat processors in all their operations.

Keywords: Kano, Karshen waya, Tsire, *S. aureus,* Dorayi, Gwale.

Introduction

Originally meat is a term used to describe any solid food but has come to be almost solely to animal flesh. As such it has played a significant role in the human diet since the days of hunting and gathering (Adam and Moss, 1995).

"Tsire" is a popular traditionally processed stick meat, and it has been considered to be a significant source of high-quality dietary animal protein (Igene, 1993). The meat pieces for the preparation of "Tsire" are usually stacked in a wooden stick and spiced with peanut cake, ginger, vegetable oil, and other flavor enhancing agents. It is being displayed for sale along the streets, clubhouses and restaurants (Idris, 2007). Umar (2007) state that, the traditional method for the product of "Tsire" follows the flow chat described below:

In karshenwaya area Dorayi Kano state "Tsire" is left uncovered throughout the retailing period in few cases where some retailers keep them in a glass cabinet, another problem is that the carcasses for the preparation of "Tsire" are in most cases brought from the abattoir to the site of preparation in an open container. It is also common to see a raw meat and ready to eat processed meat being kept on the same bench, this may, of course, create on the queue for cross contamination. Rageh (2001) state that, the nature of the materials being handled during the slaughter, skinning, and contamination of meat, if certain standards of operation were not strictly adhered.

Material and method

The study site and sample size

The study site is used for this research was Karshenwaya Dorayi, Gwale Local Government Area, Kano State, where raw meats are processed "Tsire". A total of 10 samples were obtained at different occasions.

*Corresponding author:
zakariuhulambu@gmail.com; ***Lambu, Z. N[1]***

Sample collection and handling

Random sampling techniques described by Mukhtar (2000) was employed, collection and handling were done according to the protocols of Markie and McCartney (1989), meat sample was purchased at different points of production over a period of twomonths (January to February 2017).This was done immediately after the operation. The collection was done aseptically in the wrapped sterile Aluminium foil in the sterilized frozen wide-mouth container with a fitting cover and immediately transported to the laboratory for the analysis.

Preparation of food homogenate

This was done according to the method described by FAO (1979). With the aid of a sterile blade, 25grams each of sample was aseptically removed and blended with 225ml of sterile peptone water in a sterilized blender for 5 minutes. This homogenate gives a dilution of 10^{-1} for each of the homogenate prepared, 1ml was transferred to a test tube containing 9ml of sterile buffered peptone water and this gave 10^{-2} dilutions. The procedure was repeated until 10^{-8}dilutions was attained.

Preparation of media used

Four different agar media were used in the research and prepared according to the manufacturer's specifications; these are Nutrient Agar (28g/L), Mannitol salt agar (108g/L), Malt extract agar (50g/L) and BairdParker agar (65.5g/L). these were used for bacterial enumeration, isolation and presumptive identification. These were sterilized by autoclaving at 121^{O}C for 15 minutes (Cheesbrough, 2002).

Enumeration of Fungi

From the serially diluted sample, 1ml of inoculum was transferred into an appropriatelylabeledPetri dish. This was followed by pouring of molten malt extract, it was swirled and

allowed to solidify. It was then incubated at room temperature for 2-5 days. After incubation, the plates with between 30-300 colonies were selected and counted. The value obtained was multiplied by the dilution factors in each case.

Enumeration of *Staphylococcus*

From the serially diluted sample, 1ml of inoculum was transferred into an appropriatelylabeledPetri dish. This was followed by pouring of Baird-parker agar. It was swirled and allowed to solidify. It was then inoculated at 37^{O}C for 24hours, after incubation the plates with between 30 - 300 colonies were selected and counted. The values obtained was multiplied by the dilution factor in each case.

Isolation and Identification of *Staphylococcus aureus*

With the aid of inoculating loop, a portion of 10^{-1} dilution was taken and streaked on to Mannitol Salt Agar plates prepared according to the manufacturer's specification and incubated at 37^{O}C for 48hours. Plates that reveal typical round, smooth glistening, yellowish to deep golden colored colonies were considered positive for the presumptive identification of *S. aureus*. Biochemical tests were carried out to confirm the identity of the organisms as described by Cheesbrough, (2000). These include gram stain, catalase and coagulase test.

Coagulase Test

The test was conducted by placing a drop of normal saline (0.9%wv) on clean glass slide. A small portion of the isolate as emulsified in the drop of normal saline, a drop of plasma was added to the suspension and the complex was rocked gently. On observation showed agglutination within ten (10) seconds, and the result was recorded (Cheesbrough, 2000).

Catalese Test

A 2.3ml quantity of hydrogen peroxide was poured into a test tube. A sterile wire loop was used to remove several colonies. The test organisms were mixed in the hydrogen peroxide solution. Bubbling of gases was recorded as positive test (Cheesbrough, 2000).

Aerobic Mesophilic Bacterial Count

This was carried out according to the method of John *et al.*,(1999). After homogenizing the sample and its subsequent serial dilution, 1ml each of 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7} and 10^{-8} dilutions were aseptically withdrawn using a sterile syringe and inoculated in Petri dishes. This was followed by pouring of molten nutrients agar, the plates were swirled and allowed to solidify. They were incubated at 37^{O}C for 24hrs. After incubations, plates with colonies between 30-300 were selected and counted. The values obtained were multiplied by the dilution factors to gives colony forming unit per mill, CFU/ml.

