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Food Testing News

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Radioactivity testing

Eurofins offers a global network for risk management in the food supply chain

By Dr. Susanne Rathjen and Nadja Flüchter, Eurofins WEJ Contaminants GmbH, Germany

The global food industry faces new challenges regarding risk management due to the ongoing nuclear reactor incident in Japan.

The radioactivity spread into the environment locally, and entered the food chain via water, air and soil. Further distribution via ocean currents and upper air layers has spread the contamination to other regions but at the same time the dilution effect would potentially reduce the contamination to concentrations below levels causing adverse health effects. Manufacturers, as well as importers, distributors and other parties are faced with the responsibility of putting comprehensive and reasonable monitoring systems in place to assess the risk of radioactivity levels in their foods.

European, US and other governmental authorities have implemented import measures and maximum levels for certain radionuclides in food and feed. The volatile and hence spreadable radionuclides caesium-134, caesium-137 and iodine-131 are of greatest concern to the food supply chain and can be monitored as marker nuclides by means of γ-spectrometry. The analysis of other radionuclides, such as strontium-90 or plutonium-239, require a major sample preparation effort and so comprehensive monitoring of these radionuclides in food is generally unrealistic for routine testing.

Eurofins' expertise in the field of radioactivity is based on more than 20 years experience. The Competence Centre Eurofins WEJ Contaminants in Hamburg performs the analysis of iodine-131, caesium-134 and caesium-137 using state-of-the-art γ-spectrometry with either high-resolution germanium semiconductor or sodium iodide scintillation detectors. Additional radionuclides can be determined on request. To meet the requirements of its global operating customers, Eurofins has expanded its radioactivity testing capacities to other regions, including Japan, China, the United States, Denmark and Sweden.

As well as the testing of food products and raw materials, Eurofins' offer encompasses on-site inspections including the analysis and assessment of freight containers, mainly in the ports of Hamburg (Germany), Rotterdam (The Netherlands) and in China.

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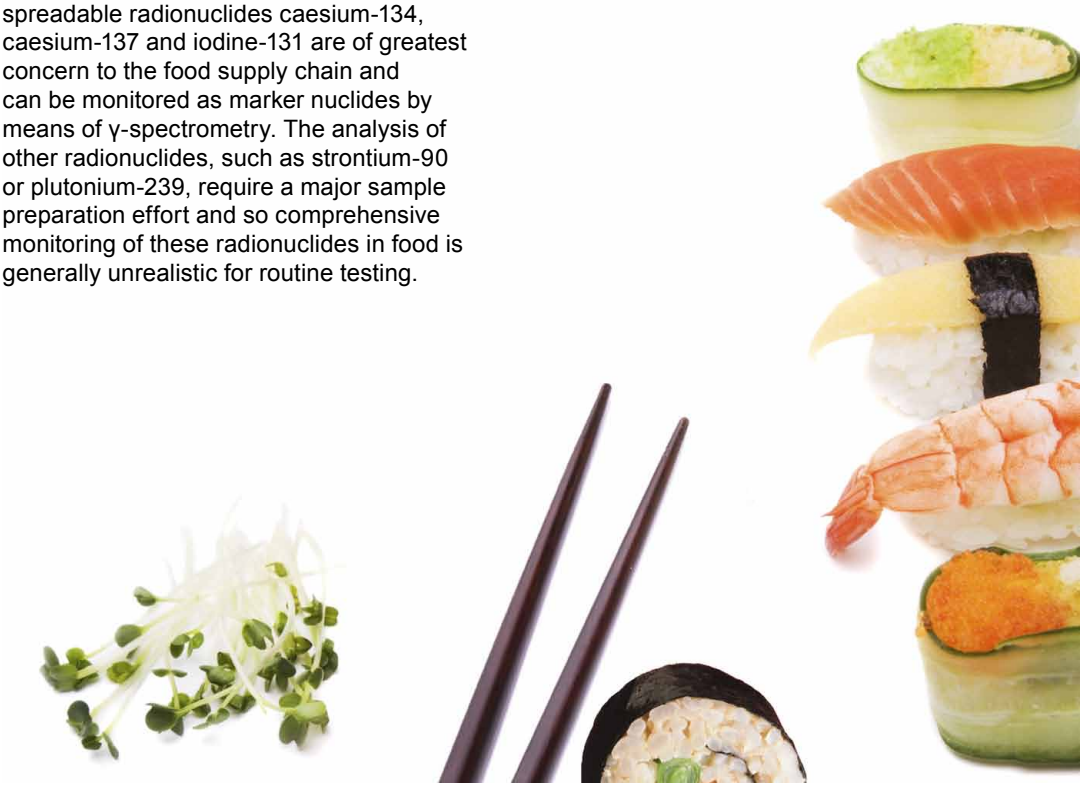

