

Conference Report

eurofins international seminar April 21-22, 2010 Food Safety Solutions



The International Seminar on Food Safety Solutions was held in Paris on April 21st and 22nd, during a week in which Iceland's unpronounceable volcano wreaked havoc with European air travel as clouds of ash forced major airports to close. Despite this, close to 100 participants were able to take part in the event organised by Eurofins.



The conference was opened by **Patrick Etievant**, head of the Human Nutrition Division of INRA, the French Institute for Agricultural and Food Research, who highlighted the complexity of food safety both as an issue in itself but also in its interrelationship with agriculture, the environment, energy, health, and the economic development of rural areas and developing countries. The challenge for the future is to ensure a sustainable food supply; safe, healthy food for everyone, that will not only meet nutritional needs but that will also have reduced environmental impact while ensuring economic growth and employment and social sustainability. These are important issues that form part of INRA's scientific research priorities for the coming decade and that will be addressed by some strategic partnerships between the major research bodies. Examples are ALLENNVI, an alliance with the French Research Council, the CNRS, in the area of nutrition and the environment and AVISAN, where, together with INSERM, the French National Institute for health and medical research, the focus will be on "cardiovascular, metabolism and nutrition" aspects.

The Eurofins International Seminar dealt with the food safety theme in four main sessions. Two sessions on the first day focused on risk analysis and management, the second day addressed existing and emerging contaminants and consumer health.

Session I - Setting Standards for Food Safety



Risk analysis is a risk-based approach for the management of public health hazards in food. The European Commission uses a Rapid Alert System for Food and Feed, RASFF, to provide its members with early warning of a serious threat to human health derived from food or feed. **Franz Uiberth** of the Institute for Reference Materials and Measurements, a Joint Research Centre of the European Commission based in Geel, Belgium, highlighted two food safety issues that had been prominent in the RASFF notifications in the last couple of years: sunflower oil from Ukraine contaminated with mineral oil and the presence of melamine in milk-derived products from China. In such "crisis" situations it is important to have access to reliable and robust analytical methods able to correctly assess the extent of the contamination. One of the IRMM's main roles is to provide a service to support the Commission's policy through the development of analytical methods, comparison of existing techniques and production of reference materials that ensure high quality results.

eurofins international seminar 2010 – Food Safety Solutions



Dietary exposure forms an important part of risk assessment, but simple methods based on “average” consumers and “average” food contents often underestimate the real risk to highly exposed consumers. **Max Feinberg** of the research unit Meta@risk of AgroParisTech provided information on a new, fully probabilistic method for making quantitative exposure assessments. This uses a dedicated statistical software CARAT (Chronic & Acute Risk Assessment) that, although requiring large quantities of data and producing a “probable” risk that is not always easy to communicate, is able to quantify a risk in a “real life” situation.



The challenge to regulatory authorities is often anticipating potential risks. **Peter Kearns**, Principal Administrator at the OECD (Organisation for Economic Co-operation and Development) gave an overview of the work being done by this body on manufactured nanomaterials or MNs, production of which is expected to represent a global market of \$1 trillion by 2015 and account for 2 million jobs. In 2006, the OECD set up a Working Party with the specific remit to discuss the challenges of nanomaterials with respect to their safety and how they fit into existing regulatory frameworks and testing regimes. That the safety of NMs is being taken seriously is evident from the current efforts of international governments to cooperate in the area of risk assessment. More information is available at www.oecd.org/env/nanosafety.



The final presentation of the morning dealt with the risk to human health from food borne viruses such as norovirus (NoV) and hepatitis A (HAV). There have been an increasing number of alerts in the European RASFF, not only for shellfish, but also berry fruits and salads. Any regulation in this area will require a validated analytical method for virus detection and **Fabienne Loisy-Hamon** of Ceeram, France provided details of the use of real-time RT-PCR for the detection of NoV GI and GII, HAV. This method is being validated through laboratory ring trials by CEN in preparation for future legislation. In the meantime, the way forward for the food industry is to incorporate the risk of viral contamination into existing HACCP plans. The different stages in a food processing operation can be evaluated using a surrogate virus, the mengo virus vMCO, which has the same properties as enteric viruses but is not pathogenic.

