

New EU Regulations on dioxins and dioxin-like PCBs in foods and feeding stuffs

By Rainer Gruemping, Eurofins | GfA, Germany

On February 3rd, 2006 the European Commission set maximum levels for dioxins and dioxin-like PCBs in foods and feeding stuffs.

Dioxins are officially categorised as toxic contaminants and are included in the Stockholm Convention of POPs. Concerns regarding the possible impact of dioxins on human health from long-term consumption of foods containing high levels of contaminants are growing. New

maximum levels for dioxins and dioxin-like PCBs in foods and feeding stuffs have recently been enacted by Commission Regulation (EC) No 199/2006 (food) and Commission Directive 2006/13/EC (feed). The maximum levels for dioxins and the maximum levels for the sum of dioxins and dioxin-like PCBs, both of which must be complied with, will take effect from November 2006. Exceeding these limits will lead to the exclusion from sale of the respective food or feeding stuff.

Extract of Commission Regulation (EC) No 199/2006 (food) ¹		
Foodstuff	Maximum levels, sum of dioxins and furans (WHO-PCDD/F-TEQ)	Maximum levels, sum of dioxins, furans and dioxin-like PCBs (WHO-PCDD/F-PCB-TEQ)
Meat and animal fat originating from - Ruminants (bovine animals, sheep) - Poultry and farmed game - Pigs	3 pg/g fat 2 pg/g fat 1 pg/g fat	4.5 pg/g fat 4 pg/g fat 1.5 pg/g fat
Liver from terrestrial animals	6 pg/g fat	12 pg/g fat
Muscle meat of fish and fishery products	4 pg/g fresh weight	8 pg/g fresh weight
Muscle meat of eel and eel products	4 pg/g fresh weight	12 pg/g fresh weight
Milk and milk products	3 pg/g fat	6 pg/g fat
Hen eggs and hen egg products	3 pg/g fat	6 pg/g fat
Oil and fat- Mixed animal fats - Vegetable oil and fats - Marine oil for human consumption	2 pg/g fat 0.75 pg/g fat 2 pg/g fat	3 pg/g fat 1.5 pg/g fat 10 pg/g fat

Choice of analytical strategy

In the past few weeks the media have reported intensively on the finding of dioxin-contaminated feeding stuffs, which resulted in about 650 farms (especially pig and poultry producers) in Belgium, the Netherlands and Germany being placed temporarily in quarantine. It appears that some food and feed processors consider that the absence of indicator PCBs at ppm levels as proof of the absence of dioxins and dioxin-like PCBs. The present dioxin crisis shows that this type of misinterpretation can have serious consequences. Qualified advice from a knowledgeable staff combined with accurate and sensitive analytical procedures are

needed in order to prevent such accidental releases.

Eurofins | GfA has more than 20 years experience in the field of dioxin and PCB analyses; all methods are accredited in accordance with DIN EN ISO/IEC 17025:2000. The new laboratory centre in Hamburg has state-of-the-art equipment with 10 HRGC/HRMS systems for the analysis of food and feed samples as well as for soil, water, residues, products, emissions and ambient air samples.

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¹ the complete text of the Regulation is available on <http://europa.eu.int/eur-lex/lex/>

Plasticizers in food

By Katrin Hoenicke, Eurofins | Wiertz-Eggert-Jörissen, Germany

The food additives epoxidised soya bean oil (ESBO) and phthalates have recently attracted significant public attention. Both are plasticizers which are used as additives in plastics to impart elastic characteristics. Current regulations allow the addition of up to 40 % of ESBO and phthalates to food-contact PVC. Their application is particularly found in the gaskets on metal lids used to seal glass jars to ensure an airtight closure. Since these additives are not chemically bound to the plastic, they are readily extractable. Also, being highly lipophilic compounds, these plasticizers can migrate into the foodstuff, particularly in the case of fatty foodstuffs.

Commission Directive 2002/72/EC sets a generic migration limit for the transfer of constituents from plastic materials and articles to food of 60 mg/kg foodstuff in the case of caps or gaskets. A specific migration limit of 60 mg/kg foodstuff is in force for

ESBO. Starting 19 November 2006 Commission Directive 2005/79/EC dictates a special limit of 30 mg/kg foodstuff covering infant formulas and follow-on formulations or baby food for both infants and young children.



