

INVITED REVIEW

Key issues in European food science research: a review of the European Food Science Day 2009

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Introduction: an overview of the European Food Science Day

On 18 November 2009, the first ever European Food Science Day took place in Brussels, Belgium. The meeting brought

*The presentations are available for download at <http://www.commnet.eu/> (click on “European Food Science Day” or go directly to http://www.commnet.eu/index.php?option=com_content&view=article&id=53). Some of the presentations may be featured in a modified form in future issues of *Quality Assurance and Safety of Crops & Foods*.

Abstract

This paper is a report on the European Food Science Day (Brussels, 18 November 2009, organized by the CommNet network of food science communicators) and its outcomes. The article presents FP 7 as a key funding mechanism in European food and nutrition research and it puts research in this sector in a socio-economic context. The article then reviews the specific activities of several EU-funded projects in the field of risk, safety, and health, discussing key issues and research questions in these fields.

together an audience of over 120 participants from a broad range of stakeholders. The meeting was opened by Antonio di Giulio from the European Commission’s Directorate General (2009) (DG) for Research, followed by a talk from Lena EK, a member of the European Parliament.* Catherine Geslain-Lanéelle, the Executive Director of the European Food Safety Authority (EFSA), gave the key note speech on ‘Assessing and communicating risk related to food safety.’ This was followed by a presentation from Beate Kettlitz from CIAA, the Confederation of the EU Food and Drinks Industry, about ‘Strengthening the Role of Food Industry in Research and Development – the European Technology

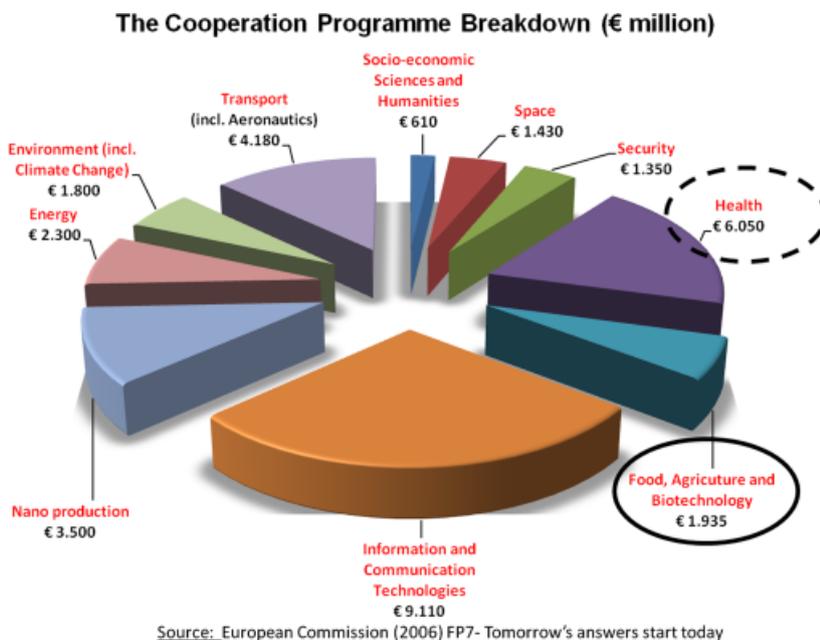


Figure 1 Breakdown, Cooperation Programmes. Source, (circles added for emphasis) European Commission (2006).

Platform Food for Life,' supplemented by contributions from Britt Maestroni on 'strengthening national food control systems – the FAO/IAEA perspective' and a brief presentation about CommNet by Rhonda Smith from Minerva PRC. Three breakout sessions, described in detail below, then dealt with the safety, health and risk dimensions of food and nutrition research.

In the afternoon Maive Rute, Director of Directorate E in DG Research presented the EC's view on food communication followed by a presentation from Willemien Bax from BEUC, the European Consumers' Organisation. After a Q&A session with policy makers, which was chaired by Marit Paulsen (MEP and Vice Chair-Woman of the EP's AGRI Committee), the meeting was wrapped-up by Ingemar Pongratz, the Vice-Coordinator of CASCADE.

The European Food Science Day is an initiative undertaken by CommNet (<http://www.commnet.eu>) an informal network of food science communicators from EU-funded research projects in FP 6 and FP 7. Started in 2005 at the initiative of the CASCADE project CommNet now encompasses 30 projects. It is a bottom-up initiative, which believes in the importance of raising standards in the field of food science communications. CommNet meetings take place two to three times per year and include interactive knowledge sharing sessions.