Alkyl esters - a new parameter for the assessment of extra virgin olive oil

By Nadja Liebmann and Dr. Torben Küchler, Eurofins Analytik GmbH, Germany

From April 1st, a new parameter for the assessment of extra virgin olive oil was established in the European Union in Regulation (EEC) 2568/91. The content of alkyl esters, namely fatty acid methyl esters (FAME) and fatty acid ethyl esters (FAEE), are regulated. There is a legal limit of 75 mg/kg for the sum of FAME and FAEE, and 150 mg/kg for the sum of FAME and FAEE, if the ratio of FAEE/ FAME is below 1.5.

Methyl and ethyl esters of fatty acids are useful indicators for determining the quality of olives and the oil produced from them as they are direct indicators of degradation. Several scientific studies have shown that oil from olives with minor damages contains FAME and FAEE. Oil from damaged olives, which have been mildly deodorised to remove sensory defects can be detected by the presence of the alkyl esters.

Eurofins Analytik GmbH has been able to determine the alkyl esters in olive oil since the end of 2009 and has experience in the procedure for the analysis and assessment of the results. Additionally, storage trials were carried out to verify that alkyl esters are not formed under different storage conditions. Until now, no increase of the alkyl esters has been found in bottled extra virgin olive oils during storage at room temperature. Results of more than 100 extra virgin olive oils from the German and Italian market showed that most of the oils comply with these limits, but several were very close to the legal limits mentioned above.

The analysis of alkyl esters is recommended for extra virgin olive oil in order to derive reliable analytical information on the quality.

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Calculating information from analytical data

By Brian McLean, Eurofins Laboratories Wolverhampton, United Kingdom

Eurofins Laboratories worldwide put a great amount of effort into ensuring that the quality of the analytical data they produce is “fit for purpose”. To ensure this data is under control the laboratories have Internal Quality Control (IQC) systems and participate in external sample check / proficiency testing schemes and ring trials.

Once analytical data is produced, it is often used by clients to calculate other information, sometimes using quite complex calculations and making use of suitable factors. This includes, for example, the calculation of meat content of meat products, energy content of prepacked food for labelling purposes, chocolate content of chocolate products, milk fat content of biscuits, or fruit content of jams or juice drinks.

In order to help their customers, most laboratories in the Eurofins Group can provide calculated information from their analytical data. Eurofins UK has accreditation to ISO 17025 for calculating some of these derived values. Examples are listed in Table 1. This includes for instance the “Apparent Total Meat Content” of products containing meat which is calculated using analytical data and appropriate standard factors for the meat species and/or the cut of meat concerned. Corrections are made to remove other sources of proteins (e.g wheat, soya, milk) which, if included, would enhance the apparent meat content result. An EU Directive specifies allowances for the amount of fat and connective tissue (e.g skin and gristle) that are permitted to be associated with the meat present, and which is allowed to contribute towards meat content. Calculations are carried out to identify excess fat and connective tissue which must be declared separately on labels.

Furthermore, several Eurofins Laboratories have databases of information that have been derived from extensive research and analysis of numerous genuine samples which can assist in the calculation of derived values, or assist in concluding whether a product is genuine.

Derived information is reported along with the analytical data in test reports and clients can use the derived data to produce labelling information, or check that the information declared on their food labels is correct, and for ensuring compliance with compositional standards.

