



## Experimental Project of DNA Identification Applied to Beef Traceability in the Pays de la Loire Region of France



**F**ood quality and authenticity, guaranteed from farm to fork, is a major source of worry for today's consumer. With the recent highly-publicized crises such as BSE and the foot and mouth outbreak, the meat industry has become a particular target for this loss of consumer confidence that has affected the entire chain, from farmer, wholesaler and slaughterhouse, to processor and retailer. The requirement for reliable traceability of all meat-derived products is now a major priority to allay consumer fears and recover sales levels.

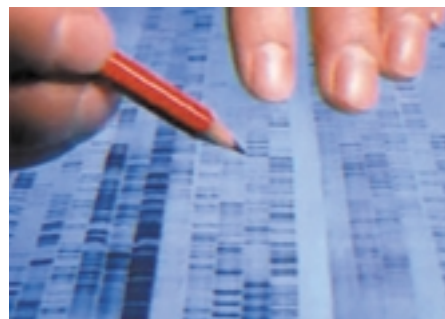


The Pays de la Loire Region in Western France is one of the country's largest meat-producing areas. In cooperation with the local meat industry, the Regional authorities have undertaken a commitment to set up a system that will guarantee maximum traceability of locally-produced beef and beef-derived products using state-of-the-art biomolecular tools.

An experimental pilot project using Eurofins-TAG™ technology - the Traceability And Genotyping system developed by Eurofins Scientific - has been put into practice in the Pays de la Loire in partnership with the meat trade association Bovi-Loire, the Regional Council and Eurofins' Nantes laboratory.

Eurofins-TAG™ employs genetic fingerprinting to provide an infallible monitoring scheme for animal and meat traceability. DNA identification through genotyping is a well-mastered molecular biology technique and the method of choice for providing a secure verification of an animal's origin and for linking BSE-tested samples and the beef eaten by consumers. To this Eurofins Scientific brings its wealth of experience in sampling logistics and in handling large quantities of data on an international scale.

In practice, each beef sample is characterised in the laboratory with a sufficient number of genetic markers to ensure individual identification for each animal from which the meat has come, at an acceptable cost to meat industry operators. DNA testing carried out on beef samples is similar to that used for human genetic fingerprints in criminal investigations.



In the current experimental project, a reference muscle sample is extracted from each carcass at the slaughterhouse and its DNA code stored in a database holding samples from all animals registered in this traceability scheme. Thereafter, a piece of meat can be taken at any point of sale and linked, via its genetic fingerprint, to an individual

reference sample in the database identifying the animal that it came from and whether it had tested negative for BSE.



The Eurofins-TAG™ System involves:

- Organising the sampling schemes in function of the slaughterhouse's operating practices,
- Collecting and incorporating the biological reference samples into the database,
- Collecting the check meat samples from retail outlets,
- Carrying out the DNA analyses on both the check and reference samples,
- Interpreting the DNA profiles in comparison with the database.

EurofinsTAG™ combines the advanced technologies of BSE testing, DNA genotyping and international sampling logistics and in so doing makes it possible to meet both consumers' and the industry's need for irrefutable traceability of meat and meat products.

This experimental project will involve 10 000 carcasses and is being carried out over a three-month period in partnership with the operators from the entire Pays de la Loire region. This pilot project in real-life conditions will provide the experimental basis and requirements for setting up long term traceability schemes for the European meat industry ●

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## Natural origin of raspberry ketone

Among the numerous molecules that make up in the raspberry aroma, **raspberry ketone** (4-(parahydroxyphenyl)-2-butanone) is one of the most characteristic in terms of smell impact. Hence its name and a great interest within the aroma industry. Although it is not a chiral compound, it is possible to check that it actually originates from the fruit in a raspberry aroma or in a food product manufactured from raspberries (preserve, ice-cream, etc.) using the  $^{13}\text{C}/^{12}\text{C}$  ratio analysis by GC-C-IRMS<sup>1</sup> (Gas Chromatography – Combustion – Isotope Ratio Mass Spectrometry). Nevertheless this analysis cannot identify the exact industrial origin whenever raspberry ketone appears to be exogenous.



Raspberry ketone is also commercialised as a pure compound for its use as flavouring ingredient in the food industry. When a biotechnological process is used, the term “natural” is legally allowed on the label. This marketing advantage explains the high demand for this source

and of course generates the need for an analytical control of the declared origin. In this case, the SNIF-NMR<sup>®</sup> analysis of raspberry ketone enables a simultaneous check of the biosynthetic origin of precursors and of the use of microbiological processes to transform them into the final product<sup>2</sup>. Sufficient resolution between the target NMR signals is obtained by recording two spectra in different solvent conditions. This analysis is now routinely available for the authenticity control of pure raspberry ketone in our laboratories ●

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<sup>1</sup> Journal of High Resolution Chromatography, vol. 18, May 1995, 279-285.

<sup>2</sup> Journal of Agricultural and Food Chemistry, 1998, 46, 248-254.

