Comparative analysis of sensory properties of French fries made by vacuum and deep fat frying

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Deep-fat frying is one of the oldest and most popular food preparation processes and consists basically in the immersion of food pieces in hot oil. The results are products with unique and distinctive qualities of flavor, color, appearance, taste, aroma and texture however, with a high fat content. Diet with this type of food has been linked to many diseases common in developed countries, such as obesity and coronary heart disease [1]. Consequently, there has been a growing movement to reduce the fat content of deep fried products. Vacuum frying could be a feasible alternative since the food preparation is done by convention, requiring less oil quantity than in the conventional process therefore, producing low-fat foods [2].

The aim of this work was to evaluate and to compare the sensory profile of raw potato and pre-frying frozen chips (French fries) fried in vegetable and sunflower oil using traditional electric fryer and a vacuum fryer (Actifry, Tefal). In the deep fat frying process the oil was used in three batches of frying potatoes however, when the Actifry fryer was used only one frying was made.

All fried potatoes samples were evaluated by eleven judges with experience in sensory evaluation. The sensory attributes used were: appearance (*color, stick shape, oil content*); odor (*characteristic odor, rancid*); taste and mouth-fell (*astringency, bitterness, salty*); flavor (*French fries characteristic flavor, oiliness, rancid*), texture (*firmness, crunchiness*) and *global appreciation*. Each sensory attribute was evaluated using an increasing 5-points scale (from 1 to 5). Sensory attributes data were statistically tested by analysis of variance (ANOVA). Duncan test (p<0.05) was applied to the data to determine significant differences between samples. In addition, Principal Component Analysis (PCA) and a Cluster Analysis (CA) were used to analyze the data and study the relations between oil type and French fries sensory characteristics using different fryers, by the use of STATISTICA 2010.

In general, the results showed significant differences in several sensory attributes (*color, oiliness* and *French fries characteristic flavor*) either when were used the raw potato or pre-frying frozen chips into the frying process, in both fryers processes; also when the two oils were compared (vegetable and sunflower oil). However, higher values for the attributes *color*, *oiliness* and *global appreciation* were observed in the 1st frying process by the traditional electric fryer and lower in Actifry.

A hierarchical grouping was performed to test the sample relationship. When the raw potato was used in the frying process, the hierarchical grouping was carried out by the type of oil (vegetable and sunflower) in conventional frying. Although, when the pre-frying frozen chips were used the hierarchical grouping was arranged by the number of frying and not the type of the oil. Still, whether the potatoes before frying are raw or frozen, in the Actifry process a single group was formed, independently of the type of oil.

Despite the healthy aspects of using Actifry in the frying process, in terms of sensory attributes, the process needs to be improved for major consumer acceptability.

References:

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