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Analytical data	Example product	Information derived
Protein, fat, ash, moisture, salt	Bacon	Added water
Protein, fat, ash, moisture, carbohydrates, soya protein, hydroxyproline	Sausages and meat products	Apparent total meat content, collagen:protein ratio, excess connective tissue, excess fat
Protein, fat, ash, moisture	Breaded fish products	Apparent total fish content
Fat, protein, water, ash, carbohydrate, alcohol, polyols, dietary fibre	General foods	Total energy (as KJ)

Table 1. Examples of Calculations Relating to Food analysis

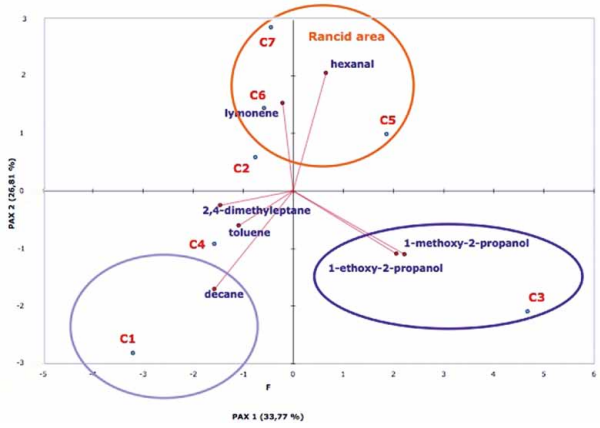
Identification and characterisation of off-flavours in foods by means of integrated sensory and SPME/GC-MS analysis

By Andrea Giomo, Eurofins Qualis, Italy

Some substances give food an unpleasant negative sensation in humans. It is therefore necessary to have an objective method for their identification and characterisation in order to quickly solve problems in food production.

Eurofins Qualis is offering an integrated package of ISO 13299:03 sensory profile technique and solid-phase microextraction/ gas chromatographic-mass spectrometric analysis (SPME/ GC-MS) which is proving very effective as illustrated by the following examples:

A factory producing breadsticks experienced frequent complaints of an unpleasant smell in their breadsticks. The sensory profile technique identified the real significant descriptor as “rancid”. Subsequent headspace gas analysis showed that the molecule that correlated with the characteristics of “rancid” was hexanal (see illustration). Once identified as the problem, the experts could check the manufacturing process: In the production of vegetable fats for the baking industry, a certain proportion of vegetable oil (high in polyunsaturated fatty acids) is used, as well as palm oil derivatives (saturated fatty acids). In the processing of the breadsticks, any dough left over was



placed in containers and used at the end of the day as “rework” material. Whilst in the container awaiting use, the room temperature activated the enzyme lipoxygenase which lead to the breakdown of linoleic and linolenic fatty acids into hexanal and other similar molecules. This produced the unpleasant rancid odour in the breadstick.

Similarly, a significant number of consumers complained about an unpleasant odour in a famous brand of organic chocolate bars. The sensory laboratory identified the characteristic descriptors for both “acceptable” and “defective” samples. The chemical laboratory analysed the headspace of these samples using SPME/ GC/MS to identify the differences and hence the “significant” odorous molecules. From the information obtained it was possible to assign the corresponding odorous molecule to the description identified in the organoleptic analysis using statistical methods. Using this technique, it was determined that the “bad smell” was caused by an amide, a derivative from fermentation probably formed during the drying phase of cocoa nibs in the country of origin of the raw material.

If you would like assistance with such issues, please contact your local Eurofins representative or the author.

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Screening for pharmaceuticals and anabolic steroids

By Vincent Cirimele, ChemTox, France

There is a real risk of general contamination of the food chain by active substances hazardous to human health following environmental pollution of water and soils by medicines used in hospitals, or the prohibited use of anabolic steroids and pharmaceuticals by cattle breeders. Furthermore, there have been several cases of doping among professional athletes which have lead to a suspicion of adulteration with banned substances (e.g. food supplements and dietary products) of food intended for sportsmen.

The diversity of food matrices concerned and the variety of regulated or banned substances have motivated ChemTox to set up several analytical approaches using tandem mass spectrometry for the identification and quantification of such contamination. Using these methods, it is possible to measure more than one hundred substances, such as pharmaceuticals or more specifically anabolic agents (beta-2 agonists, stimulants, narcotics, corticosteroids, alcohol or beta-blockers).

Current applications include the detection of anabolic steroids in food intended for athletes, pharmaceuticals in water and prohibited substances in urine, blood and hair. These analyses can routinely be undertaken by ChemTox in 10 working days for a large variety of matrices such as nutritional supplements and products with high energy value and enriched in proteins, vitamins, carbohydrates (e.g. energy drinks, concentrated gels, dried products, capsules, cereal bars).