FP 7 as a key EU-funding mechanism for food and nutrition research

The European Union addresses many of the challenges in food and nutrition sector through its research policy.[†] The practical instruments to implement EU research policy are the multi-annual Framework Programmes. The current Framework Programme, FP7, runs from 2007 to 2013 and has more than 50 billion euros at its disposal (a significant increase compared with previous Framework Programmes[‡]). It is divided into four large sub programmes, namely 'cooperation,' 'ideas,' 'people' and 'capacities'. Most food and nutrition research projects are funded within the cooperation programme, which provides the opportunity for multi-national collaboration between industry, research centres, universities, public bodies

[†]Ultimately, EU R&D activities are now based on the *Lisbon Treaty*, which entered into force in December 2009. It states that "in the areas of research, technological development and space, the Union shall have competence to carry out activities, in particular to define and implement programmes; however, the exercise of that competence shall not result in Member States being prevented from exercising theirs" (Lisbon Treaty, Title I, Article 4, 3 – see Official Journal of the European Union, 2007).

[‡]Although this increase is not linear across the lifetime of FP7.

and civil society. The Cooperation programme itself is divided into different themes – food and nutrition research falls primarily into the themes ‘food agriculture and biotechnology’ and ‘health,’ as shown in Figure 1.

The European impact of food and nutrition research: some socio-economic factors

Food and nutrition is intimately connected with the daily lives of European consumers. Several socio-economic factors have an impact on European food and nutrition research today.

Health implications

Health implications are perhaps the first to come to mind – these are manifold and range from social trends such as the rise in child obesity in Europe (Eurostat, 2009a, p. 212), to developmental impairment by metal exposure to specific diseases spread through food. In the latter category, there are a small number of diseases which have a high incidence, primarily Campylobacteriosis and Salmonellosis, as well as a range of much less common diseases (see Eurostat, 2008: p. 166). Food scares (e.g. Foot-and-mouth disease, Bovine spongiform encephalopathy, and polychlorinated biphenyls) receive considerable attention in the media and may have resulted in a decline in consumer trust (Cnudde, 2005); exacerbated perhaps by the ongoing debate over the introduction and safety of genetically modified crops.

Globalized trade

Trade in food has become truly globalized and the European Union is both the largest importer and the largest exporter of food and beverages (Eurostat, 2009b). This adds an

important economic dimension to food and nutrition research, linking it with current policy discussions on the Lisbon Agenda and its follow-up ‘EU 2020’ (see the High Level Group on the competitiveness of the agro-food industry set up by DG Enterprise). In addition to globalization, other market challenges include new materials (GMO, nanotech) as well new processing technologies, and new distribution strategies. On the micro-level, European households spend a significant proportion of their income (12.7%) on food and non-alcoholic beverage. This percentage is even higher for vulnerable groups such as the unemployed and the retired (compare Eurostat, 2008, p. 162; Eurostat, 2009a, p. 252).

Climate change

Climate change is another variable that needs to be factored in – the agricultural sector is responsible for 9.3% of EU greenhouse gas emissions (Eurostat, 2008; p. 64, data from 2004 and only for EU 15). This aspect forms part of the wider debate on climate change and cannot be dealt with in this review.

Public opinion

Last but not least, some of the public have strong opinions about food quality and safety, which policy makers cannot afford to ignore. For example, one public opinion survey found that consumers think the first aim of the Common Agricultural Policy should be to ensure consumers are supplied with safe and healthy produce (Eurobarometer, 2006). Another survey found that safety of food products is the number one agricultural topic where the public wants more information (Eurostat, 2008; p. 175). Figure 2 summarizes these different dimensions which impact on food and nutrition research.

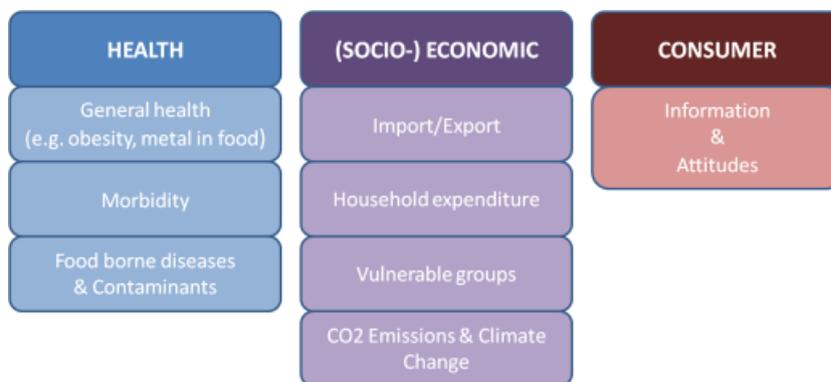


Figure 2 Impact of Food and Nutrition Research.

