

## Packaging - the unknown material

By Andreas Grabitz, Eurofins | Wiertz-Eggert-Jörissen, Germany

**According to Regulation (EC) No. 1935/2004 “Materials and articles [in contact with food] shall be manufactured so that they do not transfer their constituents to food in quantities which could endanger human health, bring about an unacceptable change in the composition of the food or bring about a deterioration in the organoleptic characteristics”.**

It has been well established that constituents such as plasticizers, dyes or metals may pass into food products from either the packaging or glass lids.

### Overall and specific migration from plastics

The passage of constituents from the packaging into the food is called migration. This will, in general, not be determined with real food but may be effectively measured using simulants. Water, vinegar, alcohol and olive oil are useful food simulants. The use of simulants and the conditions of migration testing are described in great detail in several Regulations and standardised European norms.

Two types of migration limits have been established. An overall migration limit fixes the total amount of migrated substances independently of their nature to a maximum of 10 mg/dm<sup>2</sup> of the food contact material or 60 mg per kg of the food or a simulant, respectively. Additionally specific migration limits (SML), which may be significantly lower, apply to individual chemicals, these being based on toxicological evaluation of the substance.

### Plasticizers in lids

To protect foodstuffs packed in jars against deterioration, the lids are sealed to keep the foodstuff airtight. Plasticizers such as phthalates or epoxidised soy bean oil (ESBO) are used. These may, especially in the case of fatty or fat containing foodstuffs, migrate from the lid into the food.

### Additives and monomers in plastics

Plastics are produced by polymerisation processes from one or several different monomers. Depending on reaction control, different amounts of monomers may remain in the finished plastic. For many of these monomers, for example acrylonitrile or butadiene and also for additives such as stabilizers or plasticizers, specific migration limits (SML) are defined in Directive 2002/72/EU.

### Services provided by Eurofins

Eurofins | Wiertz-Eggert-Jörissen holds copies of all the European Directives and Regulations, recommendations, norms and standards on file and will help you to identify those of relevance for you and your products. It will carry out tests in compliance with these laws and guidelines and allow you to place your product throughout the whole European market. Eurofins maintains membership of several important organisations, for example CEN, Society of German Chemists (GdCh) or the union for food legislation and food science (BLL) and therefore keeps up to date at the earliest opportunity with any new trends in food legislation.

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# Analysis of milk fat

By Derek Farrington, Eurofins | Direct Laboratories, United Kingdom



**Milk fat has over 500 different fatty acid isomers, although most of them are present in trace amounts. It is a relatively expensive product, and as such subject to fraudulent adulteration using cheaper fats. Eurofins | Direct Laboratories has been providing an expert, comprehensive milk fat analysis service for over 10 years.**

Milk fat is a complex high value product, made up predominately of triglycerides of fatty acids. Adulteration of milk fat by cheaper substitutes can be detected by examining the triglyceride profile of the sample. The make-up of the component fatty acids is also of interest as milk fat contains fats both beneficial and potentially detrimental to the health of the consumer.

Genuine milk fat conforms to a pattern of triglycerides falling within a specified range. Addition of lower cost fats such as tallow, or adding vegetable oils, changes the triglyceride profile, causing the sample to fall outside the specification limits. The method is published in Commission Regulation 213/2001. Eurofins | Direct Laboratories has participated in the development of this and other EU anti-fraud measures and plays an active role in the

EC Expert Chemists Milk and Milk Products Committee. The laboratory has also provided a service to the UK competent authority responsible for granting aid for milk products, the Rural Payments Agency, for nearly 30 years, establishing considerable expertise in this area.

Milk is a good source of conjugated linoleic acid (CLA) and also contains omega-3 and omega-6 fatty acids. CLA has the capabilities to prevent cancer and heart disease, improve immune function, and treat obesity. CLA is the main omega-6 polyunsaturated fatty acid in the diet, and it is an essential fatty acid. Essential fatty acids include omega-6 (such as CLA, gamma linolenic acid, dihomo-gamma-linolenic acid, arachidonic acid), and omega-3 fatty acids, such as eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). These essential fatty acids are the main structural components of biological cell membranes, and a balanced intake of both omega-6 and omega-3 fatty acids is necessary for healthy cell function.

