

Levels of N-nitroso compounds (NOC) in UK consumed foods

Research programme: Chemical hazards in food and feed

Study duration: 2013-12-01

Planned completion: 2016-05-01

Project code: FS102076

Conducted by: Premier Analytical Services (PAS)

Background

N-nitroso compounds (NOC) are chemical contaminants formed during the processing and manufacture of certain foods such as bacon, cheese, cured meat and fish. The types of NOC most frequently found in food include volatile nitrosamines such as N-nitrosodimethylamine (NDMA) and non-volatile nitrosamines such as N-nitrososarcosine (NSAR).

Under certain conditions such as pH, temperature and time, NOC can be formed from the reaction of certain compounds with nitrosating agents such as nitrite salts and nitrogen oxides. It is therefore possible for NOC to occur in foods that utilise nitrite salts for preservation and colouring and/or combustion gases for drying.

There are currently no regulatory maximum limits for the level of NOC in food.

Research Method

Foods selected to identify and quantify the levels of NOC present included; meats, beer, cheese, fish, soups, infant formulae, milk powders, spices and tea.

An ATNC method was used to screen these foods for the presence of NOC and where found was used to inform the selection of foods for the identification and quantification of individual NOC.

Methodology was developed to try and identify and quantify individual volatile nitrosamines in the foods that were found by the ATNC screening method. The investigation found the developed methodology was limited for determining other known NOC and would beyond this study require further refinement and development.

Results

The investigation showed levels of apparent total nitroso compounds (ATNC) were found in 36 of the 63 samples tested;

- Samples with the highest level of ATNC (>200 µg NNO/kg) included cooked bacon, cured meats and dried shrimp
- Levels of ATNC for unsmoked bacon were found to be lower (240 - 571 µg NNO/kg) than the smoked product (944 - 2853 µg NNO/kg)
- Samples with the lowest level of ATNC (?20 µg NNO/kg) included cheese, beers, gravies and soups, most dried products, most pickled products and soy sauces

Volatile nitrosamines were found in four of the samples selected following ATNC analyses. These included;

- N-nitrosodimethylamine (NDMA) in dried shrimp (9.4 µg/kg)
- N-nitrosopiperidine (NPIP) in pepperoni (1.3 µg/kg, 1.4 µg/kg) and unsmoked bacon (1.6 µg/kg)

The measurement of ATNC has enabled foods found that contain NOC to be identified for further investigation although care must be taken when interpreting such data as ATNC is not necessarily a reliable indicator of the presence of volatile nitrosamines.

The levels of NOC found during this investigation were low and unlikely to be a risk to health.

Research report

PDF

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