

Occurrence of Polycyclic Aromatic Hydrocarbons

Area of research interest: [Chemical hazards in food and feed](#)

Occurrence of Polycyclic Aromatic Hydrocarbons in Herbs, Spices, Supplements and Tea

Project code: FS102111

October 2014 – July 2015

This investigation was carried out to obtain data for use in establishing the UK negotiating position during discussions on the setting of limits for PAHs in food supplements and dried spices and herbs. Teas and herbal products for use in infusions were also tested.

Background on PAHs in food supplements and dried spices and herbs

When PAH limits were first introduced, for benzo(a)pyrene, the Commission proposed the inclusion of limits for food supplements, since these were already in place in national legislation in certain Member States. However, there was insufficient data at the time on which to set workable limits and some Member States, including the UK, were still collecting data that subsequently indicated potential difficulties with the original proposed limit of 2.0 µg/kg, particularly in the case of bee and marine algal products. Discussions were suspended but resumed in 2014 with limited time available to collect and submit further data. Negotiations were extended to include dried herbs and spices since these were also reported to be at risk of high PAHs, possibly due to poor practices during drying, but also because some supplements are already based on herbs and spices and there was a possibility of confusion for regulators that would not be resolved by existing legal definitions for supplements.

Objective/Approach on PAHs in food supplements and dried spices and herbs

200 samples of food supplements, herbs, spices and tea were supplied to Fera for analysis. Some were available from recent surveys and the sample set was augmented with additional algal supplements, bee products and spices. The samples tested for PAHs comprised 50 herbal supplements, 20 alga-based supplements (including chlorella and spirulina, which had previously been the subject of Rapid Alerts due to high PAH levels), 10 propolis and other bee products, 25 samples of dried spices and herbs, 68 herbal teas and 27 traditional teas.

The samples were homogenised and analysed using an accredited analytical procedure. The methodology was based on internal standardisation (¹³C₁₃) with measurement by gas chromatography--mass spectrometry (GC-MS).

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Occurrence of Polycyclic Aromatic Hydrocarbons (PAHs) in chocolate and chocolate confectionery products

Project Code: FS102071

January 2014 – January 2015

This study was carried out to evaluate the practicality and effectiveness of new limits introduced for cocoa beans and derived products, including chocolate confectionary, in 2013. Limits were applied on a fat basis and there was a proposal to amend this to a whole weight basis.

Background on occurrence of PAHs in chocolate and chocolate confectionery products

When the limits were set for vegetable oils, cocoa butter was excluded from the regulations following evidence from the chocolate and confectionary industry that there was a likelihood of a high rate of non-compliance. This was attributed to the drying techniques used. As most primary producers were subsistence-scale farmers in developing countries in Africa and South America, considerable time would be required to provide training on best practices. However, when the PAH limits were amended in 2011, cocoa beans and products were included, with limits coming into force in 2013. Official controls for chemical contaminants are prioritised on the basis of risk. Chocolate confectionery had not previously been tested for PAHs in the UK and this study was conducted to determine whether there was a need for future monitoring.

Objective/Approach on occurrence of PAHs in chocolate and chocolate confectionery products

100 Retail chocolate and chocolate confectionary products were purchased by a sample collection agency and sent to FERA. The samples included 50 individual products with a cocoa content greater than 50%, purchased in duplicate. The samples were homogenised and analysed using an established, validated analytical procedure for PAHs that is UKAS accredited to the ISO 17025 standard and has been reported before in detail to the FSA. The methodology was based on internal ¹³Carbon standardisation with measurement by gas chromatography-mass spectrometry (GC-MS). A portion of each sample was also sent to a subcontractor to be analysed for fat content using a UKAS accredited method based on BS:4401:Part 4 1970 (Werner-Schmidt Method).

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Analysis of banana chips for Polycyclic Aromatic Hydrocarbons

Project code: FS203005

August 2013 - July 2014

This investigation was carried out after high PAH levels were reported in some banana chips. Samples, mainly of banana chips fried in coconut oil, were analysed and it was confirmed that there is an associated risk of raised PAH levels. The results were presented to the European

Commission and regulatory limits established consequently.

Background on analysis of banana chips for PAHs

Over the years up to 2012, there were several European Union border rejections of banana chips due to high reported PAH levels (action was based on risk assessment as the product was not regulated at the time). Some commercially produced banana chips are prepared by frying in coconut oil, which is itself a raised risk for PAHs and was already regulated. The levels of PAHs reported in affected banana chips were not consistent with the use of compliant coconut oil and it seemed possible that high PAH levels were a characteristic of the production process. This limited investigation was to assess the extent of any possible problem with a view to raising the issue with the Commission with a possible proposal to add banana chips to the regulated foods. Banana chips are an important import, used widely in cereals and confectionery as well being as sold for snacks and often eaten by children.

Objective/Approach on analysis of banana chips for PAHs

Samples of banana chips prepared by frying in coconut oil or palm oil, as well as sun-dried, together with other fruit products prepared by frying in coconut oil, were obtained locally by the analytical contractor from a range of large and small retail outlets or purchased online (because the banana chips were always imported, a geographically-based sampling plan was not necessary). Some samples were of cereals or mixed snacks. For these, the banana chips were picked out for analysis. All of the samples were tested for 28 PAHs including the 16 identified by EFSA as suspected human carcinogens and a possible concern for health if present in food. The results were used to determine the extent to which there was a problem linked to frying bananas or other fruits in coconut oil and to identify any requirement for regulation.

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