

## EFFECT OF THE ADDITION AND FLOWER OF JAMAICA (*Hibiscus sabdariffa* L.) AND OF WHEAT FIBER IN THE PHYSICOCHEMICAL AND MICROBIOLOGICAL PROPERTIES IN NUGGETS FROM TILAPIA (*Oreochromis niloticus*)

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### Abstract

Functional foods represent a range of foods that besides acting as nutrients, can positively affect specific biological functions improving the general state of health; Therefore, a nugget was made from tilapia (*Oreochromis niloticus*) with addition of wheat fiber and Jamaican flower (*Hibiscus sabdariffa* L.) as an antioxidant. The nuggets that showed the best performance in relation to the addition of the extract of Jamaica flower and wheat fiber was with the treatment No. 3 (10 g of extract of Jamaica flower and 3.5 g of wheat fiber) with protein values of 16.96%, 69.94% of humidity, 7.68% of fat, 2.02% of ashes and 1.87% of total fiber. The sensory evaluation of the final product presented high levels of acceptance (higher than 4.5%) in relation to color, criscity and acceptability.

**Keywords:** Food quality, functional foods, antioxidants, microbiological properties, stability, sensory evaluation.

## Introduction

The human being has the need to take nourishment, hence the relevance reached by the issues related to health and the possible beneficial effects of food [1], and among these is fish, its proteins are of high biological value, it contains essential amino acids that the human being does not synthesize, it is more digestible because it has less connective tissue and collagen, the content of carbohydrates in the muscle is practically negligible. In relation to the mineral content, the fish is the main source of iodine, calcium, iron, selenium and zinc, vitamins B complex and E. The main components found in fish fat are Omega 3, EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), which are beneficial for health due to its antiplatelet, vasodilator and blood triglyceride lowering properties, contribute significantly to human health, helping to reduce the incidence of coronary heart disease and moderate hypertension [2].

Dietary fiber (wheat fiber) has technological functional properties, so called because of its association with the desirable and physiological effects in food products with beneficial effects in the organism [3].

Likewise, functional foods with antioxidant capacity are widely used today and among them are the phenolic compounds that are associated with the prevention of diseases induced by oxidative stress such as cardiovascular diseases, cancer and inflammation. The possible protective effects reported are generally associated with their antioxidant activity [4].

Therefore, a nugget was made from tilapia (*Oreochromis niloticus*) with addition of wheat fiber and Jamaican flower (*Hibiscus sabdariffa* L.) as an antioxidant, and the final product was evaluated bromatologically, microbiologically and sensorially.

## Methods

### Preparation of fish nuggets

Tilapia (*Oreochromis niloticus*) was checked for quality by the demerit, for further cleaning, weighing, formulation, homogenization (temperature 5-10 °C), molding, breaded, freezing (-20 °C), packing and storage

### Bromatological Analysis

The bromatological tests carried out in this investigation were: Humidity [5] Ash [6], Proteins, Total Fiber, Fat [7], And Lipid.

### Microbiological analysis

The microbiological tests performed were: Total mesophiles (NTC 4519), Total coliforms (NTC 4458) [8], *Staphylococcus aureus* (NTC 4779), *Salmonella* (NTC 4574) and *Listeria monocytogenes* (NTC 4666) [9].

### Statistical analysis

The analysis of variance was applied through the SPSS Software.

## Results

After fish capture, the pH drops (due to the accumulation of lactic acid), reaching levels of 5.8 - 6.2, with rigor mortis appearing. The terminal pH will depend on several factors: the fish species, the amount of muscle glycogen and the buffer capacity of the fish components. This was done taking into account the pH in several of the samples of tilapia (*Oreochromis niloticus*), in order to objectively establish the quality of the specimens purchased, which can be seen in table 1 where the difference in pH was minimal (0.1).

It is important to note there were no significant differences between the results of the nuggets in relation to the content of proteins, fats, ash and moisture ( $p > 0.05$ ). The minimum variations were presented for the fiber content when increasing the levels in each treatment. According to Beirão, Teixeira and Meinert (2000) [10], the proximal composition is variable, since it depends on the species, nutritional status, seasonality, age, body and gonadal conditions as shown in table 2.

Table 3 shows that low or no microbiological counts of fillets and non-meat ingredients show that the quality of the raw materials used in the elaboration of nuggets was very good. The low initial load of mesophiles in tilapia fillets agrees with

[11], being also reported in other freshwater species [12], [13].

### Discussion

The fish-based Nuggets were prepared with the addition of Jamaican flower extract and wheat fiber at different percentages. The final product obtained in this research has the same texture and color properties as a product made from other types of red meat (beef, pork, chicken, etc.) All the formulations presented good physical and chemical quality with a high content of protein and low fat

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content with respect to the specifications indicated for this type of product. The nuggets that showed the best behavior in relation to the addition of the extract of the flower of Jamaica and the wheat fiber was the treatment 3 (0.50% of Extract of flower of Jamaica) with protein values of 16.96%, 69.94% humidity, 7.68% fat, 2.02% ash and 1.87% total fiber.

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1.

**Table 1.** Mean values and standard deviation of pH of bonefish samples before and after rigour mortis

Sample	pH before rigour mortis	pH after rigour mortis
Tilapia ( <i>Oreochromis niloticus</i> )	6.7 ± 0.3	6.6 ± 0.2

**Table 2.** Result of the proximal analysis of fish nuggets with addition of Jamaican flower extract and wheat fiber.

Sample	Protein	Fat	Moisture	Ash	Total fiber
Tilapia nuggets with addition of wheat fiber and jamaica flower, treatment 1	16.93	7.66	69.91	2.00	1.84
Tilapia nuggets with addition of wheat fiber and jamaica flower, treatment 2	16.97	7.82	69.84	2.03	1.85
Tilapia nuggets with addition of wheat fiber and jamaica flower, treatment 3	16.96	7.68	69.94	2.02	1.87
Tilapia nuggets with addition of wheat fiber and jamaica flower, treatment 4 (No treatment)	16.95	7.54	69.93	1.99	N.D.

**Table 3.** Microbiological results of fish nuggets with addition of jamaica flower extract and wheat fiber

PRODUCT	Aerobic mesophiles (UFC /g)	Total coliforms (UFC /g)	Fecal coliforms (UFC /g)	<i>Staphylococcus aureus</i> (UFC/g)	Fungi and Yeast (UFC /g)
Tilapia nuggets with addition of wheat fiber and jamaica flower, treatment 1	15	<3	<3	<10	43
Tilapia nuggets with addition of wheat fiber and jamaica flower, treatment 2	62	<3	<3	<10	35
Tilapia nuggets with addition of wheat fiber and jamaica flower, treatment 3	62	<3	<3	<10	23
Tilapia nuggets with addition of wheat fiber and jamaica flower, treatment 4 (No treatment)	75	<3	<3	Negative	275