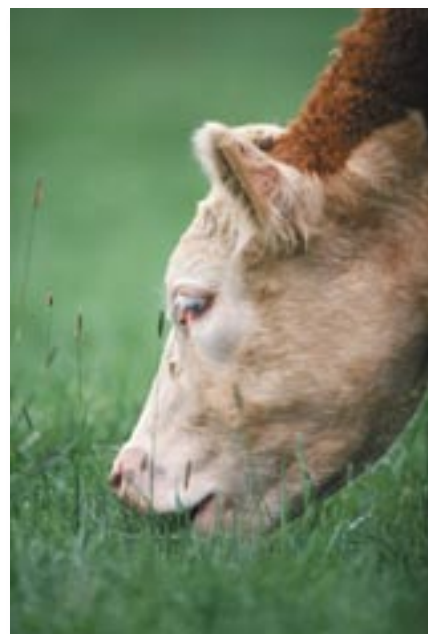
Cow feeding regimes such as increasing red clover can significantly enhance the concentration of CLA in milk fat. The feeding regime also influences omega-3 and omega-6 contents. Eurofins | Direct Laboratories worked for a number of years with the ADAS research team specialising in milk composition and has gone on to develop high resolution capillary chromatographic techniques to meet the evolving requirements of customers specialising in organic and other high value milk products.

Milk fat is also a significant source of trans fatty acids (TFAs). It has been estimated that dairy products can account for about a quarter of the average dietary intake of TFAs. Essential fatty acids are

transformed in the body into long chain polyunsaturated fatty acids essential for the development of the nervous system and eyesight but TFAs compete with these essential fatty acids for the enzyme systems involved in these reactions. TFAs can also raise LDL cholesterol levels in the blood, however the mechanism by which trans fat elevates blood cholesterol levels is as yet unknown. There is an increasing tendency for legislation concerning labelling TFA levels in foods. Denmark has limited TFAs to 2g/100g fat or oil in the product from June 2003. Also the US Food & Drugs Administration will require TFAs to be declared on labels from 2006. Dairy producers need to be aware of these legislative developments. Eurofins | Direct Laboratories fatty acid analysis includes identification and quantification of the more important TFAs occurring in milk fat.

Eurofins | Direct Laboratories has offered analysis of non-milk fats in butter and high-resolution fatty acid profile analysis for several years and is accredited to ISO 17025 for these test methods.

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# Detection of added citric acid in fruit products by Stable Isotope Ratio Analysis

By Eric Jamin, Eurofins Scientific Analytics, France

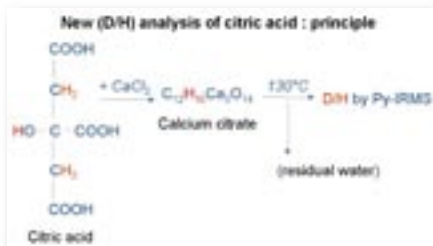


**Citric acid (in various chemical forms) is one of the most widely used additives for fine-tuning acidity in fruit products.**

The Directive 95/2/EC authorizes its use in several food products with the proviso that it is included in the ingredients list. In the case of fruit juices, a maximum addition of 3g/L is defined. To enforce this legislation, an analytical tool capable of detecting and quantifying citric acid addition is required.

Since the natural ranges of citric acid concentrations in fruits are very wide, fairly large additions may well be undetected. Isotopic

methods present a very satisfactory solution to the discrimination between endogenous and exogenous sources of citric acid. Two decades ago, Isotope Ratio Mass Spectrometry (IRMS) determination of the  $^{13}\text{C}/^{12}\text{C}$  isotope ratio was proposed as a means of detecting the addition of citric acid from C4 plant sources (cane or maize) in C3 fruits such as citrus. However many other sources remained undetectable. More recently we have shown that the simultaneous use of the  $^{13}\text{C}/^{12}\text{C}$  ratio of citric acid and of the  $^2\text{H}/^1\text{H}$  of its non-exchangeable sites enables the detection of all commercial sources of citric acid in fruit juice.



A new method based on the transformation of citric acid to its calcium salt followed by a pyrolysis-IRMS measurement has been developed in Eurofins Nantes laboratory and peer-tested in the context of an EU-funded project<sup>1</sup>. This work was recently published in the Journal of Agricultural and Food Chemistry. The method is applicable to all types of fruit juices containing high concentrations of citric acid (citrus, pineapple, red fruits, etc.). Preliminary market observations tend to indicate that citric acid derived from cheap C3-plant sources is sometimes used without declaration.

