

Targeted investigations of acrylamide in food

Research programme: Chemical hazards in food and feed

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Conducted by: Premier Analytical Services

Background

Acrylamide (AA) levels in biscuits can vary widely and amounts above 1000 µg/kg have been reported in some products. Free asparagine (Asn) is believed to be the limiting or dominant precursor of AA formation in cereal products and hence recipes that utilise cereals which are naturally high in Asn, such as rye, oats and wholemeal flours, may form more AA. Conversely, reducing or consuming Asn, e.g. by the addition of either an enzyme or yeast or another microorganism to product recipes, can have a significant impact on AA generated during baking. The thermal conversion of Asn into AA is a multistep series of reactions, some of which are believed to involve reducing carbohydrates.

Research Approach

This study investigated the relationship (correlations) between declared recipe ingredients, processing (colour indicator) and acrylamide formed in retail biscuits. The study determined whether a matrix model could be developed to predict a more appropriate subgroup for a given biscuit type for which a current “indicative value” might apply. The investigation targeted approximately 60 biscuit samples from each of the main biscuit categories included in UK FSA Acrylamide Surveys (2007-2013) such as Digestive, Rich Tea, Ginger, Rye, etc. Samples will be collected by from local retail outlets and data from these products (acrylamide level, ingredients etc) subjected to multivariate analyses to determine possible trends and categories. If successful, this model will then be extended to data held from previous UK Acrylamide Surveys (2007 – 2013) so that trends and comparisons can be made with a larger pool of data. It is anticipated that this investigation / model may be extended to other food categories such as bread etc at a later date.

Results

This short pilot investigation of acrylamide in biscuits was undertaken to determine whether it would be feasible for biscuits to be divided into discrete subcategories of expected acrylamide levels for more precise setting of performance targets such as the current EU ‘indicative levels’ or potentially future maximum limits, based on available knowledge of recipe and process factors.

The study provides some support for subcategorization based on ingredients in this food category such as yeast, ginger or raising agent, but it also illustrates the inherent complexities of establishing well defined discrete categories for enforcement of acrylamide levels or other purposes, due to the range of influencing factors.

Research report

England, Northern Ireland and Wales

PDF

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