Relationship between acrylamide formation and quality of frying oil during processing of French fries

Inês A. Castro, Castro, Pinto Costa Lda, Maia, Portugal; Daniel Pinto, Castro, Pinto Costa Lda, Maia, Portugal; Cristiana Castro, Centro de Engenharia Biologica - Universidade do Minho, Braga, Portugal; António Vicente, Centro de Engenharia Biologica - Universidade do Minho, Braga, Portugal

Thermal treatments such as frying and baking are fundamental to obtain specific sensorial characteristics such as color and flavor in foods. Thermal treatments may also induce the formation of health-promoting components, such as antioxidants and antimicrobial agents, or potentially harmful compounds in foods. Therefore, the knowledge of chemical reactions occurring in foods is of extreme importance from a food safety point of view. The presence of acrylamide in thermally processed foods has been considered as an important food-related crisis by international authorities. It is well-known that temperature plays an important role in acrylamide formation especially for shorter heating times as in frying of potato chips; lowering the frying temperature may significantly reduce the amount of acrylamide formed.

The aim of the present work was to determine the relation of acrylamide formation and the quality of oil (in terms of total polar materials-TPM) during French fries processing. Process temperature ranged from 170 to 200ºC and TPM of frying oils ranged from 5 to 15%. Acrylamide was quantified by HPLC and TPM were assessed according to ISO 8420:2002. For all tested temperatures the concentration of acrylamide increased with the raise of the frying temperature and also with the increase of TPM present in oil, except for the 200ºC assay in which the acrylamide formed seems to remain constant for all the values of TPM tested.

The results seem to reinforce the importance of controlling the quality of frying fats in terms of TPM, which has now been shown to enhance acrylamide formation thus representing a supplementary food safety risk.