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<sup>1</sup>PURE JUICE, a shared-cost RTD project funded under the Fifth Framework Programme of the European Community, within the Competitive and Sustainable Growth Programme, Measurement and Testing Activity. Contract N°: G6RD-CT-2002-00760.

## EU-funded research for traceability

By Michèle Lees, Eurofins Scientific Analytics, France

**There are a number of reasons why a food operator needs an efficient traceability system** not least of which is the ability to trace the source of a particular contamination and carry out a swift recall of products, reducing liability and protecting the company's brand. There is now also a legal requirement : in Europe from January 1<sup>st</sup> 2005 all food operators must have a system in place that demonstrates one-step forward, one-step backward traceability (General Food Law 178/2002/EC).

Eurofins Scientific is participating in an EU-sponsored RTD project that aims to develop integrated systems to improve traceability along entire fork to farm food chains. "TRACE" is a five year project with 50 par-

ticipants including food companies, research institutes, and laboratories not only from Europe but also from China.

Many companies have already gone a long way towards implementing traceability in their own food chains. TRACE will endeavour to establish a commonly-agreed standard for an electronic request-response scheme as a communication link between these different chains. In parallel to this, work is going ahead on developing reliable analytical methods to establish the origin and/or mode of production of food products using stable isotope and trace element analysis, metabolic profiling and the latest bio-molecular techniques for DNA and protein composition. Bioanalytical

evidence from natural tracers in the plant or animal product will make up a "biological bar code" that can be integrated into sector-specific systems as traceability control mechanisms.

Eurofins Scientific Nantes is involved in the development of these new analytical methods and in the overall project management. This project is funded by the European Commission through the Sixth Framework Programme under the Food Quality and Safety Priority.

More information is available on [www.trace.eu.org](http://www.trace.eu.org)

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### in brief

#### LEM Laboratoires (France) joins the Eurofins Group

LEM comprises 3 laboratories with more than 180 employees and has a high level of expertise in the following fields:

- **Environmental analyses:** ground and surface water, effluents, soil, air;
- **Indoor air quality of domestic and work premises:** determination of airborne dust and microbiological pollution such as asbestos and legionella;
- **Building materials:** quality control in terms of CE labelling, particle sizing of granulated stone products; LEM is the leading company in France for the analysis of stones.
- LEM also has considerable expertise in research studies, consultancy and analyses relating to the preservation of **Historical Monuments**;
- In the field of **food analysis**, LEM carries out microbiological and chemical testing for detection of contaminants and applies molecular biological methods of analysis to both raw materials and finished products.

These fields of expertise complement those of the Eurofins Group and LEM will continue to offer analytical services of the highest standard.

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Ensuring global traceability across the supply chain as well as making appropriate use of analytical tools have now become key elements required under European regulations.

The 14<sup>th</sup> edition of the Eurofins International Seminar which will take place in **Paris, on February 16 & 17, 2006**, will cover emerging issues such as **GMOs, allergens and mycotoxins** and open the debate on such questions as:

- What is the status of GMOs today in terms of development, culture and cross contamination?
- Have the requirements of regulations EC 1829 and 1830/2003 been implemented? If so, how?
- How are retailers and the food industry in general managing the allergen risk? What are the consequences of EC directive 2003/89 at industry level?
- Will mycotoxins be a major food safety issue in the future?
- What's new in the field of analytical techniques?

During 2 days of presentations by internationally recognised experts, the seminar will set out how molecular biology can help in all areas of prevention, risk assessment and risk management and will also highlight global concept solutions regarding food, feed and seed safety management systems.

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#### New Eurofins laboratory in Hamburg

In **January 2006** Eurofins will take possession of a modern, purpose built laboratory in Hamburg (Germany). These premises will constitute one of the largest and most up to date laboratories for the analysis of **food, food supplements, feeding stuffs and cosmetics**.

With a floor area of more than 4000 sqm, Eurofins will perform a broad spectrum of tests, ranging from nutritional testing and conformity checks of various types of products to highly specialised dioxin testing.

Under the direction of experienced chemists and experts, more than **200 employees** will work in the new building. Its optimal logistical design features will enable efficient and rapid processing of samples, as well as maintaining the highest quality standards.

Linked to a reorganisation of the laboratory services, a team of **25 experts will be available for customer support and advice**.

All existing and prospective Eurofins customers will be welcome to visit the new laboratory.

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Design : P. Vestergaard Soelberg.

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