Session II - Food Safety Systems - An approach to risk management



Recent food safety scares have undermined consumer confidence and put pressure on food business to implement tighter quality assurance measures. A number of different standards for food safety management systems exist to help operators demonstrate control of food safety hazards. The proliferation of such schemes places has been blamed for placing an additional burden on suppliers who have to cope with frequent audits, with resulting higher costs in the food supply chain. The Global Food Safety Initiative (GFSI) was set up in 2000 to promote convergence between food safety schemes by benchmarking food safety standards against food safety criteria developed by global stakeholders: “Once certified, accepted everywhere”. How the GFSI is structured and what it has accomplished over the past 10 years was presented by **Catherine François** of the Consumer Goods Forum, responsible for the management and international development of the GFSI. The initiative now counts CEOs and senior management of nearly 400 members, both retailers and manufacturers, and is well established as an international stakeholder platform for sharing knowledge and best food safety practice.



With the increasing distance between where food is produced and where it is consumed, managing food safety in a global market is a major challenge for most retailers. **Jan Kranghand** of METRO AG presented the Group’s strategy for ensuring food safety along the global supply chain. Traceability is a key element, and the Group makes the most of technological progress made in GPS systems and GS1 DataBar bar codes to link the production site with point of sale. Jan also highlighted the importance of training when dealing with less developed businesses and small suppliers. METRO sponsors educational schemes in aspects such as HACCP principles and certification procedures in countries like India, Vietnam and Morocco.

eurofins international seminar 2010 – Food Safety Solutions



Food manufacturers are also faced with the complexity of today's global market. **Bruno Séchet** of the Bel Group provided details of his company's policy for Food Safety Management. Bel, an international, family-owned group renowned for its brand name cheeses, owns plants around the world. Becoming a global player has meant making a number of changes to the Group's existing Food Safety Management system as it has had to integrate the specific requirements of its clients in the different countries it deals with. According to Bruno, harmonisation of the different schemes under a "GFSI approved standard" umbrella would be a major step forward. With consumer focus also shifting towards environmental and social concerns, there will be further challenges ahead for the global food market.

The role of third party certification also featured in the next presentation given as a Web conference by **Phil Olsson**, senior principal of the Olsson Frank Weeda Terman Bode Matz PC law firm in the US. Some high visibility recalls in the US - spinach, peanut butter, tomatoes and peppers, to name but a few - have been the driving force behind two new major food safety bills currently under discussion: a House Bill, the Food Safety Enhancement Act (HR 2749) that was passed in 2009 and a Senate Bill, the FDA Food Safety Modernization Act (S510). If the latter passes the Senate, a conference committee will be called upon to draft a final Food Safety Bill, incorporating the similar points in both bills, and resolving the differences between them. The Bill will eventually provide the FDA with greater regulatory powers over food suppliers and food providers, and bring in new import requirements such as third-party certification of designated imports. This will provide an important role for Food Safety Service Providers in the US. A group of certification providers have recently formed a coalition to improve clarity of language and terminology, better legislation and provisions in case of conflict. Details of the FSSP were presented by Patricia Wester, Director of Food Safety Systems for Eurofins US and currently Chair of the Steering Committee of the FSSP coalition.



The final key conference of the day was given by **Kirk Kealey** who is in charge of Raw Material Food Safety and Quality for PepsiCo. As one of the largest multinational food and beverage companies in the world, food safety and integrity is one of PepsiCo's highest priorities. Kirk described the holistic approach to risk management in food safety that his company follows, which has to integrate aspects such as performance and productivity as well as quality and hygiene control. He also introduced the concept of economic adulteration or food fraud and its potentially damaging consequences on a company brand. PepsiCo have

built up a comprehensive Raw Material Risk Profile database which enables them to prioritise and focus on higher risk raw materials. Kirk's final thought for the day was "Don't gamble with food safety"!

Session III - Existing and emerging contaminants - Food Safety Solutions



Day two addressed specific food safety issues and began with a review of process-induced contaminants by **Richard Stadler** of the Nestlé Product Technology Centre. These potentially toxic chemicals formed in foods during the cooking process include acrylamide and 3-MCPD esters, and these compounds were covered in this talk. It is now widely accepted that acrylamide is formed by the reaction of reducing sugars with free asparagine in the context of the Maillard reaction, and is therefore found in a wide range of cooked foods such as bread, fried potatoes, potato crisps, coffee, biscuits, and breakfast cereals.

