

**NSAP****47th Annual
Conference
(JOS 2022)****CONFERENCE
PROCEEDINGS**THEME
**SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES****Effect of heat sources on sensory evaluation and microbial count of Tilapia fish (*Oreochromis niloticus*)**

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Abstract

This study aims to evaluate the Effect of heat sources on sensory evaluation and microbial count of Tilapia (*Oreochromis niloticus*) fish. A total of six (6) *Oreochromis niloticus* with a mean weight of 658±25g were caught from the fish farm. The live weights were taken using a digital weighing balance. The fish were gutted, washed thoroughly with water to remove slime and blood; thereafter, the dressed weights were taken and allocated to three heat sources in a completely randomized design. The fish were transferred into a basket for proper draining of water before smoking. They were also covered with a muslin cloth to prevent dust and flies. Smoking was conducted using charcoal, firewood and an electric griller for one hour to achieve uniform smoking. The smoked fish was subjected to sensory evaluation, and microbial count. Sensory evaluation of Tilapia fish differently smoked with three heat sources shows that electric heat source Tilapia fish was more preferred in terms of colour but with least texture and saltiness while the firewood heat source Tilapia fish has more texture than the other heat sources. Tilapia fish from charcoal heat source had the highest microbial growth/count of 1.33 (CFU/g) while electric heat source and firewood heat source Tilapia fish had the same microbial growth/count of 0.67(CFU/g). The findings of this research show that electric heat source is most preferred.

Keywords: Tilapia fish, sensory evaluation, charcoal, firewood, and electric griller

Introduction

Fish is one of the most important sources of animal protein available in the tropics and has been widely accepted as a source of high-quality protein and other elements for the maintenance of a healthy body. But fish is a highly perishable commodity that undergoes spoilage as soon as it is harvested. Once spoilage set in, the odour/flavor, texture, colour, and sometimes the chemical composition change (Gupta and Gupta, 2006). Tilapia (*Oreochromis niloticus*) is a group of fish species native to Africa, however, they have been introduced in many other countries around the world. They are disease-resistant, reproduce easily, eat a wide variety of foods, and tolerate poor water quality with low dissolved oxygen levels. Prevention of microbial spoilage of fish may be achieved by different preservation methods such as smoking, drying, freezing, salting, and use of modified atmospheric storage, (Awan and Okaka, 1985; Gupta and Gupta, 2006).

Smoking is the process of flavoring, cooking, or preserving food by exposing it to smoke from burning or smoldering material; most often wood. Smoking has been used for the preservation of food for centuries (RahHuong, 2014). Smoking gives a special colour and flavor to the fish and extends its shelf-life via the effects of dehydration, anti-microbial and anti-oxidant of the smoke compounds (Pagu *et al.*, 2013). Smoking also changes the texture of the product (Sigurgisladdottir *et al.*, 2001).

The aim of the study is to seek the effect of heat sources on the physicochemical, microbiological, and sensory evaluation of smoked tilapia fish.

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PROCEEDINGS****THEME
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AGRICULTURE AMIDST
GLOBAL CHALLENGES**

MATERIALS AND METHODS

Experimental Site

This experiment was carried out at Post-Graduate Laboratory, Department of Chemistry, Faculty of Natural Science and Pharmacy Microbiological Laboratory, Faculty of Pharmaceutical Science, University of Jos, Jos Plateau state. On latitude 9.9181°N and longitude 8.8804°E

Methodology

A total of six (6) Tilapia (*Oreochromis niloticus*) with a mean weight 658±25g were caught from the fish farm. The live weights were taken using a digital weighing balance. The fish were gutted, washed thoroughly with water to remove slime and blood; thereafter, the dressed weights were taken and allocated to three heat sources in a completely randomized design. The fish were transferred into a basket for proper draining of water before smoking. They were also covered with a muslin cloth to prevent dust and flies.

Smoking process

Smoking was conducted using charcoal, firewood, and an electric griller for one hour to achieve uniform smoking. The fish was covered with a carton to retain heat from the smoke and prevent contamination by dust and flies. After the hot smoking, the smoked products were removed from the kiln and allowed to cool at room temperature before they were weighed to determine the moisture loss.

Sensory evaluation

A total of 20 trained individuals aged between 20 and 40 years were used to assess two replicates of the prepared sausage. The samples were evaluated using a 9-point hedonic scale for colour, aroma, flavor, juiciness, tenderness, texture, saltiness, and overall acceptability. The scale had a maximum score of 9 while the lowest score of 1 was assigned to the poorest condition (Mahendraker *et al.*, 1988).

Microbial Analysis

The microbial count was done using the pour plate water method (Harrigan and Macanée, 1976). A sterile pipette was used to measure 1ml out to the 10⁻³ dilution and this was pipetted into sterile Petri dishes, nutrient agar at 45 °C was poured into it. It was swirled gently for even distribution. The plate was inverted and incubated in an incubator at 37 °C. The total plate count was carried out after 24 hours.

Statistical Analysis

The various data were statistically analyzed using one-way ANOVA and multiple t-tests of graph pad prism version 8, with results presented as mean ± standard deviation.

