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The elaboration and the evaluation of the acceptability of the fish burger of acará-açú (*Lobotessurinamensis*) in the macapaense market – AP, Brazil

Elaboração e avaliação da aceitabilidade do fishburger de acará-açu (*Lobotessurinamensis*) no mercado macapaense – AP, Brasil

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Abstract

The increasing consumer market requires innovative and quality products to respond to demand; thereby it is necessary that new experiments of new products are performed. Furthermore, a sensory analysis is a quick and an effective method to evaluate the acceptability of new food products. Therefore, the present study sought to assess the degree of acceptance of the fish burger meat of Acará-açú in the Macapá market. A sensory analysis was performed by 145 taste-testers, randomly selected and without prior training, of whom scored 6 parameters on a hedonic scale between 1 and 9, assigning score 1 for "extremely disliked" and 9 for "greatly enjoyed." The following parameters were tested: taste, aroma, texture, color, salt content and general acceptance. In addition, the taste-testers were asked to score the likelihood that they would purchase the food product if available. The scores attributed by tasters ranged from 1 to 5, considering 1 for "I definitely would not buy the product" and 5 for "I would certainly buy the product." From the sensory characteristics observed in this study, we may conclude that the fish burger's sensory analysis showed acceptability index greater than 82% for all attributes and the purchase intention was confirmed by 80% of the attendees. The tallied scores averaged above 5 for each sensory parameter indicating that fish burger meat of Acará -açú taste-tested in the Macapa market received positive acceptance which Indicative of the viability of the production of this product and distribution in the food market.

Keywords: Sensory analysis. Food Technology. Purchase Intent.

Resumo

O mercado consumidor cada vez mais exige produtos inovadores e de qualidade, e para suprir tal demanda é necessário que experimentos com diferentes produtos sejam realizados. A análise sensorial é um método rápido e eficaz para avaliar a aceitabilidade de novos produtos no mercado de alimentos. Diante disso, o presente trabalho procurou avaliar o grau de aceitação do fishburger de Acará-açu no mercado macapaense. A análise sensorial foi feita por 145 degustadores não treinados e selecionados aleatoriamente, os quais atribuíram notas de 1 a 9 (1=desgostei extremamente; 9=gostei extremamente), segundo escala hedônica, para os seguintes atributos: sabor, aroma, textura, cor, teor de sal e aceitação geral. Para a intenção de compra as notas atribuídas pelos degustadores variaram de 1 a 5 (1=certamente não compraria o produto; 5=certamente compraria o produto). A partir das características sensoriais observadas neste estudo, percebeu-se que as amostras de fishburger de Acará-açu submetidos à análise sensorial obtiveram índice de aceitabilidade superior a 82% para todos os atributos estudados e a intenção de compra foi confirmada por 80% dos provadores, o que configura indicativo da viabilidade da produção desse produto e distribuição no mercado de alimentos.

Palavras-chave: Análise sensorial. Tecnologia de Alimentos. Intenção de compra.

Introduction

Fish is an important component of human food. However, it can rapidly lose its sensory characteristics as a highly perishable raw material.[1] The consumption of fish and crustaceans is one of the fastest growing food segments in Brazil. It has obtained some growth rate of 9% in the last six years, surpassing other proteins of animal origin.[2]

To overcome the short shelf life and make the most of the raw material, fish processing techniques can be used. Among them, the formulation of fish burgers is considered an innovative technique that is little known in the market.

The development of fish products contributes to add value to the final product, since, for the production of fish burger, residues and species of low commercial value can be used in processing. Through the use of these techniques it is possible to obtain quality products suited to modern consumers' demand.[3]

To evaluate the sensory quality of foods it is necessary to study consumers' acceptance and then identify how the sensory characteristics of the product developed influence choices.[4] Sensory analysis is performed according to the responses transmitted by individuals to the various sensations originating from physiological reactions in response to stimuli, generating the interpretation of the products intrinsic properties. For this, there must be some contact and interaction among the parties, individuals and products.[5]

Acceptance analysis makes it possible to obtain important information, reflecting the degree to which consumers like or dislike a particular product.[6] In view of this, the objective of this study was to prepare (tropical South America) oscar fish [*Astronotus ocellatus* (Cuv.)]-based fish burger, perform sensory analysis and evaluate acceptability by the consumer market in the Brazilian municipality of Macapá, AP.