Considerable effort from both the scientific community and the food industry has been put into finding ways to reduce acrylamide levels and these are summarised in a "Toolbox" produced by the CIAA (Confederation of Food and Drink Industries). Richard reviewed some of the mitigation options, including asparaginase treatment which has been quite successful in some but not all affected food products. Given the wide range of products involved, each with different recipes and different processing technologies, mitigation solutions need to be specifically tailored. Similar work is ongoing to reduce levels of 3-MCPD esters in refined and deodorised vegetable oils, although in this case questions such as which are the major pathways of formation, and what are the relevant precursors of these compounds, still need to be answered.

eurofins international seminar 2010 – Food Safety Solutions



Some compounds occurring naturally in plants used for food or animal feed can also have toxic properties and pose a risk to human health. Examples of plant toxins were given in two talks in this session. The first dealt with alkaloids, basic nitrogen containing compounds produced by a variety of organisms, including plants and fungi. The presentation given by **Hans Van Egmond** of RIKILT in the Netherlands focused primarily on pyrrolizidine, tropane and ergot alkaloids. Pyrrolizidine alkaloids, in particular, have been linked to the contamination of animal fodder by ragwort (*Senecio jacobaeae*) an increasingly common weed found in the European countryside. Research on new analytical methodology to detect alkaloids in food and feed is currently underway in the CONFIDENCE Project, funded by the European Commission under the 7th Framework Programme.



The second example of naturally occurring toxins, the group of mycotoxins, was addressed by **Michele Suman** of the Barilla Central Research Laboratories in Italy. These are secondary metabolites produced by fungi and a particular problem in the cereal supply chain at a worldwide level. Michele presented the main mycotoxins of concern and the analytical methods available for their detection. A recently acknowledged “emerging” issue is that of conjugated mycotoxins, in which the toxin is bound to a more polar substance like glucose. These are often referred to as masked mycotoxins as they can escape routine detection methods. A glucoside of deoxynivalenol (DON-3G) was first identified in cereals and has been recently found in barley, malt and beer. Developing analytical screening methods for multi-mycotoxin detection, including masked forms, is the challenge for the future.



Mineral oil and mineral oil products are a major source of contamination of the human body for which not enough is known of their potential negative effects on human health. Although the case of adulterated Ukrainian sunflower oil highlighted the problem in 2008, contamination from mineral oil can occur from various sources, including batching oil used for jute and sisal bags, release agents, dust control agents used for grain, rice, animal feed, lubricating oil in machinery, packaging material such as recycled cardboard. **Maurus Biedermann** from the Official Food Control Authority of the Canton of Zurich in Switzerland presented the work carried out in the laboratory to develop methods to detect mineral oil components, including both saturated hydrocarbons (MOSH) and aromatic hydrocarbons (MOAH) using LC-GC and GCxGC techniques. Further toxicological evaluation is required, in particular of the mineral oil aromatic hydrocarbons, in order to set safety limits for these contaminants.



The analytical tools now available to the food scientist are increasingly sophisticated, able to detect ever lower levels of possible contaminants. Focus is now moving towards untargeted methods, with the potential of screening several undesirable compounds in one run. Metabolomics is an example of such an approach, defined as “global characterisation of a biological system through the simultaneous measurement of any metabolite present in this system and accessible to the analysis”. The metabolomic fingerprints generated are then treated statistically and the results used for diagnostic or interpretation purposes. **Jean-Philippe Antignac**, of the Food Contaminant Laboratory LABERCA of the National Veterinary Institute in Nantes, presented a metabolomic approach based on liquid chromatography coupled to high resolution mass spectrometry. This has recently been developed as a new screening tool to control the illegal use of growth promoters in cattle by monitoring the metabolic impact of the administered drug.



The importance of analytical methods in support of Community legislation was illustrated by the talk given by **Vincent Baeten** of the Walloon Agricultural Research Centre, Belgium. He presented the work of the SAFEED-PAP project, funded by the European Commission, with the aim of developing suitable validated methods for the species specific detection and quantification of animal protein in compound feed. The availability of such methods would enable the amendment of the extended total feed currently in place in the EU. Vincent presented the methods that had been worked on and summarised the results of the project.

eurofins international seminar 2010 – Food Safety Solutions

Session IV - Innovation in the food industry: consumer health or safety



The final session of the conference looked at some of the latest trends in the food industry and their impact on consumer health. The session kicked off with a short review of increasing overweight and obesity prevalences within Europe by **Jaap Seidell** from the Vrije Universiteit Amsterdam in the Netherlands. His talk concluded that lifestyle is the main underlying factor in the major chronic non-communicable diseases, something the food industry should take into account.

Today's food products are globally sourced, more complex and more likely to be produced in a factory rather than our own kitchens. Greater exposure to a wider range of ingredients has led to an increase in the number of people affected by food allergies, putting the onus of food industry to take the steps needed to protect consumer health. **Gale Prince**, President of Your Food Safety Coach, LLC, a firm specializing in assisting industry in preventing food safety problems, provided advice on a number of allergen control strategies from monitoring production facilities and ensuring correct labelling to employee training and consumer feedback.