Key research issues and questions addressed by EU-funded research projects

The following discussion highlights key issues addressed by the projects participating in the European Food Science Day in the areas of *safety, health and risk management*.

Safer food

Reducing Foodborne Diseases in Europe (Susanne Braun, Pathogen Combat) <http://www.pathogencombat.com/>

The overall objective of PathogenCombat is to provide new information and methods for the food industry and public authorities on how to reduce the prevalence of new and emerging foodborne pathogens in the food chain. PathogenCombat focuses on the following areas: Microbial behaviour in the food chain, research and applications of protective and probiotic cultures, novel detection methods, hygiene, new processing techniques, food safety management, communication, dissemination and training. As PathogenCombat ends, new results are emerging ready to be communicated throughout Europe. Therefore, the efforts concentrate on dissemination, specifically targeting Small and Medium Sized Enterprises in Europe. Under the responsibility of the University of Stuttgart, Germany, more than 20 workshops on food safety have been conducted in Europe to help small food producing companies use novel technologies and learn about new scientific results. Dissemination activities are still ongoing to present the latest unique research results to a larger audience by using different means for knowhow transfer. So far, these efforts have been very successful; several enterprises use the outcomes of PathogenCombat, for example the 'Food Safety Management System self-assessment tool.' This tool allows enterprises to assess their Food Safety Management System and is one example for the practical activities of PathogenCombat.

Food safety through traceability (Matthias Kück, Chill-On) <http://www.chill-on.com/>

Addressing the key issue in food products – safety coupled with industries' demands for transparency and quality assurance – is the main objective of the various tools being developed by CHILL-ON. A holistic approach targets the delivery of a complete and integrated solution by developing a state-of-the-art Chain Information Management System, called 'TRACECHILL,' for the entire supply chain from 'farm to fork.' The aim of the system is to tackle the most crucial points and design and implement novel solutions. This includes chilling technologies, real-time temperature monitoring, traceability, smart labels that

change colour with time and temperature and molecular diagnostic tools for pathogenic and spoilage bacteria. Quantitative Microbial Risk Assessment and shelf-life prediction models, allow real-time evaluation of quality and potential hazards, to facilitate electronic management in the supply chain. By collecting all relevant information along the full supply chain, the system will be able to provide crucial safety and important quality information in real-time and for various user levels. The implementation of the CHILL-ON technologies in supply chains of fish and poultry in field trials is now ongoing in selected supply chain scenarios.

Food Safety Hazards: What is next? (Roland Poms, MoniQA) <http://www.moniqa.org/>

The EU has become the largest exporter and importer of food worldwide. As a global network of food safety experts MoniQA is able to react quickly and comprehensively by providing information about emerging food safety issues, such as melamine, dioxins in Irish pork, clenbuterol and others (cf. MoniQA Emerging Issues Working Group: www.moniqa.org/emerging). In some instances new methods need to be developed, and others improved or validated. Another very timely issue is nanotechnology in food and the safety issues connected with it (e.g. EFSA, 2009 scientific opinion). Recent issues like the swine flu required clarification of the risks associated with transmission; facts are sometimes falsely promoted even by public service media. At the European Food Science Day, the presentation was followed by a lively discussion on how to communicate food safety risks to the public and how to inform the consumer.

Improving health

Vitamins and minerals – EC funding is addressing current confusion about how much and when (Rhonda Smith, EURRECA), <http://www.eurreca.org>

Why are there currently different opinions and recommendations across Europe regarding how much iron, folate, zinc and other micronutrients we need to eat daily to enjoy the best of health? The EC-funded network of excellence European Micronutrient Recommendations Aligned (EURRECA) has got to grips with understanding the reasons behind these variations; why for example a young man needs a lot more vitamin D by simply stepping across the border between Belgium and the Netherlands. Through detailed research and analysis, EURRECA scientists have found that not only have different countries use different sources for the science behind their decisions, but have also set different age group targets and established different criteria for making their recommendations.

But why is it now so important to understand the reasons behind these recommendations? With increasingly mobile populations, new generations may be born in one country, grow up in another, be educated and work elsewhere before returning to their country of origin to start a family. European consumers increasingly pay attention to the food they eat, particularly at special times of their lives (e.g. during pregnancy, later in life or when recovering from illness). We all need recommendations we trust and understand. EURRECA is working to support governments, policy makers and recommendation-making bodies to reach appropriate decisions on recommendations, also taking national preferences, food choice and sustainable food issues into account.