Methodology

The oscar fish specimens used in this experiment were purchased fresh and gutted from local supermarkets. To verify the meat freshness content of the fish to be processed, a form was applied according to the methodology proposed by Hootman.[7]

The samples acquired for processing presented organoleptic characteristics in accordance with what is recommended by the Technical Regulation on the Identity and Quality of Fresh Fish (whole and gutted),[8] considering the general appearance, skin, scales, eyes, gills, mucus, operculum, elasticity of muscles, odor, color and taste that are characteristic of the species.

Once acquired, the oscar fish specimens were transported to the Fisheries Biology and Fish Technology laboratory of the Brazilian university *Universidade do Estado do Amapá* (UEAP). The species oscar fish (*Astronotus ocellatus*) was chosen because, although its meat has a high culinary potential, the population of Macapá is not yet in the habit of consuming marine fish and few studies have been developed to evaluate its potential in the manufacture of processed products.

The following ingredients were used to make the fish burger: fish meat, water, salt, cassava starch and hamburger condiment. After the meat was obtained, the aforementioned ingredients were added. Amounts in grams used in the process were summarized in Table 1. After mixing the ingredients, the fish burgers were molded, packed and frozen in a freezer at a temperature of -18 °C (Figure 1).

Table 1. Ingredients used in oscar fish burger formulation on the Macapá market. Amapá, 2013.

Ingredients	Quantities
Oscar fish pulp	1 kg
Water	15 ml
Ordinary salt	5 g
Cassava starch	100 g
Mixed seasoning	10 g