There has been considerable debate at various levels on the introduction of thresholds or action limits for allergen labelling. Whereas it is now scientifically accepted that it is possible to establish such thresholds, and that these would provide better protection for consumers, there still remain several problems that need to be addressed, such as the small amount of allergenic material that will induce a reaction, and the varying degree of sensitivity to allergens from one person to another. Different risk assessment approaches to setting allergen thresholds were presented by **Alfonso Lampen** of the Federal Institute for Risk Assessment, BfR, in Germany. If such thresholds are set, there will clearly be the need for sensitive testing methodologies, not just to enforce labelling legislation but also to detect potential cross-contamination. Alfonso presented a PCR based "ready-to-use" allergen detection assay recently developed as part of a German government funded project.



There is also an urgent need for analytical methods to detect and characterise nano-particles in complex matrices such as food before the safety aspects of these materials can be wholly assessed. **Stefan Weigel** from RIKILT in the Netherlands reviewed some of the more suitable analytical approaches currently being assessed under a newly launched EU-funded project, NanoLyse. The challenges to be overcome are numerous: detection levels are in the ppm to ppb levels, the behaviour of engineered nano-particles (ENPs) is not well known, there are few or no standard materials. Method development will focus primarily on selected ENPs as model particles, including nano-silver, nano-silica, an organically surface modified nano-clay and organic nano-encapsulates. The diversity of the ENPs will require tailored analytical solutions with priority given to methods which can be implemented in existing food analysis laboratories.

One of the potential applications of ENPs is in food packaging materials, an example of which is the incorporation of silver nano-particles into packaging as an anti-microbial agent. This is referred to as smart packaging, a rapidly evolving area that involves both active materials that release or absorb substances into or from the packaged food or the environment surrounding the food and intelligent materials which monitor the condition of packaged food or the environment surrounding the food. **Eddo Hoekstra** from the JRC Reference Laboratory (EURL) for food contact materials presented the latest EU requirements for marketing smart packaging under Regulation (EC) No 450/2009 published in May last year, and the work being done by the Commission's laboratory to validate the necessary analytical methods.





All food contact materials must comply with Regulation (EC) N°1935/2004 that stipulates three basic requirements as regards food safety: the materials concerned should not endanger human health, nor change the composition of the food in an unacceptable way, nor modify the taste, smell and texture of the food. Migration of chemical components of the packaging into the food has to be tested and comply with limits set by the legislation. One of the most common plastics used in the food industry is Polyethylene Terephthalate (PET), the


eurofins international seminar 2010 – Food Safety Solutions


properties of which make it particularly suitable as bottles for different types of beverages including carbonated drinks. However one disadvantage of PET is its thermal instability. Acetaldehyde is one of the main degradation compounds formed during the blow-moulding process, which, if it migrates to the beverage will adversely affect its organoleptic properties. **Valeria Merlo**, of Eurofins Chemical Control in Italy, described the development of an analytical method based on headspace gas chromatography that can be used to determine acetaldehyde content at the preform stage in order to ensure acceptable final PET products.

The overall programme was complemented by short presentations from the main sponsors.

Françoise de Goeijen from DSM Nutrition presented the Premi@Test *Salmonella*, a combined PCR and micro-array method for the rapid serotyping of *Salmonella*, an essential part of a *Salmonella* reduction programme. 

Thomas Glauner of Agilent Technologies reported on the increasing use of Mass Spectrometry in food/feed safety monitoring-from poisons to pathogens including the latest developments involving Mass Tagged PCR primers that provide a highly sensitive multiplex assay for diagnostic molecular microbiology. 

Klaus Mittendorf of ThermoFisher Scientific reviewed the use of high resolution mass spectrometry for both the screening and the quantification of residues and contaminants in food, and in particular the move towards untargeted analysis to highlight unknown but potentially harmful compounds present in a food sample. 

Richard Fielder from Romer Labs UK presented their various test systems available for allergen detection, including the AgraStrip® Gluten Test Kit, a lateral flow device that specifically recognises the fragment of the gliadin protein present in gluten which is toxic for celiac disease patients. 

We also thank our other sponsors for their support:



Science plays an important role in addressing food safety issues and the aim of the Eurofins International Seminar is to update its participants on the progress made in this area. This brief report is just a short summary of all the information given. You can find more by downloading the presentations themselves that are available at:

<http://eis.eurofins.com/members-section.aspx>

Please contact us for access.

Report, May 2010.
Michèle Lees