Results

Figure 1 shows the effect of heat sources on sensory evaluation of roasted Tilapia fish. The sensory evaluation of Tilapia fish differently smoked with three heat source shows that electric heat source Tilapia fish was more preferred in terms of colour but with least texture while the firewood heat source Tilapia fish has more texture than the other heat sources.

Figure 2 shows the effect of heat sources on microbial count of roasted. Tilapia fish from charcoal heat source had the highest microbial growth/count of 1.33(CFU/g) while electric heat source and firewood heat source Tilapia fish had the same microbial growth/count of 0.67(CFU/g).



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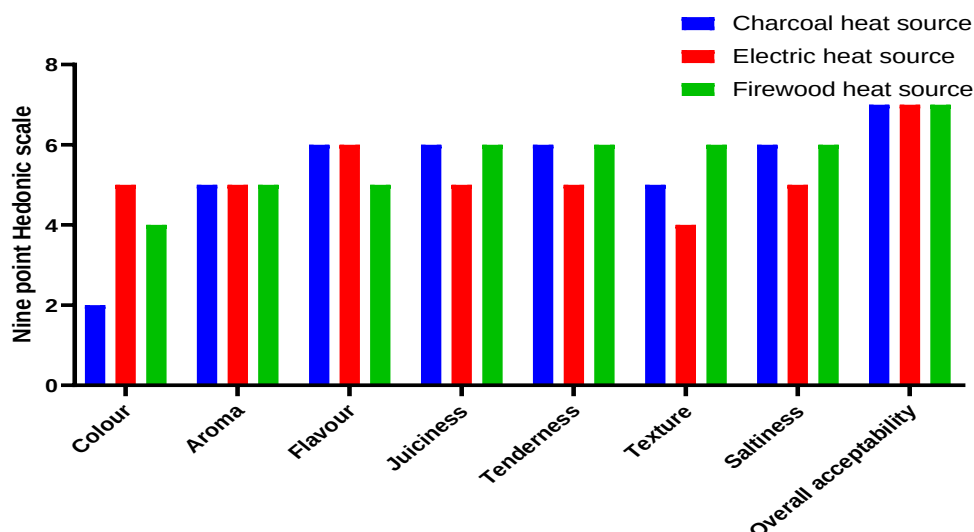


Figure 1: Effect of heat sources on sensory evaluation of roasted Tilapia fish

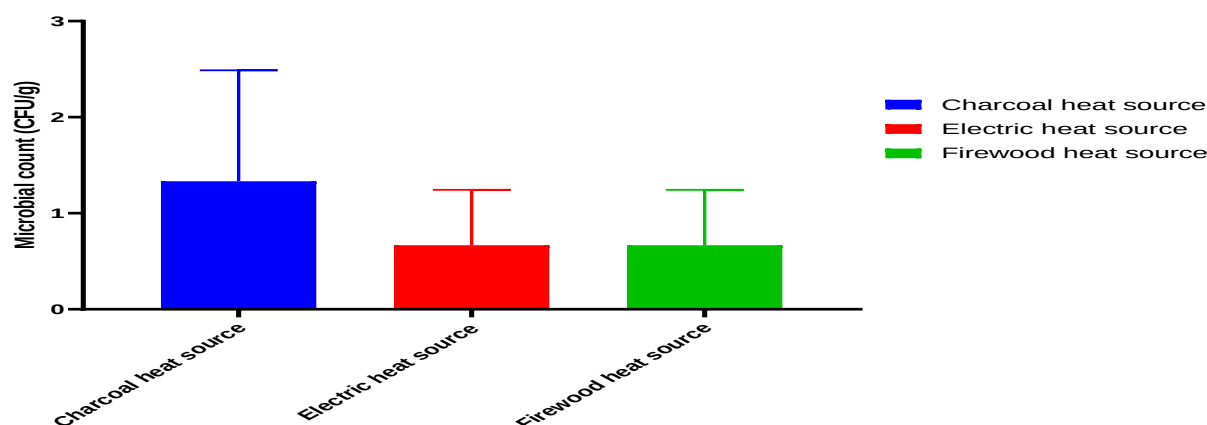


Figure 2: Effect of heat sources on microbial count of roasted Tilapia fish

Discussion

In this experiment, colour was more preferred in Tilapia Fish smoked with electric heat source than the charcoal and firewood heat source which shows a significant difference ($P < 0.05$). These results are in disagreement with Hassaballa *et al.* (2009) who concluded that there was no significant difference in texture scores between baked and grilled Tilapia fish burgers conducted by sensory evaluation. There were no significant differences ($P > 0.05$) in the aroma and overall acceptability which contradicts the results reported by Eduarda *et al.* (2014) who studied the effect of grilling, physicochemical and textural properties of Tilapia. The result obtained could be due to the temperature intensity of the heat source.

The total plate count result obtained was in agreement with that of Agnihortri and Pal (2000) and Oshibanjo (2017). Higher values were reported by Dharmaveer *et al.* (2007). The differences observed can be attributed to some eventual contamination, growth of microorganisms in the Tilapia fish, and the temperature intensity of the heat source.

Conclusion

The findings of this research show that an electric heat source is most preferred.

**NSAP****47th Annual
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PROCEEDINGS**THEME
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AGRICULTURE AMIDST
GLOBAL CHALLENGES****References**

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