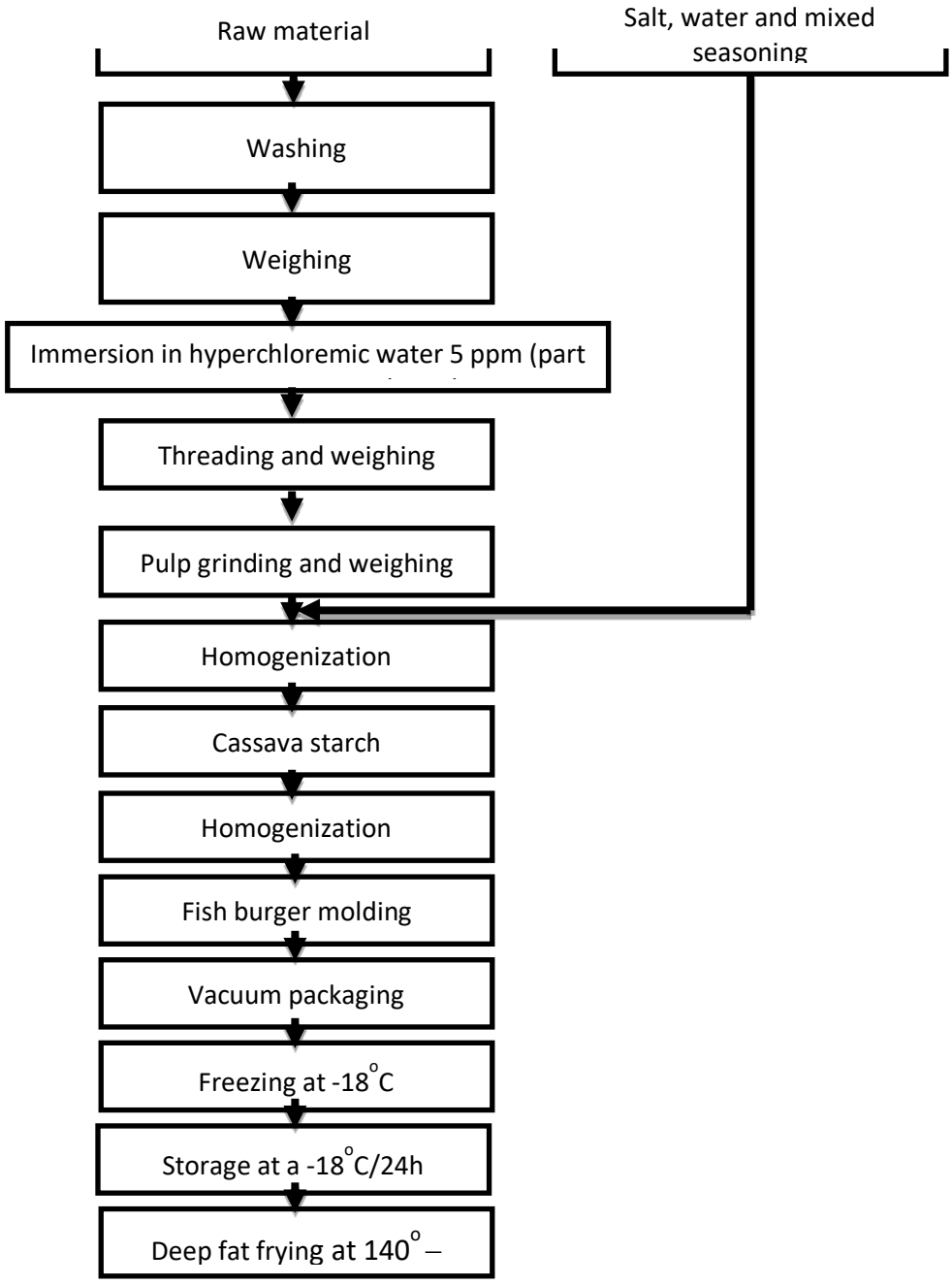

Figure 1. Oscar fish burger processing flowchart, Macapá. Amapá, 2013.

Subsequently, fish burgers went through deep frying process. In this process, the burgers were immersed in vegetable oil at a temperature ranging from 140 ° to 170 °C for 5 minutes. After this procedure, the products developed were sent for sensory analysis.

Sensory analysis was performed during the *50th Expofeira Agropecuária do Amapá* Brazilian agriculture and livestock farm trade fair in the period from September 27 to October 6 2013, at exhibition park *Parque de Exposições da Fazendinha*, a district in Macapá, AP. Analyses were carried out at the booth destined to Fish Technology during the whole event between 6h pm and 8h pm.

The oscar fish burger product was sensorially evaluated by 145 untrained tasters and randomly selected. The chosen tasters' ages ranged from 18 to 56 years, 63% were male, 55% of the interviewees were born in the Brazilian state of Amapá and had a monthly income of around three Brazilian minimum wages.

For sensory analysis, the structured 9-point hedonic scale was used, where: 1 = Dislike Extremely; 9 = Like Extremely, for the attributes: taste, flavor, texture, color, salt content and general acceptance. For the purchase intention, the structured 5-point scale was applied, where:1 = I definitely would not buy product; 5 = I definitely would buy product.

The sensory test card was prepared according to the methodology proposed by Dutcosky[9] and used by Veit et al.[10] The data obtained were tabulated in an electronic spreadsheet for later descriptive statistical analysis. The acceptability index was calculated using the mathematical expression AI% = X.100/N, where X represents the mean of each sample and N the maximum score of each sample given by the tasters. The cut-off criterion used for the index to be considered of good acceptance was equal to or greater than 70%.[10]

Results and Discussion

From the sensory characteristics observed in this study, it was observed that the oscar fish burger samples submitted to sensory analysis obtained acceptance scores between 5 and 9 for the attributes: color, flavor, taste, texture, salt content and general acceptance. The frequency of the "like" score was higher than 96.55% for all attributes studied and less than 5% for the degree of indifference, indicating a good acceptance of the product (Figure 2).

