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Food Testing News

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A unique method for fraud detection in honey

By Eric Jamin, Eurofins Analytics France

In the resolution of January 2014[1], members of the European Parliament identified a list of products that are most at risk of food fraud and honey is included in their list. A recent article[2] highlighted a similar situation in the USA, and requested a Food and Drug Administration (FDA) standard for honey.

The most common economic adulteration of honey is from the addition of sugar. C4-plant sugars (cane, maize), can be reliably detected using the AOAC 998.12 Carbon 13 – IRMS method (down to 7% addition in total sugars). However this method and more recently developed chromatographic methods using either multi-component LC-IRMS profiles, LC-MS detection of specific sugar syrup markers or foreign enzyme activities fail to detect the addition of refined syrups which perfectly mimic honey composition. Other types of fraud also exist for example, the false declaration of botanical or geographical origin.

The Eurofins Laboratory in Nantes has developed a new analytical technique to test different kinds of honey. Developed as part of a collaborative research project, this method significantly improves the detection of adulteration. The technique used is high resolution Nuclear Magnetic Resonance (NMR) profiling. This is an innovative high-throughput technique, providing a wide range of information that is both targeted (quantification of defined substances) and non-targeted (identifying deviations from reference spectra).

Applied to honey, this analytical method can simultaneously:

- Detect the addition of exogenous sugars (from whatever source: cane, corn, beet, wheat, rice, etc.);
- Confirm the floral origin of honey declared on the product's packaging (mono-floral honeys);
- Detect various irregularities such as excessive heat treatment or a start of fermentation;
- Quantify the main parameters included as analytical criteria defined in the EU directive 2001/110 and in the Codex Alimentarius: sugars (glucose, fructose, sucrose) and the sugar breakdown product 5-HMF.

This unique method, combined with the AOAC 998.12 analysis, ensures an optimum level of control regarding the authenticity of honey, at a reasonable cost and short timescale. Concurrently, Eurofins laboratories can also provide a broad scope of food safety related analyses.

Contact: *ASMNantesAuthenticity@eurofins.com*

[1] *http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2013-0434+0+DOC+PDF+V0//EN*

[2] *Easter Strayer, S.; Everstine, K.; Kennedy, S. Economically Motivated Adulteration of honey: quality control vulnerabilities in the international honey market. Food Protection Trends, January/February 2014.*

Animal species testing: Quality control in food and feed

By Anke Bluth, Eurofins GeneScan, Germany

Species testing for constituents of animal origin plays an increasingly important role in the quality control of food and feed: For the feed industry for example, new EU regulations released in 2013 changed the testing requirements for feed, depending on the feed material and the class of animals it is intended for: different materials require different tests if they are intended for either ruminants, non-ruminants, fish and aquaculture organisms or pet food.

Screening for mammals and birds

The new animal species testing service "DN*Animal Screen* Tetrapod" detects mammal and bird DNA. This is important for example in the quality control of fish meal for feed use. This test can of course also be used for other purposes such as control for the presence of meat traces in vegetarian or vegan food.

Species authenticity and halal food

In 2013, the horse meat (lasagna) scandal raised awareness of the importance of authenticity testing of meat species. A large European testing programme was one of the consequences of this crisis, and many food companies started to test their products for traces not only of horse, but also of other animal species. The discovery of non-declared species also triggered a discussion about the quality control of food certified as "halal" for the Islamic community. This matter was of great concern in Europe, especially in France, and called on detection methods for "haraam" (forbidden) species.

In response to this call, Eurofins has just launched a new multiplex real-time PCR test called "DN*Animal Screen* Halal" which detects pork, horse and donkey DNA simultaneously in various matrices, thus providing a secure and fast tool for the quality control of halal food.

Both methods are available as real-time PCR test kits for laboratories wishing to do their own animal species testing as well as an analytical service for offer within the food and feed producing industry. They complete the Eurofins animal species testing portfolio which already comprises other qualitative and semi-quantitative tests for cattle, goat, sheep, horse, pork, duck, chicken, turkey and fish species.

