

## Conference Report

# A lunch box for tomorrow: Outcomes from the EFFoST annual meeting 2012, Montpellier, France

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The 2012 European Federation of Food Science and Technology (EFFoST) conference took place in Montpellier, France on 20–23 November. Emphasis was on connecting the integrated (broad) and the specialised (disciplinary) views on food to promote health, food security and sustainability for all. The role of EFFoST in this development was stressed via its linking to *circa* 100,000 agri-food persons in 40 countries and through (a) three food research journals, (b) young scientists group, and (c) industry platform focussing on small to medium sized enterprises (SMEs). EFFoST is currently creating a European Academy of Food Engineering with the European Federation of Chemical Engineers. The conference had 21 invited lectures, 45 other oral presentations, 243 posters and over 300 attendees. The oral sessions corresponded to the food production, environmental impact and economic competitiveness themes as did the poster sessions.

The Conference Chair (Professor Nathalie Gontard) welcomed the delegates and explained why priority in food science must focus on reducing food waste and on connecting holistic and disciplinary food research. This was followed by four plenary lectures. A presentation on food research in the 7th Framework Programme (FP7) and in Horizon 2020 indicated that the last call for project proposals in the former was published in July 2012 and that the latter which spans 2014–2020 will be simplified in terms of the administrative burden for both those submitting new research proposals and for those successful in receiving funding. Horizon 2020 will focus on four areas,

(a) excellent science, (b) industrial leadership, (c) societal challenges, and (d) on coupling research to innovation. It has a budget of €4.6 billion for the bio-economy area (which includes food) compared with €1.9 billion in FP7. A Unilever speaker stressed the company's commitment to source all agricultural raw materials sustainably by 2020 and to reduce environmental impact via a sustainable food chain. A third paper discussed 'right foods to right nutrients' as related to stunted growth. On a global basis 26% of adults are stunted and a 'good lunch box' approach is needed. The fourth paper described integrated and specialised research approaches to food at INRA.

### Food production: security, safety, health and wellbeing of consumers (Sessions 1 and 2)

#### Session 1

The concept of planetary boundaries as applied to climate change, upset of the nitrogen cycle, and the rate of biodiversity loss was the first invited paper. Fifteen to 50% of foods are lost post-harvest and the low versus high carbon footprints of home and factory prepared meals, respectively was stressed. The second invited lecture described a training programme for PhD students from different countries on an engineering design approach to powder processing. Emphasis is on understanding how powder properties and functionality are achieved with a long-term aim of developing innovative products. This was followed by eight further lectures: global harmonisation of food safety risks; case studies on food safety management systems in leafy green vegetable cultivation; identification of emerging food safety risks; contamination levels of lactic bacteria in chilled stored food products at the end of their shelf life; consumer knowledge gaps/communication in relation to new food technologies; acceptance of traditional African foods (Hibiscus, Kenkey, Akpan) by European consumers; bio-refinery concepts for healthy and sustainable food products; use of electrohydrodynamic processing (EHP) using Fluidnatek equipment in the development of nano-encapsulation.

#### Session 2

The first invited lecture was on the use of Positron Annihilation Lifetime Spectroscopy to obtain results on the nanostructure of carbohydrate and protein systems in a structured approach to developing novel food products. The second invited paper was on probiotics and the *in*

*vivo* microbial production of health associated conjugated linoleic acid by a *Bifidobacterium* strain and its linking to alterations in the fatty acid composition of the host liver and brain. The third invited presentation was on health related food choices, e.g. foods with appealing texture are consumed in larger quantities. Therefore, emphasis should be on consumer-driven design of textures of healthy foods. Seven further oral presentations completed the session: evaluating probiotic and nutritional potential of lactic acid bacteria through genetic screening; use of whey protein (WP) matrices to immobilise and protect bioactive ingredients in food products; bio processing of legumes; interactions of pea proteins during high moisture extrusion cooking; effect of colonic metabolites from wholegrain bread on an *in-vitro* model of inflammatory bowel disease; effect of food processing on viruses; barriers to accessibility of carotenes and lycopene in carrots and tomatoes.

### **Environmental impact and economic competitiveness (Sessions 1 and 2)**

#### Session 1

The first of two invited papers addressed sustainable food production in the context of the environmental impact of food loss and waste in high and low income countries. About 1.3 billion tonnes of food is lost annually and represents about one third of that which is consumed. Low income countries have large and small food losses at the production and consumption stages, respectively, whereas the opposite prevails in high income countries. Much of the waste in high income countries is unnecessary, e.g. consumers don't want misshapen carrots and ignore the fact that these are of equal eating quality and nutritive to well shaped carrots. Global food production needs to increase by 70% by 2050 to feed the global population. This requires increased biodiversity which in turn leads to 'environmental 'negatives', e.g. de-forestation. The second invited paper discussed a sustainable food chain in the context of that prevailing in the Netherlands which despite a small land mass has very high agricultural outputs and consequent food exports; this is achieved through good chain planning and management. The Food Valley concept in Wageningen was cited and embraces an innovation platform, the golden triangle (private business, knowledge institutes, government participation), and successful partnerships. This was followed by eight other papers: sterilising white wines with pulsed electric fields or high voltage electrical discharges had variable effects on wine quality; improving efficiency of bread provers via modelling/validation of air turbulence and velocity; functionality driven fractionation of plant proteins in the context that there is no need for pure food ingredients, i.e. semi-crude fractions often suffice; short time/high voltages gave the best results in the electrochemical treatment of sugar factory effluent; use of composite films for active coating of fresh meat; extraction of bio-actives from pomegranate husks, i.e. flavonoids, condensed tannins, hydrolysed tannins; reducing

waste in UHT pasteurisation via better control of high-temperature holding time; defining sustainability assessment methodologies for the food process industry.