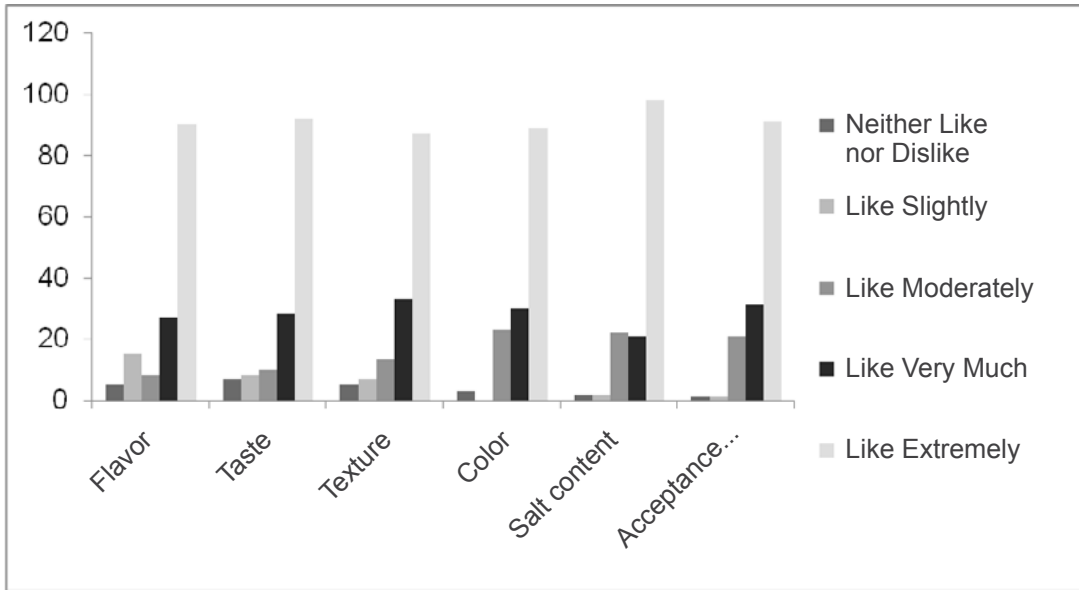

Figure 2. Macapá consumers' evaluation of oscar fish burger sensory attributes. Amapá, 2013.

Sensory analysis is an important method in assessing quality and acceptability of a novel food product, as no chemical analysis can replace the sensory receptors that shall target consumer preferences. According to Vieira et al.,[10] objective methods can measure factors indicative of oxidation, chemical composition and degree of decomposition but only the sensory evaluation quantifies the product acceptance perception and intensity by consumers.

Vieira et al.[10] report that the main processing factors influence the sensory properties of fish meat, mainly taste, flavor and texture. Lima and collaborators,[11] when developing the Nile tilapia (*Oreochromis niloticus*) fish burger, found similar results, identifying market acceptance of the product offered ranging from moderately to widely accepted.

The AI% acceptance test revealed the acceptance potential of the product tested, in which all the attributes analyzed presented an average of more than 7 and AI% greater than 80%, being above the cut-off limit of 70% (Table 2).

Table 2. Acceptability index (AI%) and means of oscar fish burger sensory attributes. Macapá, Amapá, 2013.

Attributes	AI%	Average
Flavor	95.6	8.6
Taste	94.4	8.5
Texture	96.7	8.7
Color	91.1	8.2
Salt content	82.2	7.4
General acceptance	90.0	8.1

No studies of sensory acceptance and analysis were found in the literature for the *L. surinamensis* species. However, results similar to the ones in the present study were reported by Sales et al.,[12] who tested the structured 9-point hedonic scale on mangrove snappers (*Lutjanus griseus*) and obtained the mean of the acceptance scores equal to 8, located in the hedonic term "Like Very Much," indicating that this product is well accepted. According to Nielsen et al.,[13] 75% of Norwegian salmon consumers consider texture as a more prominent quality attribute.

The averages of the scores for the intention-to-purchase parameter, which ranged from 3 to 5, show results between: I might buy product/I probably would not buy product and I definitely would not buy product. The intent to purchase test showed that more than 80% of the consumers who participated in the test intended to buy the product if it were on sale (Figure 3).