## Fruit authenticity in jams and marmalades : The United Kingdom Preserves Manufacturers Association

The United Kingdom Preserves Manufacturers Association (UKPMA) recognised the potential for the adulteration of fruit ingredients and proactively established its Fruit Quality Control Group (FQCG) in 1993 to investigate the matter. This group initiated and supported a number of activities to identify authenticity issues and to help the industry recognise and combat the problem. The FQCG has successfully introduced an Annual Fruit Authenticity Surveillance Exercise (FQCS), as a result of which recorded instances of adulteration have declined significantly.

The concern of the FQCG has been directed at the fruit ingredients used to manufacture jams, jellies and marmalades. Fruit used in the manufacture of preserves may be whole, pulp, puree, juices or any combination of these ingredients. Once the fruit is no longer intact and recognisable as whole fruit there is potential for adulteration. The addition of cheaper fruits, sugar, glucose syrup, fruit acid etc. are typical examples of adulteration which may occur in the supply chain. Whilst such additions are fraudulent and lead to misleading product labelling, the issue is misrepresentation rather than product safety.

The most effective point to control food authenticity is before the ingredient is incorporated into the finished product. As a result, the



FQCG has concentrated on the evaluation of the fruit rather than the manufactured product. It is often difficult and on occasions impossible to detect some forms of adulteration in the final product.

An assessment of the commercial situation is essential to determine the potential for adulteration and to set up the most appropriate procedures to detect prohibited additions. Adverse weather conditions can affect the quantity or quality of the fruit leading to increased prices or fruit shortages. Such conditions make fruit extension and thus adulteration more likely.

Audit trails with suppliers are a useful method of providing greater confidence in a source. The particular country of origin, the supplier's history and relative importance of the ingredient are all factors to be considered. The testing protocol should be designed to evaluate the ingredient consistent with perceived risk.

The most beneficial activity of the FQCG has been the introduction of the FQCS, an industry annual surveillance programme of targeted fruit. The fruit samples are taken unannounced and independently sent for evaluation by a recognised and accredited laboratory. While the rewards for fraud remain high, more sophisticated additions are taking the place of crude and easily detected forms of adulteration. Consequently sophisticated methods (e.g. isotopic and advanced compositional testing) developed for the assessment of fruit juice have been extended and developed for the evaluation of fruits used in preserves.

The results of the FQCS are discussed and distributed throughout the industry. This has highlighted the current risks and enabled the industry to most effectively target the potential areas of concern. The importance of fruit authenticity to UKPMA members has been reinforced by members to suppliers, with the consequence that the incidence of adulteration has reduced leading to an increase in the quality of jams and marmalades on the market today ●

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# Meet 3 new laboratories of the Eurofins Scientific group :

Let us introduce three recent additions to the Eurofins Scientific Group :

Dr SPECHT & PARTNER (Germany), MILJØ-KEMI (Denmark) and ANALYTICO FOOD (Netherlands).



## *Pesticide analyses at Dr. SPECHT & PARTNER (Hamburg - Germany)*

**Dr. SPECHT & PARTNER** Chemical Laboratories is one of Europe's leading laboratories in the field of pesticide residue analysis and has been EN 45001 accredited since March 1998. This Hamburg-based private laboratory, was founded in 1949 and is best known for its extensive work on the development of a multi residue method (MRM) for the determination of up to 250-300 pesticides in a wide range of sample matrices of plant origin. The "Specht-Method" is an official European standard method and has been used for enforcement purposes in Germany for a long time. A modified version has recently been successfully tested by a European intercomparison study and is expected to become an official CEN method.

Dr. Specht & Partner is well known for analysing difficult matrices like tea, tobacco, coffee, cocoa, spices, herbs, oleoresins, flavours and many dehydrated crops. Its reputation as one of most experienced pesticide residue laboratories in Europe refers in particular to analyses requiring a very low detection level, such as those requested by the baby food industry, a demand that is expected to increase in the near future, when the European maximum residue regulation for pesticides in baby food comes into force (01.07.2001). In addition, the laboratory also provides a consultancy service on pesticide residues and risk assessments. Dr. Specht & Partner is a regular part of many companies' QA systems, delivering analytical results at specified times, sometimes upon special request within 24 hours. These requirements are achieved thanks to a highly experienced and motivated staff and state of the art instrumentation.

When Dr. Specht & Partner became a member of the Eurofins Scientific Group in September 2000, one of the first deci-

sions was to transfer all general food analysis to WEJ (Dr. Wiertz – Dipl. Chem. Eggert – Dr. Jörissen GmbH) also of the Eurofins Scientific Group and to concentrate on residue analyses. From September 2001 on, Dr. Specht & Partner will move to new laboratory premises to build up Eurofins Scientific Center of Competence for pesticide residue analyses with around 50 employees. From that time on, the pesticide residue department of WEJ will be completely integrated into Dr. Specht & Partner ●

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## *MILJØ-KEMI, the environment specialist (Denmark)*

The **MILJØ-KEMI** Group joined Eurofins Scientific as of 1 January 2001. The company was established in 1981 and operates seven laboratories in Denmark, one in Norway, and one in Germany. The staff number totals 280.