Are you what your mother ate and fed you? (Margaret Ashwell, EARNEST) <http://www.metabolic-programming.org>

It seems possible that both pre- and post-natal nutrition may affect long-term adult health. This is supported by findings from lifetime experimental studies in animals, historical and prospective observational studies in humans and experimental and hypothesis-testing trials in humans with long-term follow-up. But what is the extent of early nutrition programming in contemporary European populations with regard to long-term health and the burden of adult disease? Which nutritional exposures lead to programming and at what critical time periods do they act? By which mechanisms do these exposures produce programming? How effective are interventions to reverse the effects of programming? The Early Nutrition Programming Project (EARNEST) brings together a multi-disciplinary team of international scientists and leaders in key areas of the field from major research centres across 16 EU countries. The first results are now available and the take home messages include:

- Human trial follow-up: Low protein infant formula 'programmes' slower growth
- Prospective epidemiology: Maternal fish consumption 'programmes' better infant development
- Animal studies: Maternal obesity 'programmes' obesity in offspring
- (Positive) Early Nutrition Programming effects can be cost effective

How safe is European baby food? (Barbara Demeneix, CASCADE) <http://www.cascadenet.org/>

The CASCADE Network of Excellence gathers European experts from the areas of food safety, endocrine disruption and risk assessment. The common focus of the CASCADE research is hormone-disruptive contaminants in the food

chain. One of CASCADE's achievements is an examination of commercial baby food sold throughout Europe, with respect to environmental pollutants like dioxins, PCBs and bisphenol A. The 'baby food basket' represents what an average European baby eats during its first months of life. This talk provided a brief overview of this study. Also, some of the major controversies and hot topics within the field of endocrine disruption were highlighted.

Reducing risk

Improving Egg Safety through Genetics (Chris Warkup, SABRE) <http://www.sabre-eu.eu>

Cracked or broken eggshells provide a route for pathogen contamination of eggs by *Salmonella* spp. and other zoonotic infections, which may cause food poisoning. Work within the SABRE project has identified key genetic factors that could be used to improve egg shell quality through the selective breeding of laying hens, resulting in a decreased incidence of food contamination through cracked or broken eggs. SABRE – Cutting Edge Genomics for Sustainable Animal Breeding – utilizes the latest techniques in genetic science to develop more economically and environmentally sustainable production systems for cattle, pigs and chickens and maximize food safety and quality.

Prevention and control of epidemics in food producing animals (Wim H.M. van der Poel, EPIZONE) <http://www.epizone-eu.net>

Diseases in food producing animals have a vast economic and social impact on producers, but also consumers. To combat those animal diseases, scientists worldwide need to cooperate. International collaboration improves research, preparedness and control and EPIZONE has a proven track record with the work performed on bluetongue, PPRV, avian influenza and many more disease-related problems. Over 400 EPIZONE scientists are examining how the diseases spread, what the biggest risks in the future are, how to diagnose the diseases and how to fight them.

Toxic metals from food and their health risks (Staffan Skerfving, PHIME) <http://www.phime.org/>

Research on the health effects of exposure to metals has been ongoing for a long time. Still, there are many grey areas, which yet need to be understood, not least the geography and time trends of exposure, the impact of low-dose, long-term exposure and being exposed to several metals and other contaminants at the same time. Furthermore, we need to find ways of reducing the exposure of whole population groups, and especially sensitive groups like fetuses, children, women, elderly and genetically susceptible persons. PHIME scientists are examining

all these areas. The successful reduction of lead in Europe through the abolition in petrol serves as a good example, but cadmium, mercury and arsenic exposure, both in Europe and in the rest of the world are still a problem. Lower IQ, kidney damage and cardio-vascular diseases are only some of the health problems connected with these metals. Good nutrition seems to be a route to reducing the negative impact of exposure. Adequate risk assessment as a basis for risk management by the policy makers and authorities are crucial. Also, PHIME scientists work on plant species that take up less of the harmful and more of the essential elements. It is likely that all these efforts will have to be combined to overcome the problem.

Conclusions

As an informal network of food science communicators CommNet aims to train and support scientists in EU-funded projects with dissemination. In this context, the European Food Science Day provided an excellent opportunity to learn about cutting edge food and nutrition science being undertaken in Europe. CommNet has already organized more than 20 training sessions, and the issues and challenges identified by the participating projects will continue to play an important role in CommNet activities, such as participation in the upcoming Euroscience Open Forum (ESOF 2010) in Torino, Italy.

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