

Buffalo Sensory Analysis of Meat in the City of Medellin, Colombia, South America

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Abstract: The aim of this study was to determine the organoleptic properties of meat buffaloes in the town of Medellin, Colombia. It was a methodology employed with satisfaction hedonic scale of five-point verbal. GLM method was employed, with the technical MANOVA, with the orthogonal contrasts canonical, determining the dimensionality, in that the response variables were expressed by the criterion of maximum likelihood. The analysis was complemented through the technique of Spearman, using the SAS statistical package version 9.0. In making, the MANOVA, for the response variables smell, taste, tact and general appearance of the product found no statistical differences ($p > 0.05$). However, the variables above presented statistical relationship ($p < 0.05$), when the ANOVA analysis for each gender. The Spearman correlation coefficient showed that there are significant correlations between the different responses, for both men and women. This result indicates that the meat buffaloes, will present a good acceptance by the general public and therefore an acceptable marketing in the city of Medellin.

Keywords: Meat, MANOVA, alternative food, organoleptic, spearman correlation.

INTRODUCTION

Meat is a major nutritional food for human consumption due to the presence of proteins of high biological value-, fat-essential fatty acids-, B-complex vitamins-and-minerals-iron, zinc and phosphorus [1]. The organoleptic attribute of the food such as taste, color, texture and aroma, among others, allow a person can experience a range of sensations. This set of experiments determined the selection of a product. Consequently, the demand for products with high nutritional and organoleptic quality, allow the food industry to offer differentiated products and guided by the preferences and needs of a population. A tool used in the development of strategies of differentiated products is commercially sensory analysis, by which to determine the organoleptic attribute of a product and the impact this will have on the market. Moreover, when electing cuts and meat products, consumers tend to select the product by its general aspect (attractive, fresh and color), sensorial properties and texture of muscle fat estimated visually [2, 3]. According to Shackelford [4] it was determined that consumers are willing to pay a higher price for those meats that presented guaranteed quality. The selection of this type of product is also accompanied by the extension of the market, and beyond that, are according to the requirements of the public, which requires higher

quality products. Moreover, the meat industry pays better for cuts of high sensory quality of meat, in order to ensure customer satisfaction [5].

From the commercial point of view, the buffalo destined for meat production in Colombia, have a great importance in the different farms, mainly due to the quality of their housing and their high growth rates. Moreover, buffaloes meat has a marked superiority in the nutritional composition, when compared with red-meat (bovines) and white (birds) [6, 7]. The current trend of world population is consuming healthier products, higher quality and lower costs without neglecting the nutritional quality. Therefore, buffaloes may be considered as an alternative development of substitute products based on meat of high nutritional and sensory quality. The aim of this study was to determine the organoleptic properties of buffalo meat in the city of Medellín, Colombia, South America.

MATERIAL AND METHODS

This study was conducted to determine the organoleptic properties of the meat of buffalo (*Bubalus bubalis*) from different races. We conducted a technical study based on sensory analysis in August 2007, with 107 people in the city of Medellin (58 men and 49 women) in the department of Antioquia, Colombia. The tasters were in an age group between 17 and 68 years of both sexes. Each individual was provided a 150g serving of buffalo meat (cuts of top quality), baked at coal without any type of temper.

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Sensory Methodology

It was used an effective methodology with a hedonic verbal satisfaction scale with a five-point numerical scale definition of the characteristics-product-independent variables: 1. Didn't like it at all, 2. Didn't like it much 3. Neither like nor dislike, 4. like a little 5. like it a lot. And by the following questions were assessed features like: 1. How much you like the product in general?, 2. How much do you like the smell and aroma?, 3. How much you like the taste? 4. How much you like the consistency (texture and juiciness)? The preparation of the meat was performed by an expert cook and when roasting the meat it was added a little salt and olive oil by the will of the taster (judge).

How much you like the product in general?, How do you like the smell and aroma?, How much do you like the taste? and How much you like the consistency? (Texture and juiciness)?

Statistical Methodology

It was used the GLM method (general linear model), with the MANOVA (multivariate analysis of variance) technique with canonical orthogonal contrasts, determining the dimensionality in which the response variables were expressed by the maximum plausibility criterion. The analyzes were complemented by Spearman technique and descriptive one-dimensional analyzes, where was estimated the arithmetic mean, typical deviation, coefficient of variation and range. Supplemented by distributions of frequency qualitative nature. We used SAS version 9.0 package Statistic [16].

$$y_{ij} = \mu + G + e_{j(i)}$$

Where:

μ = Medium Effect,

G = Effect of the gender,

$e_{j(i)}$ = Experimental error.

RESULTS AND DISCUSSION

When performing the variance analyzes MANOVA, by contrast to the population for the answers variables found to smell, taste, feel and overall look of the product did not meet statistical differences, as can be appreciated in Table 1 ($p > 0.05$). This fact could be explained by the lack of difference between types of meat from different individuals in texture, aroma and flavor. The difference between types of meat can be influenced by ripening, due to the changes in these characteristics being in function of time [8].

Moreover, the buffalo meat and beef have similar characteristics in regard to texture, therefore, to perform multivariate analyzes, assumes that people have found no difference between the texture, the smell and aroma, flavor, and consistency. In Trinidad and Tobago, it was reported that there are small differences for the sensory texture of meat from Zebu cattle, European cattle and buffalo [9].

The Spearman correlation coefficient demonstrated that there are significant correlations between different answers-variables for both men and women (Table 2). Notes that the association between the overall product and taste, smell and flavor had a greater relation for men than for women at the time of selecting this type of meat. However, women rated in a better way, linking between the general aspects of the product with the taste, compared to men.