Higher values of ESBO and phthalates have recently been found in

different fatty foods such as pesto, pasta sauces or tuna in oil. The German Federal Institute for Risk Assessment (BfR) has recommended that food-contact materials containing phthalates should not be used in association with fatty foods. In addition, fatty foods sold on the German market and packaged in glass jars sealed with metal lids should be analysed for plasticizers.

Due to the very wide use and application of phthalates, their presence in food may well be attributable to causes other than migration from packaging material. Recently, particular phthalates have been analysed in edible oils, probably resulting from the use of plastic tubes and tanks during processing and bottling.

Eurofins | Wiertz-Eggert-Jörissen offers the analysis of ESBO and different phthalates and is accredited in accordance with ISO 17025 for all of these test methods.

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Monitoring the authenticity of fruit flavours

By Eric Jamin, Eurofins Scientific Analytics, France

Fruit flavours are complex in terms of both chemistry and legislation. "Natural X flavourings" must be extracted from the natural source X. The European Fruit Juice Directive 2001/112/EC furthermore defines a specific type of natural flavour called "recovery aroma" which must be recovered during the production process of the fruit juice in question. Only this type is authorised to restore the volatile losses resulting from processing the fruit into juice and juice concentrates.

Three analytical tools can be used to determine whether a fruit juice or drink complies with current legislation and has been labelled accordingly:

- Quantitative GC-MS (Gas Chromatography with Mass Spectrometry detection) to screen for the volatile molecules present in the product
- Chiral GC-MS to determine the

enantiomeric distribution of flavour compounds

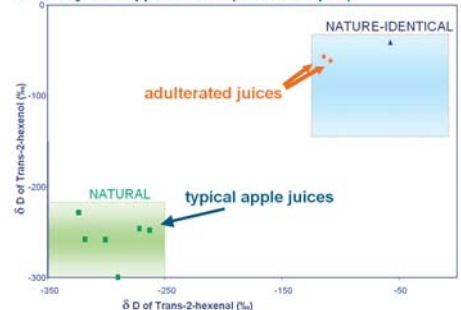
- GC-IRMS (Gas Chromatography coupled with Isotope Ratio Mass Spectrometry) to determine the stable isotope ratios in selected compounds

Of these the most recent is the hyphenated technology GC-IRMS. $^{13}\text{C}/^{12}\text{C}$ ratios measured on the CO_2 gas can be used to distinguish certain fruit components from their artificial counterparts if the latter originate from a different metabolic or fossil source. $^2\text{H}/^1\text{H}$ ratios are measured on the H_2 gas, providing additional information.

This sophisticated technique enables improved monitoring of fruit juice and fruit flavour authenticity and ideally complements chiral analysis by focusing on those critical compounds that have a high sensory impact and

no chiral properties, such as ethyl butyrate and decanal in orange, trans-2-hexenal and trans-2-hexenol in apple.

D/H analysis of apple volatiles (market samples)



Eurofins laboratories in Nantes (France) now have the ability to combine all these techniques and to provide an expert interpretation based on a large database of authentic samples taking into account the potential effects of the technologies used to produce the fruit flavours.

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Astaxanthin in fish and fish feed

By Carsten Theisen Pedersen, Eurofins Denmark

Astaxanthin is a carotenoid, a red pigment that occurs naturally in a wide variety of living organisms. It is produced by algae where it protects against ultraviolet light and acts as an antioxidant. From the algae, the carotenoid makes its way up through the food chain to crustaceans like shrimp, crawfish, crabs and lobster, that are tinted red by accumulated astaxanthin.

Wild salmon and trout acquire their distinctive pink pigment from eating small shellfish. However for farmed salmon or trout to have a similar colour, astaxanthin or another carotenoid such as canthaxanthin needs to be included in their feed. These carotenoids also play an important role in the growth and survival of the fish.

Astaxanthin is either produced synthetically or from various organisms such as the microalga *Haematococcus pluvialis* or from *Phaffia* Yeast, *Phaffia rodozyma*. Another source is krill meal which has a high content of astaxanthin bound as esters, that have been shown to be more efficient than free astaxanthin for fish pigmentation.



Astaxanthin is an expensive raw material and if not correctly processed and protected in the feed premix it will degrade and not provide the right pigmentation of the fish flesh required by the fish farmer. However if the astaxanthin molecule is over-protected, it will not be liberated in the fish and no pigmentation will occur.

Canthaxanthin is a food colour also used for pigmentation of fish flesh. In the United States, it has to be labelled as an artificial colouring if added to fish feed. The European Union has set limits on the accepted level of canthaxanthin in commercially sold fish.