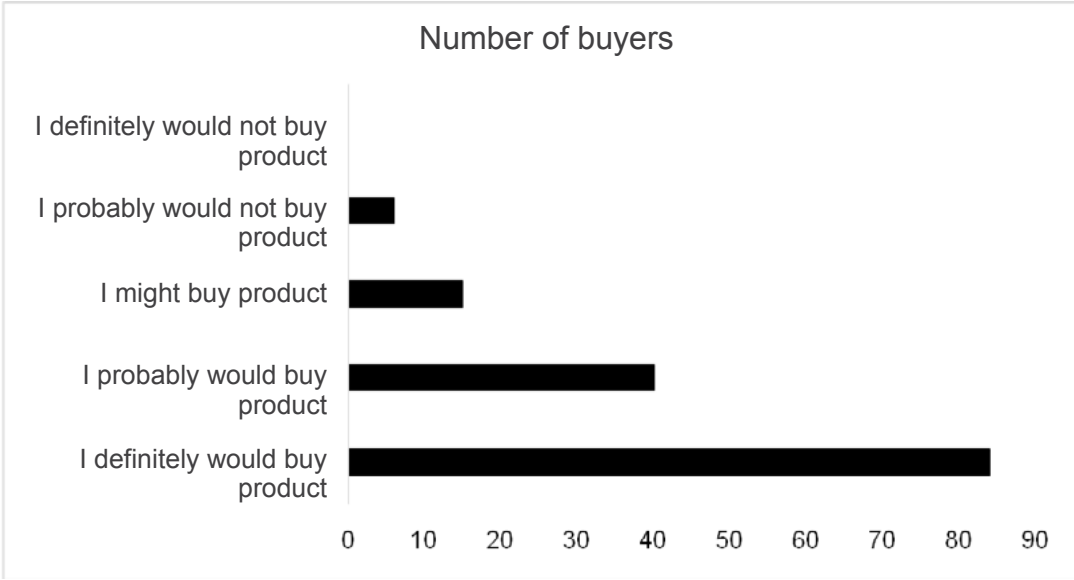

Figure 3. Evaluation of purchase intention for some oscar fish burger-type product. Macapá, Amapá, 2013.

Dutra & Costa[14] have presented two formulations of tilapia-based hamburgers and obtained a good acceptance (> 75%) according to the purchase intention evaluation carried out. Silva and collaborators[15] have evaluated the purchase intention of 40 consumers in relation to the tilapia fish burger which resulted in: 32.5% of the testers informed that they would certainly buy the product, 45% would buy the product, 20% would perhaps buy it, 2.5% would not buy it and 0% would certainly not buy it.

Fish-based products in the Brazilian North region are still little known. Fish burger experiments commonly found in the literature are directed to tilapia, since it plays an important role in the Brazilian food market, as, according to the MPA (Brazilian Ministry of Fishing and Aquaculture)[2] statistics the species is the most cultivated in Brazil.

Surveys showing the feasibility of formulating products and fish-based by-products are important[3,4,6,9,16,17] since they spread the idea of inserting this food, which is rich in proteins, minerals and nucleic acids, in Brazilians' diet through the development of innovative products made with fish meat. In addition, they are economic indicators, as they point to the market potential of new products, attesting that they are able to equally compete with other animal products that have been on the market for the longest time.

Conclusion

Sensory analysis is an important factor in evaluating some food product quality and stability since no instrumental or chemical test can replace sensory receptors. Although objective methods measure factors indicative of oxidation such as decomposition products, only sensory evaluation quantifies the total perception of taste intensity or product quality.

The main processing factors that influence the sensory properties of fish meat, mainly taste, flavor and texture, are raw material quality, some fish fraction used for product development and frozen product storage conditions.

Therefore, results obtained in the present study suggest the possibility of using oscar fish meat to develop fish burgers since the sensory characteristics evaluated were well accepted by the interviewees.

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