The laboratory is under COFRAC accreditation to the ISO 17025 standard for human hair in order to evaluate doping practices by athletes, but this approach can be also applied to animal hair to check for the long-term use of prohibited anabolic products by cattle breeders wishing to increase the muscle mass of their animals.

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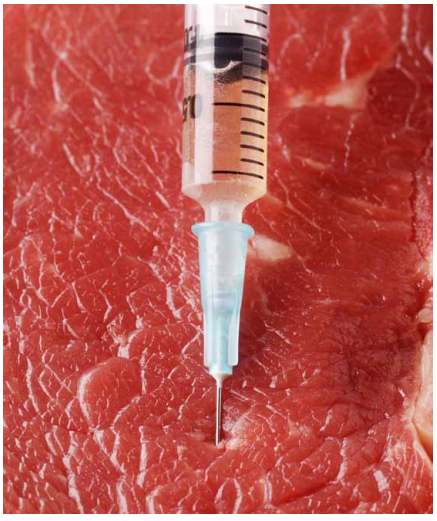

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Food Testing

in brief

E. coli outbreak in Germany

The virulent strain of *Escherichia coli* (*E. coli*) O104:H4 has recently been causing severe symptoms and even death among people across Europe. As certain foodstuffs have been identified as a possible source of contamination in the past, Eurofins routinely performs the analysis of *E. coli* (incl. *E. coli* O104:H4) within 3-4 days via polymerase chain reaction (PCR) for the identification of the toxin genes and via enzyme-linked immunosorbent assay (ELISA) for the detection of the toxins themselves. Please ask your Eurofins Analytical Service Manager for further details.

Pre-harvest analysis of Indian grapes

In 2010, most European importers stopped importing Indian grapes due to the presence of the growth regulator chlormequat at levels above the Maximum Residue Level (MRL) in numerous shipments.

For the 2011 season, Eurofins established an efficient system of pre-harvest control. Combining rapid sample logistics with express analysis in our pesticide laboratories in Hamburg, test reports were available within 4 to 7 days after sampling. Farms with produce found to be in compliance were then permitted to harvest. Using Eurofins OnLine (EOL) clients can check test results and trace back the grape samples from their supermarket shelves to the specific farm via GPS coordinates.

More than 700 Indian grape orchards have been sampled and analysed by Eurofins so far.

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New EU guidance values for acrylamide

In January 2011, the EU Commission published a recommendation (C2010 9681 final) on investigations into the levels of acrylamide in food. This process contaminant of toxicological relevance is formed from asparagine and reducing sugars during heat treatment. Several “Guidance Values” came into force based on the concept of the German signal values, for the following food categories:

- bread, baked goods and fine bakery wares, e.g. soft bread
- cereals
- baby food
- potato products
- coffee (products)

For gingerbread, potato pancakes and coffee substitutes no EU guidance values exist so far. For these the German signal values remain valid for Germany. Eurofins | WEJ Contaminants has established efficient and reliable methods for the determination of acrylamide from all relevant food groups based on LC-MS/MS technology.

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EU: 0.1% GMO threshold in feed

On June 25, 2011, the European Commission published a regulation for low level presence of non-EU approved genetically modified organisms (GMOs) in feed, which will come into force 20 days after publication. A 0.1% threshold then replaces the former zero tolerance level for unapproved GMOs. It applies under certain conditions for GM material authorised for commercialisation in a third country, and for which the EU approval procedure has been pending for more than three months, as well as for certain GMOs for which the authorisation has expired.

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COMING EVENTS

EVENT	DATE & PLACE	MORE INFO	CONTACT
Dioxin 2011	21-25/08/2011, Brussels, Belgium	*www.dioxin2011.org*	*claudianeuenfeldt@eurofins.de*
Euro Fed Lipid	18-21/09/2011, Rotterdam, Netherlands	*www.eurofedlipid.org*	*nadjaliebmann@eurofins.de*
Anuga	08-12/10/2011, Cologne, Germany	*www.anuga.de*	*service@eurofins.de*
FI Europe	29/11-01/12/2011, Paris, France	*Eurofins booth: 4A33, Hall 4*	*eventsfr@eurofins.com*

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