Carotenoids can be extracted and analysed using HPLC. However the extraction can be difficult for some matrices, protection from light and oxygen is required, and since several isomers exist, isomerisation can occur making calibration difficult.

Eurofins offers a number of analytical methods for the determination of carotenoids and their esters in a number of relevant matrices and collaborate with major producers of both astaxanthin and fish feed. By offering a highly accurate test, Eurofins helps to make the best use of this extremely expensive compound.

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Plant genotyping using molecular markers

By Kader Fatmi and Stéphanie Guillet, Eurofins Scientific Analytics, France

Seed producers, scientists and research institutes are using molecular markers for different applications such as marker-assisted selection (monitoring of genes of interest), genetic identification of varieties (specific DNA profiles for each cultivar) or seed quality control.

Numerous molecular markers can be used and combined according to their characteristics and the nature of the plant material to be analysed. Among these markers are mainly:

- microsatellite markers or SSR (Single-Sequence Repeat) which correspond to non-coding regions with a repeated motif such as (CA)_n. Those markers are highly polymorphic and need to be developed for

each species;

- AFLP (Amplified Fragment Length Polymorphism) markers which are obtained after DNA enzymatic digestion and selective amplification of some regions of the gene. These are polymorphic markers that can readily be obtained for any species, without knowledge of the sequence.



Eurofins is a leading laboratory for genotyping, offering the analysis of

these molecular markers for several applications including the constitution of genetic fingerprints for vegetables and field seeds (characterization of cultivars, constitution of a database), hybridity checks (selection of divergent parental lines) or marker assisted selection. In the Eurofins Nantes laboratory, genotyping applications using SSR markers are developed using multicapillary electrophoresis, a very sensitive and reliable technique. Other molecular markers are available such as AFLP markers, RFLP (Restriction Fragment Length Polymorphism) or SNP technology (Single Nucleotide Polymorphism) for routine applications or for customised projects.

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in brief

Detection of bird flu / avian influenza virus

Notably the first global service provider, Eurofins Scientific has implemented a new test for the presence of the deadly bird flu virus strain H5N1 (avian influenza). Although in full agreement with the European Food Safety Authority (EFSA) press release of 26th October 2005 "whilst it is unlikely that H5N1 could be passed onto humans by raw meat or eggs, cooking food properly would inactivate the virus and eliminate this potential risk", Eurofins has found that some customers still demand testing of certain raw products to reduce the risk of consumers and employees to approximately zero. Although the risk of transmission of the virus via the food chain is estimated as extremely low, Eurofins has experienced strong demand for this test.

For more information please visit our website at <http://www.eurofins.com/news/news-birdflu/en>

Instrument calibration standards for the dairy industry

It is essential that mid-infrared instruments used for the analysis of milk or cream used on industrial sites are calibrated on a regular basis using reliable standards. Eurofins Laboratories (Wolverhampton) are UKAS accredited and can call upon unsurpassed expertise in the compositional analysis of milk to provide

accurate calibration standards.

All standards are formulated in the Eurofins QC laboratory, fully validated before release to the customer and preserved against deterioration. A continuity of supply is maintained as fresh standards are produced according to their shelf life.

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Eurofins | GfA in Hamburg and Muenster

Eurofins | GfA opened a new Eurofins laboratory centre in Hamburg at the beginning of 2006, focusing on the analysis of contaminants such as dioxins, PCBs and PAHs, heavy metals, flame retardants, organotin compounds and chloroparaffins.

The Eurofins | GfA customer service (Analytical Services Department) and the Air Monitoring Department remain at the Eurofins | GfA headquarters in Münster:

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Testing on consumer goods

For more than 22 years, Eurofins ATS, located in Aix-en-Provence, has serviced the South European retailing markets (France, Spain and Italy), checking the quality of consumer goods, in the areas of detergents, cosmetics, paper, hygiene and general small household.

As of January 2006, this type of consumer goods testing is now offered to German and UK retailers.

The offer covers:

- Chemical and physical analyses
- Performance tests
- Panel usage tests
- Consumer tests

Two dedicated, trained sales executives will promote the tests in the German and UK market and interface with the national retailers and consumer organisations. The initial market reaction has been very positive in both countries, leading to preliminary sales and the start of successful co-operations. These cross-selling activities will widen the overall Eurofins offer to enhance customer satisfaction.

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