#### Session 2

The first invited paper was on modelling and simulation as efficient tools for process up-scaling with particular application to food treated with ultra high pressures (up to 1000 MPa). The second paper was on bio-sourced phenolic compounds as alternatives to petroleum based polymers as food packaging materials. The results showed that a resin containing a natural polyphenol (from condensed tannins) was equal or better than industrial epoxy resins. This was followed by presentations on: environmental impact of tomato cultivation and sauce processing; achieving greater efficiencies in the Portuguese dairy sector; effect of hypobaric storage on pectinolytic activity in strawberry juice; sustainable fractionation processes for concentrated foods; effect of aloe vera coating on the quality and shelf life of fresh-cut kiwi fruit; enhancing the antioxidant activity of enzymatically modified chitosan films; use of nano-composites in bio-packaging applications; use of wheat-straw bio-composites for food packaging.

### **Environmental impact and economic competitiveness (Sessions 3 and 4)**

#### Session 3

The first lecture showed that the World-wide web can be used as a science accelerator, i.e. modern web technologies hold promise as new ways of sharing all elements of the scientific cycle, i.e. hypotheses, experimental designs, experimental data and the resulting theories. The second invited paper discussed knowledge engineering in the context of integrating knowledge into computer systems to help solve complex problems, e.g. predicting product shelf life from a computer-generated model. Following papers dealt with: maximising heat transfer in bakery convection ovens; developing a web-based tool for chronic acute risk assessment (CARAT); use of a two dimensional tool for determining in-can flow characteristics in heat processing operations; on-line assessment of food quality and quantitative risk assessment; role of scientific uncertainty in food risk analysis; dietary exposure analysis – a new resource for exposure professionals (GuiDEA project); modelling the bread-making mixing process, e.g. a spiral kneader is more efficient than an oblique-axis mixer; modelling fish/meat smoking in terms of fish colour versus in-smoker residence time, wood consumption, smoke generation and environmental impact of the process.

#### Session 4

This had three invited and seven other presentations. The first described the use of synchrotron beam techniques (SOLEIL and ESRF) on starch in terms of mapping orientation in the crystal domains and estimating phosphorus or sulphur content at the micron scale. Paper two discussed the

use of NMR/mass spectrometry for identifying markers for intake of specific foods and for measuring metabolomic variability at individual and population levels. Paper three was on the use of transmission electron microtomography (TEMT) for observing structural elements with a size of several tens of nanometre. A scanning version of TEMT (STEMT) is useful for 3D observation of  $\mu\text{m}$ -thick specimens of soft food materials. Following papers were on: studying cream-cheese microstructure using X-ray microtomography; quantifying the antibacterial effects of silver nanoparticles; assessing the potential of rheo-acoustic techniques for food structure investigation; novel sensors for the food industry [EU CAFÉ project (computer-aided programme for process control)]; fluorescence dyes as a tool for fast and accurate detection of pressure-induced germination of bacterial spores; kinetic modelling of myofibrillar protein denaturation and oxidation during heating; new methods for assessing headspace and other food volatiles.

*Day 3* of the conference had two invited lectures followed by a round table wrap-up discussion. The first dealt with the European Food Technology Platform (ETP) 'Food for Life' which is now totally funded by industry. Food-DrinkEurope provide the secretariat and a new shopping list of research topics is available in a web-based document at [www.fooddrinkeurope.eu](http://www.fooddrinkeurope.eu). Research topics for the ETP come from industry (36 national platforms, i.e. mini ETPs comprised of over 5000 companies) and the ETP, in turn, feeds into Horizon 2020. Seven research areas have been highlighted, i.e. (i) health, wellbeing and longevity; (ii) safe foods that the consumer can trust; (iii) sustainable and ethical production; (iv) food processing, quality and packaging; (v) food and consumers; (vi) food chain management; (vii) communication, training and technology

transfer. The second invited lecture was on the Nestle experience in addressing some of the challenges facing food production and processing in Africa. Development in Africa is being hindered by low performance of the local agriculture, low quality of local raw materials, and lack of investment in food processing and packaging R&D. Solutions include: integrating agriculture and food processors (more product development); improving grain and raw material safety; understanding the needs of African consumers; integrating local chefs in product development teams; introducing processing technologies new to Africa; and maximising the use of traditional ingredients.

The principal conclusions from the wrap-up panel discussions were (a) the need to combine holistic and specialised approaches to develop a sustainable food chain, and (b) the need to associate food distributors, which has been quite difficult up to now.

### Poster presentations

These covered a wide range of topics and complemented the oral presentations. They are broadly divided in 11 sub-groups within the framework health promotion, food security and sustainability for all: processing/bio-refining (55); physico-chemical tests/properties (40); general food science (37); health/bio-actives (30); safety/risk assessment (29); modelling/software (21); packaging/films/coatings (15); sensory (7); food and value chains (4); food waste (3); shelf life (2).

The conference gave ample opportunity for networking and there was active discussion of the oral presentations and at the poster assembly sessions. Keep in touch with EF-FoST; see details of the 2013 Conference (Bologna) at [www.fffostconference.com](http://www.fffostconference.com)