Changes in pasta protein networks induced by drying and their relationship to protein digestibility and allergenicity

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Pasta is a popular food which possesses interesting nutritional quality but may trigger allergic reaction in sensitized people. Many questions remain open for research area, including the relationship between pasta processing, pasta structure and resulting nutritional properties. The purpose of this study was to characterise the structure of pasta dried at different conditions and to relate it to the in vitro digestibility and allergenicity of proteins. Four drying profiles were studied: Low Temperature 55°C (LT), High Temperature 70°C (HT), Very High Temperature 90°C applied either from the beginning of the cycle, when the moisture content of spaghetti was high (20%) (VHT) or at the end of the drying cycle, when the moisture content of pasta was low (12%) (VHT_LM).

**Proteins:** Size Exclusion HPLC (SE-HPLC) after protein extraction with SDS (detergent), then with DTE (reducer) in dried and cooked pasta (Fig.1).

**Microstructure:** Confocal Laser Scanning Microscope of cross sectioned cooked pasta after protein staining with fuchsin acid (Fig. 2).

**Protein digestibility:** Digestion of cooked pasta composed of a buccal phase (α-amylase, pH7), a gastric phase (pepsin, PH2) and an intestinal phase (pancreatin, pH7). Protein hydrolysis was evaluated by measuring the increase in free amine groups in protein extracts (Fig. 3).

**Protein allergenicity:** Juices from in vitro bucco-gastric or pancreatic digests were used to inhibit recognition of wheat proteins by IgE from a pool of allergic patients (table 1).

**Allergen profile:** LT & other drying profiles

**Microstructure of cooked Pasta**

**Methods**

**Protein Solubility**

**Allergenicity of Digests from Cooked Pasta**

**Protein digestibility in Cooked Pasta**

VHT_LM decreased significantly protein digestibility (by 10%) and increased allergenicity of intestinal digests. This could not be explained by a different protein spatial distribution at a microscopic level. VHT_LM cooked pasta presented a higher proportion a high molecular weight protein aggregates (data not shown) which may have contributed to this lower digestibility and higher allergenicity. Both gluten and soluble proteins seemed to be involved. It appears that applying VHT at the end of the drying cycle led to the formation of specific protein aggregates.

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d3 remplacer 20 ppm gluten par 20 ppm
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