Enumeration of Coliform Bacteria

In this, 1ml of inoculum from 10^{-1} dilution was transferred to each 3 tubes 9ml of lactose broth with Durhan tubes, then 1ml from 10^{-2} was transferred to each of the 3 tubes of 9ml broth with Durhan tubes. Then all the 9 tubes were labeled accordingly and incubated for 37^{O}C for 24hours. After incubation, a number of tubes that produce gas were recorded and compared with the MPN table to get the MPN of coliform/ml (FAO, 1978).

Result and Discussion

The result of the aerobic plate count carried out in this research is presented in table 1.

Table 1: Result of Aerobic Plate Count, Staphylococcal Count and Fungal Count of "Tsire" sold at Karshenwaya, Doray:

Sample	APC	SC	FC
TSR. 1	1.30×10^{6}	9.20×10^{6}	1.30×10^{6}
TSR. 2	2.30×10^{8}	2.30×10^{8}	1.39×10^{7}
TSR. 3	5.00×10^{8}	2.40×10^{8}	5.30×10^{7}
TSR. 4	4.90×10^{7}	1.20×10^{7}	2.10×10^{6}
TSR. 5	5.50×10^{7}	1.20×10^{8}	1.48×10^{7}
TSR. 6	1.45×10^{7}	9.80×10^{8}	1.47×10^{7}
TSR. 7	1.80×10^{8}	1.27×10^{8}	1.23×10^{7}
TSR. 8	8.90×10^{7}	3.90×10^{8}	1.39×10^{6}
TSR. 9	1.54×10^{9}	9.90×10^{9}	1.35×10^{7}
TSR. 10	5.50×10^{8}	4.80×10^{8}	7.60×10^{7}

Key: TSR – Tsire APC – Aerobic Plate Count SC – Staphylococcal Count FC – Fungal Count

Table 2: Results of Coliform Count of "Tsire" sold at Karshen Waya, Doarayi

Sample	Result	Count
TSR 1	333	> 2,4000cfu/g
TSR 2	333	2,400
TSR 3	322	2,400
TSR 4	333	2,400
TSR 5	333	2,400
TSR 6	333	2,400
TSR 7	333	2,400
TSR 8	321	150.0
TSR 9	333	2,400
TSR 10	333	2,400

Key: TSR –Tsire

Table 3: Results of *Staphylococcus aureus* identified in the sample analysed.

Sample Code	*Staphylococcus aureus*	coagulase test	catalese test
TSR 1	+	+	+
TSR 2	-	-	-
TSR 3	-	-	-
TSR 4	-	-	-
TSR 5	+	+	+
TSR 6	-	-	-
TSR 7	-	-	-
TSR 8	+	+	+
TSR 9	-	-	-
TSR 10	-	-	-

Key: TSR –Tsire + = sample positive for *S. aureus* = sample negative for *S. aureus*

Discussion

From the result of bacteria enumeration carried out in this research, it was found out that all the samples analysed were found to have total aerobic mesophilic count above the established standard of between $10^3$and 10^4cfu/g allowed for number of organisms associated with good manufacturing practice (GMP) as specified by the International Commission on Microbiology Food Specification of the International Association of Microbiological Society (1978). This study indicates a high level of poor manufacturing practices (Abdullahi and Ibrahim, 2002).

Meat from healthy animals processed under aseptic condition should have a low microbial count or no microbial organisms at all; so, the presence of microbes on meat indicates contamination of the meat. This may be from the food handlers, the flies, the products. In other words, most of these organisms could have been introduced into "Tsire" as a result of unhygienic handling of the raw meat, in most cases, the meats processed in an open and crowded market place, atypical characteristic of Dorayi Karshen Waya, this practice allows the dust and flies to mix freely with the products.

Secondly, the raw meat for the processing of "Tsire" mostly comes from Kano abattoir and according to Rajeh (2001), Kano abattoir environment is predominated by mesophilic microorganisms within the observed range of temperature (35^oC – 37^oC) and within 10 minutes, a space as small as the size of Petridish attracted two hundred and ninety (290) bacterial cells; this shows that if meat of such size will be kept for such length of time, it will equally attract the same number of contaminants. This shows how grossly contaminated any meat left inside the abattoir.

Presence of *Staphylococcus aureus* in 30% of the sample analyzed indicates the man and environmental contamination which of course agrees with some earlier reports (Adesiyun, 1984) this also indicates health hazard because according to United Nation Food and Agricultural Organization, meat for consumption should contain no any single pathogenic microorganisms.

The difference in bacterial load was also observed among the 10 samples; this may be due to the different levels of the hygienic practice observed by different vendors because some vendors operate in relatively more hygienic condition than others.

As for the fungal count analysis, the load was very high as compared to the acceptable level described by the Food and Agricultural Organization of the United Nation. This may be due to the unhygienic handling of

the processed meat and its subsequent exposure to the open place as observed in Karshen Waya, Dorayi.

Conclusion

Conclusively, this research finding indicates the presence of a high microbial load in all the 10 samples of "Tsire" analyzed, which is far above the standard established of 10^3 - 10^4cfu/g allowed for a number of organisms associated with good manufacturing practices as specified by the International Commission on Microbiological Society (1978). These values indicate spoilage and health hazard and undesirable manufacturing practice. Base on this, it can finally be asserted that the "Tsire" sold at Karshenwaya, Dorayi Karama is microbiological of low quality, and there is a need for improvement on the way and manner by which processing procedures take place.

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