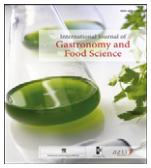

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Cooking and nutritional science: Gastronomy goes further

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Abstract

Science-based cooking is closely associated with the design of stimulating and novel dishes that make guests feel an explosion of sensations. Chefs are expected to use high quality foods and thorough preparation techniques. But food science is not only texture and technology, it is also nutrition and health. From a nutritional point of view, science-based cooking may contribute to providing certain nutrients and other food components, which could confer healthy aspects to the dishes and menus. Chefs may then also consider nutritional aspects when designing dishes and menus. The purpose of the present study was to evaluate the nutritional profile of the innovative dishes and menus offered in Mugaritz Restaurant in Spain. European food legislation and recommendations have been applied in order to evaluate two menus and to globally understand the impact they have on diet and health.

Keywords: Gastronomy; Nutritional profile; Health properties

Introduction

The evolution and history of gastronomy has been clearly influenced by the social and economic background in each period of time. In 1825, gastronomy was defined as 'the reasoned knowledge of all that relates to man feeding himself'. Its aim was to 'attend to the preservation of man by means of the best possible food' (Vega and Ubbink, 2008). In the past, the aim of a diet was to provide nutritional requirements in order to avoid nutrient deficiencies. This aim has evolved into the desire to keep or improve health status through the diet. Likewise, the evolution of gastronomy into haute cuisine has led to the utilization of new ingredients and technologies that could interact with nutrients and alter the contribution of the dishes to the overall diet. The main goal of haute cuisine cooks is to innovate and design delicious dishes with new textures and flavors, which promote new sensations in customers. The logical next step of this goal for haute cuisine could be to understand the impact of these new processes and ingredient mixtures on the nutritional composition of the dishes and menus, and furthermore, the impact of the menus on the overall diet of the individual. Cooks could implement this knowledge in the design of new dishes in order to equilibrate the menus in terms of nutritional and health properties. As gastronomy and haute cuisine are intensely related to social interactions, it is extremely interesting to analyze their implications on one of the major current concerns of society: health. In this sense, European Food Safety Authority (EFSA) is concerned about new product launches with nutritional and health claims that need to be substantiated. New legislation is consequently being put together in order to control and define the claims made by the manufacturers of these products. Bearing these indications from EFSA in mind, the results presented here

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are discussed in terms of nutritional and health properties of two different menus from Mugaritz Restaurant.

Materials and methods

Menu design

The working team of the experimental kitchen from Mugaritz Restaurant was responsible for defining and designing the dishes. The selection of the final recipes and menus was made attending to guest demands and sensory preferences. Recipes are described in Supplementary material. Final presentation of a dish is shown in the figures, for example, *A pasta of amaranth, baby langoustine tails*, is shown in Fig. 1.

Nutritional composition analysis of dishes and menus

A total of 21 dishes conforming to two different menus (Sustraiak and Naturan) were analyzed. All dishes were prepared in duplicate and weighed. Each dish was then completely homogenized and a representative sample was used for nutritional composition analysis. Macro and micronutrients as well as certain bioactive compounds were determined. Samples were analyzed according to the Association of Official Analytical Chemists methods (AOAC, 2002): moisture (AOAC 950.46), ash (AOAC 923.03) and protein content (AOAC 954.01). The measurement of reducing sugars was expressed as invert sugar or dextrose equivalent by the Luff–Schoorl method (Lees, 1968).

Total lipids were evaluated by extraction with chloroform/methanol/water following the Bligh & Dyer method with minor modifications (Bligh and Dyer, 1959). The quantitative cholesterol content of the samples was determined according to the Annex V of the European Official Analysis Methods (European Commission, 1991a). Quantification of the silanised sterol fraction was carried out by capillary gas chromatography, on a Hewlett Packard 6890 chromatograph with flame ionization detector (FID) using a SE-54 capillary column (30 m × 0.25 mm i.d. and 0.25 μm thickness, Supelco). Lipid extractions from each sample were esterified as described in Annex X of the European Official Analysis Methods (European Commission, 1991b). Fatty acid methyl esters (FAMEs) were analyzed using a gas chromatograph Hewlett Packard 5860 equipped with a flame ionization detector 6890 (FID) and a DB-23 fused silica capillary column (60 m × 0.25 mm i.d. and 0.25 μm thickness; Agilent Technologies, USA). Fatty acids were identified by comparison of retention times to standards and relative quantities were expressed as weight percent of total fatty acids.

Fig. 1. Presentation of the dish of *A pasta of amaranth, baby langoustine tails. Tender garden leaves*. Photograph from Jose Luis López de Zubiria.

Total dietary fiber (TDF) was analyzed following the official enzymatic–gravimetric method (AOAC 991.43), total sodium (Na) and potassium (K) by a flame photometric method (AOAC 969.23), calcium (Ca) by atomic absorption spectrophotometry (AOAC 975.03) in a fast sequential atomic absorption spectrophotometer (model AA240 FS, Varian Inc., The Netherlands), following the official methods (AOAC, 2002). The analytical curve was plotted for each element. All the nutritional composition analyses were done in duplicate and the results shown in the tables are the means.

Nutrition and health assessment tools

For the nutrition and health assessment of Mugaritz food designs, the current legislation on nutrition and health claims of foodstuffs was utilized. As a consequence, the nutrients of compulsory declaration for nutritional claims were analyzed. Total energy was also calculated as indicated by law: energy (kcal) = 4 × (g protein + g carbohydrate) + 9 × (g lipid) + 2 × (g of TDF) (European Commission, 2011).

In order to assess the real contribution of each dish and menu to the diet, results were expressed considering the servings given to the customers in the restaurant. This information allowed the comparison between nutritional values of all the dishes (per serving) and evaluation of their contribution to the menu.

In order to convey the relative significance of the contribution of each dish and menu to a daily diet, the results were also expressed as a percentage of a Daily Reference Value (DRV) or Reference Intake (RI). DRVs or RIs for energy and selected nutrients were those proposed by the Panel on Dietetic Products, Nutrition and Allergies of the European Food Safety Authority (EFSA) for a woman (EFSA, 2009a, 2010a).

In order to highlight their nutritional properties or potential effects on health, it was also necessary to evaluate the overall nutritional status of the dish and menu designs. To that end, dishes were categorized on the basis of their composition according to a legal proposal of the European Commission (2009). For each food category, thresholds of sodium, saturated fat and sugars have been suggested. Dishes complying with these nutritional criteria would be justified in making nutrition and health claims according to food regulations (European Commission, 2006, 2010, 2011). Thus only those dishes, which did not exceed EFSA thresholds, were evaluated for nutritional and health claims.

Additionally, the presence of some nutrients (sodium and cholesterol) and also certain bioactive components (long chain omega-3, linolenic acid and potassium) involved in the etiology (formation or prevention) of