The company offers all kinds of services related to the environment, including monitoring, sampling, laboratory testing and consultancy in air, water, soil, sludge, and sediments. Testing of products and equipment for environmental performances is another main activity.

MILJØ-KEMI is well recognised for its high competence in determining all types of organic substances at ultra low levels. Specialist consultancy is available for occupational health, indoor air, labelling of products, selection of appropriate building materials, risk assessments, and environmental management.

Among our clients are industrial enterprises, environmental health services, governmental offices, banks, and hospitals ●

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## *ANALYTICO FOOD, a partner for Dutch Food Industries*

**ANALYTICO FOOD** has been part of Eurofins Scientific S.A. since August 2000. It is located in Heerenveen, in the North of Holland, and is one of the top three commercial laboratories in the Netherlands. The laboratory is market leader in the Netherlands in the dairy field, with the largest Dutch dairy companies as customers. The meat industry is another important segment as is the convenience food sector, catering, bakery, raw materials and the fruit and vegetable industry. Analytico's accredited laboratory is highly efficient and fully automated offering fast delivery times on top of excellent service in :


- Microbiology: wide range of parameters, including pathogens (a.o.24-hour Salmonella service) and challenge testing. Legionella testing including risk-analysis and evaluation.


- Chemistry: extensive nutritional analysis (labelling), metals and mycotoxins (aflatoxin, ochratoxin, DON). Vitamins (HPLC) are also part of the expertise.


Analytico also offers a consulting service that includes food hygiene and safety, HACCP coaching, sampling, hygiene inspections and training. The laboratory recently invested in a new computerised and process-oriented line for microbiology, quadrupling capacity up to 8000 plates per day. The system is the most advanced in the Netherlands and together with new developments in the field of BSE testing, Legionella quick-tests and other rapid detection methods, are clear indicators of Analytico's continuing growth ●

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## News in brief...

 **SNIF-NMR**<sup>®</sup> is now an official AOAC method of analysis for the detection of the adulteration of maple syrup by the addition of beet sugar (2000.19). The AOAC will publish the method in the first supplement (2001) of the 17<sup>th</sup> edition (2000) of the AOAC.

 **GMO** : Eurofins Scientific Group now has 3 sites for GMO analyses. In addition to Nantes and Hamburg, a laboratory has just been opened in Des Moines (Iowa - USA) at the heart of an experimental area of North-American seed producers. Each of the sites follows the analytical protocol described in standard AFNOR XP V 03-020-1.

 In addition to the laboratories described on page 3, three other structures have just joined the Eurofins Scientific group. They are :

- **GFA**, based in Münster and Wittenberg (Germany) and its French subsidiary, AERIA, located in Orleans. GFA is specialised in the detection of dioxins, furans and others components, present at trace levels, in a wide range of matrices.
- **ATS**, located in Aix en Provence (France), European leader in the tests and studies of non food products (hardware store goods, perfumery, cosmetic and hygiene).
- The sensory analyses activity and consumer tests of **Qualité France** (Paris) have recently come to reinforce the skills of Eurofins Scientific Test Center Business Unit.

A detailed presentation of these new skills of the group will be made in our next issues.

## 6th International Symposium on Food Authenticity and Safety November 28, 29 & 30, 2001 - Nantes, France



A Committee of internationally recognised experts will direct the scientific content of this Symposium:

Chairperson: Dr. Michèle Lees, Head of Collaborative Research, Eurofins Scientific – France

Mr. J.A. Bouchand, DGCCRF, France

Dr. M. Woolfe, FSA, United Kingdom

Dr. C. Hischenhuber, Nestlé Research Centre, Switzerland

Pr. G.J. Martin, CEAIS, France

Dr. B. Pöpping, Eurofins Scientific, Germany

Dr. L. Reimann, Woodson Tenent, USA

Dr. C. Guillou, European Joint Research Center Ispra, Italy

Dr. F. Bellatif, Eurofins Scientific, France

Increasing economic pressure creates an environment where adulteration of food may flourish and in doing so it attacks the profitability, the brand values and the sustainability of honest businesses. Such pressure along with increasing consumer awareness and increasing regulatory requirements make it essential, not optional, for decision makers within honest businesses to keep informed about the latest developments in authenticity and safety testing as well as these regulatory changes.

If you are a scientist, involved in research and development, in quality control for the food trade, a representative of an enforcement body or a consumer association, this message should concern you :

**On November 28, 29 and 30, 2001**, our 6th biennial International Symposium will offer an unique networking opportunity for experts and users from all over the world who, like you, are concerned by food quality and safety, and interested in exchanging views and information.

• **Don't miss the opportunity to present your work by a conference or a poster !**  
(Prior approval of the Scientific Committee is necessary)

**You will find further information :**

on our Internet site : [www.eurofins-fasis.com](http://www.eurofins-fasis.com)

by e-mail at the following address : [fasis@eurofins.com](mailto:fasis@eurofins.com)

or by phone : 00 33 (0) 2 51 83 21 00



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