Those results indicate that men evaluate in a best way the smell and aroma depending on the overall appearance of the product it was consuming (Table 2). Women elected buffalo meat due to better evaluated the flavor (taste) with the overall appearance of the product (Table 2). Notes that the presentation of the product is a factor that can positively influence over the selection of a product or by product of buffalo origin meat. The differences generated by sex could be linked to race and type of muscle (cut), since it could significantly influence the flavor and juiciness [10].

Table 1: Multivariate Analyzes of Variance for the Population Found

	Canonical coefficients	
	Standardized	Not Standardized
How much you like the product in general?	0.08	0.10
How much do you like the smell and aroma?	-0.14	-0.18
How much you like the taste?	1.18	1.43
How much you like the consistency (Texture and juiciness)?	-0.57	-0.82

Table 2: Spearman Correlation Coefficients for Men (Below the Diagonal) and Women (Above the Diagonal)

	How much you like the product in general?	How much do you like the smell and aroma?	How much you like the taste?	How much you like the consistency (texture and juiciness)?
How much you like the product in general?	1	0,33 (>0,0318)	0,48 (<0,0011)	0,57 (<0,0001)
How much do you like the smell and aroma?	0,48 (<0,0002)	1	0,56 (<0,0001)	0,49 (<0,0009)
How much you like the taste?	0,34 (>0,0108)	0,46 (<0,0005)	1	0,60 (<0,0001)
How much you like the consistency (texture and juiciness)?	0,49 (<0,0002)	0,49 (<0,0002)	0,50 (<0,0001)	1

Furthermore, it is necessary to take in account that the flavor of the meat, similarly depends on the time of the preparation that is exposed, influencing on the speed in which they perceived the distinctive flavors and aromas evaluated by the same judge [11].

In Figure 1 shows the percentages for the traits analyzed both for men and for women. The general product obtained as answers, for both men and women, "I like a little" and "I like it", of 88.86% and 93.75%, respectively. This result allowed us to estimate that the buffalo meat will have a good acceptance by the general public and therefore an acceptable trade in Medellín (Colombia). Hurtado- Lugo [12], suggested that the marketing potential for buffalo meat was 90.2% in the city of Palmira (Colombia). Moreover, it is observed that the sensory quality of the meat is determined by a set of sensations (such as color, flavor, etc.), when it is ingested by a person. Among them, the flavor is determined by the disposition of the fat in meat, buffalo having slightly different flavor to the beef.

This difference is associated with lower fat presence in the muscle, thereof, lower marbling in buffalo meat [13].

In this study, we found that the opinion "like it a lot" for both men and women was 55.56% and 46.51%, respectively. Hurtado-Lugo [12] reported that the opinion "like it a lot" was 63.7% in the total surveyed in the city of Palmira, Colombia. Overall, the difference in perception of the product by persons-judges in both cities, can be associated by eating habits and cultural costumes of both regions of Colombia. Moreover, it can be considered that buffaloes meat can be an alternative way in feeding the population of the city of Medellín, as in the case of Brazil [14].

In order to cover new trends and demands by consumers, and cover specific requirements of the beef market, the meat industry is constantly changing on trade strategies [15]. In countries like Brazil and Argentina, the market for buffalo meat has a high level of acceptance and commercialization of first quality cuts and byproducts of buffalo origin meat in the industry. Hurtado-Lugo [12] suggested that buffalo meat can be marketed in the region of Palmira (Colombia), as presented good sensory acceptance due to its organoleptic properties. It is observed in this study that the buffalo meat has a good acceptance in the population of Medellín, Colombia. Although it is

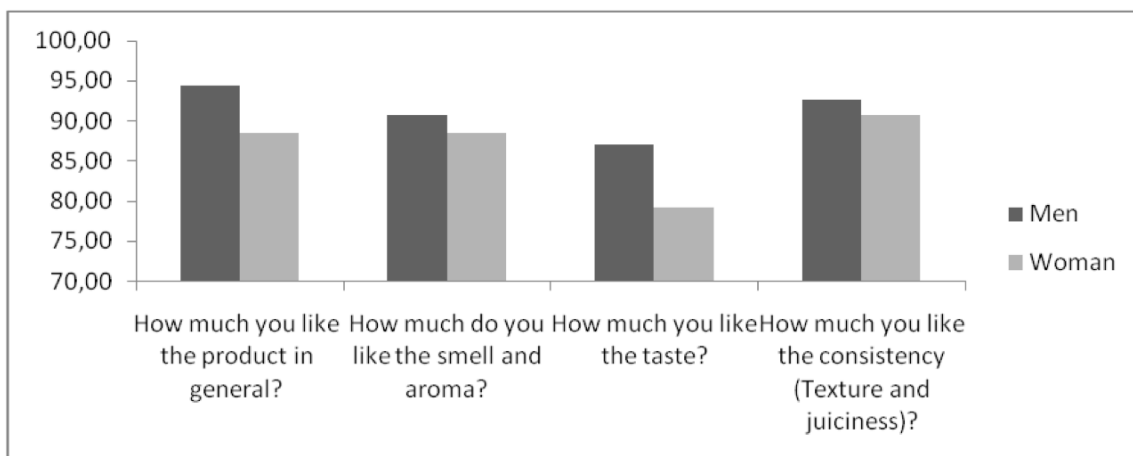


Figure 1: Percentage of men and women discriminated by answer-variables.

perceived that a lot of sensorial characteristics that operate in a complex way, the analyzes showed that in the population studied there was a difference ($p > 0.05$) in beef attributes evaluated in this study.

CONCLUSIONS

The buffalo meat, due to its organoleptic features, presented a good acceptance in Medellín city. The gender analyzes allowed to determine the significant difference in the evaluation of the attributes of buffalo meat, and therefore, can create strategies for developing products for a specific market for gender.

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