Contact: *AnkeBluth@eurofins.de*

Analysis of phenolic compounds: Controlling quality and authenticity of plant products

By Eric Jamin, Eurofins Analytics France and Jules Skamarack, Eurofins Scientific Inc., US

Phenolic compounds are a very broad group with over 500 plant derived substances divided into 5 classes and 31 subclasses. In addition to their organoleptic impact (color, astringency, aroma, bitterness) they are appreciated for their antioxidant properties which provide a potential health benefit. The composition of certain groups of phenolic compounds such as anthocyanins or flavanone glycosides is also very specific to certain plants and their profile can be used to ascertain the authenticity of processed products.

To determine the phenolic compound content of a product, the initial analytical approach consists of using non-specific methods in order to determine the overall content of phenolic compounds, usually expressed as an index such as gallic acid, chlorogenic acid or catechin equivalent. Various methods are used such as Folin Ciocalteu, Vanillin and Folin Denis.

A more detailed approach using chromatography can specifically quantify certain compounds of interest. Furthermore, a complementary analysis by nuclear magnetic resonance allows the identification and quantification of other substances belonging to this large group.

In response to the diversity of matrices and researched substances, appropriate analytical strategies can be developed by Eurofins from the methods already implemented in our laboratories. Furthermore, stability studies or control of the dissolution of the active ingredients are part of our services.

Contact:
ASMNantesAuthenticity@eurofins.com

Flavour enhancers in food products

By Valeria Merlo and Daniele Boglio, Eurofins Chemical Control

The flavour enhancers glutamate and the ribonucleotides - inosine monophosphate (IMP) and guanosine monophosphate (GMP) - play a major role in the so-called fifth taste (*Umami*, coming from the Japanese adjective *umail* which means delicious); in fact they enhance the taste and/or aroma of a food product. The other four well-known basic taste qualities are salty, sweet, bitter and sour.

Glutamate is naturally present in many foods such as ripened cheese, soy sauce and tomatoes. The nucleotide IMP is abundant in meat and some fish products, while some mushrooms, oysters and meat are rich in nucleotide GMP.

Regulation (EC) No. 1333/2008, dated 16/12/2008, harmonises the use of food additives in foods and regulates the use of flavour enhancers as food additives (see Tab.1).

Tab.1: Flavour enhancers as food additives

E- Numbers	Food additives
E 620 - E 625	Glutamic acid and its salts
E 626 - E 629	Guanylic acid and its salts
E 630 - E 633	Inosinic acid and its salts
E 634	Calcium-5'-ribonucleotides
E 635	Sodium 5'-ribonucleotides

However when present in a food together they are synergistic. In fact it has been demonstrated that the interaction between glutamate and IMP or GMP creates amplified taste perceptions in comparison with those generated by a single ingredient. This justifies the simultaneous presence of nucleotides and glutamate in food products such as stock cubes, ready-to-eat meals and salty snacks.

Eurofins offers the determination of flavour enhancers in food matrices using high performance liquid chromatography coupled with mass spectrometry [HPLC-MS/MS].

Contact: *ValeriaMerlo@eurofins.com*

Quality management within the Eurofins Group

By Brian McLean, Eurofins Food Testing, UK

Eurofins places high priority on Quality Assurance and Quality Control in its laboratories as stated in its Mission Statement and Corporate Values. The Quality Management Systems for its Food and Environment Divisions are being further strengthened by the creation of two international Quality Groups: the Food Quality Assurance Management Group (created in 2011) and the Environment Quality Assurance Management Group (created in 2013) which are working to standardise the Quality Assurance practices of its participating laboratories.

Within the Group, quality is evaluated by the appropriate National Accreditation Bodies via accreditation and certification. The main focus is accreditation to the ISO 17025 standard for "the general requirements for the competence of testing and calibration laboratories". However, every laboratory is subject to many other audits including a peer review by Eurofins own staff as part of cross country audits.

The objectives of the International Quality Groups are to:

- Increase customer satisfaction
- Ensure data equivalency among Eurofins labs
- Ensure that international accounts (multi-national clients) have a consistent level of service
- Define and implement best quality practices in the Divisions
- Enhance quality cooperation

The current work-plan includes the following matters:

- A standardised quality policy
- Transparency between laboratories proficiency test results
- Identifying and implementing Quality Metrics to compare laboratory performance
- Internal cross country audits
- Harmonised practices via creation and implementation of quality documentation on subjects such as: management of uncertainty, characteristics of methods, quality metrics, quality recognitions
- Identification of good practice in the implementation of an electronic Quality Management System

This initiative will give clients the assurance that the standard of service is consistent across the Eurofins Group and that the practices of Eurofins laboratories are continuously being standardised, assessed and improved by scientific and quality assurance staff from other countries within the Group as part of its continuous improvement program.

Contact:
LaureAmelieGonthier@eurofins.com

in brief

New EFSA statement on tropane alkaloids

In 2013, the European Food Safety Agency (EFSA) issued a Scientific Opinion on tropane alkaloids (TA) in food and feed. TAs are secondary metabolites and include more than 200 different compounds present in various plants. Plant families of concern include Brassicaceae (the mustard family), Solanaceae (the nightshade or potato family) and Erythroxylaceae (the coca family).
Most of the research has centred around the toxic alkaloids hyoscyamine and scopolamine e.g. from Datura plants as they are potential contaminants of various food and feedingstuffs when growing in the vicinity of crops. Cereals and cereal-based infant food, buckwheat, oilseeds, such as linseed, sunflower or soybean products and herbal teas are examples of products where this may be of concern.
According to EFSA, the dietary exposure of toddlers could exceed the Group Acute Reference Dose (ARfD) of 0.016 µg/kg body weight. Further investigations are required for a comprehensive health risk assessment. Eurofins is offering the determination of the most important tropane alkaloids atropine (sum of (+)- and (-)-hyoscyamine) and scopolamine in relevant food and feed matrices using Liquid Chromatography (LC-MS/MS).

Contact: *NadjaFluechter@eurofins.de*

50 years of pesticide residue analysis

The publication of the book “Silent Spring” by Rachel Carson in 1962 is considered by non-governmental organisations as the cradle of pesticide policy and the critical review of the use of plant protection products. Dr. Carson was the first to describe the negative effects of ”modern agriculture” as it was in the sixties.
Two years later, Dr. Wolfgang Specht decided to purchase two gas chromatographs and started to develop one of the first multi pesticide residue methods.
Over the past 50 years the perceived importance of pesticide residue analysis has continued to grow as exemplified in the increasing number of samples processed by the Eurofins Group amounting to more than 500,000 samples worldwide every year.

Contact: *JochenRiehle@eurofins.de*

Commercial Planting of GMOs

The „International Service for the Acquisition of Agri-biotech Applications” (ISAAA) has released its annual report on the commercial (planting/ cultivation) of genetically modified plants. As in past years, the commercial (planting/ cultivation) of genetically modified organisms (GMOs) continued to increase into 2013 and accounted for over 175 million hectares globally. We would be happy to send you a free overview of the global GMO (planting/ cultivation) figures upon request.

Contact: *gmo@eurofins.de*

COMING EVENTS

EVENT	DATE & PLACE	MORE INFO	CONTACT
Analytica	**01.-04.04.2014, Munich, Germany**	*Booth A3/329*	*LuisaMehl@eurofins.de*
Cereal Hazards	**01.04.2014, Hamburg, Germany**	*Contact us*	*conferences@eurofins.com*

Eurofins China
Arnaud Leclercq / *ArnaudLeclercq@eurofins.cn*

Eurofins Denmark
Svend Aage Linde / *SAL@eurofins.dk*

Eurofins France
Fayçal Bellatif / *FaycalBellatif@eurofins.com*

Eurofins Germany
Maike Pielburg / *service@eurofins.de*

Eurofins Italy
Valeria Merlo / *ValeriaMerlo@eurofins.com*

Eurofins Japan
Colin Granier / *ColinGranier@eurofins.com*

Eurofins Netherlands
Linda Tilman / *L.Tilman@eurofins.nl*

Eurofins Norway
Nina Dyrnes / *Nina.Dyrnes@eurofins.no*

Eurofins Sweden
Fredrik Westerberg / *FredrikWesterberg@eurofins.se*

Eurofins Switzerland
Klaus Fuchs / *KlausFuchs@eurofins.com*

Eurofins UK
Liz Paterson / *info@eurofins.co.uk*

Eurofins USA
Lars Reimann / *LarsReimann@eurofinsus.com*

Other countries
info@eurofins.com

Newsletter editorial team:
F. Heupel, L. Kandalaft, S. Noster-Vallée, B. McLean, M. Pielburg, T. Jaschik, L. Reimann, S. Jensen, M. Martin.

For further information & contacts in other countries please refer to our website *www.eurofins.com*.