

The paradox of progress

Due to progress in science and technology – and the increasingly stringent legislation that has resulted – today's agri-foodstuffs sector must respect ever stricter standards and increasingly rigorous quality control and monitoring procedures. Yet paradoxically, over the past decade there has also been an increasing number of food alerts – BSE, dioxin, listeria, salmonella – creating a genuine crisis of confidence among consumers. Research on food safety and quality must therefore be a priority.

The paradox stems from changes resulting from two factors. While the globalisation of supply and commerce provides for a very varied range of produce in the shops, it inevitably increases the risk of poor quality. Also, the economic pressure for ever growing rationalisation of the complete agri-foodstuffs chain – from the farm to the supermarket shelf, including processing and transport – results in produce being sold in bulk. When there is a problem at any stage of this chain, the threat of contamination can consequently assume alarming proportions with the potential of placing large sections of the population at risk.

Increasing by stealth Although safer and subject to stricter control, the agri-foodstuffs sector is increasingly exposed to 'industrial' risks. Apart from the very particular cases of BSE (or mad cow disease), which originated in the United Kingdom, or the Belgian 'accident' concerning dioxin contamination, attributable to the gross negligence of a supplier of animal feed, scientists are most concerned by the much stealthier and generalised increase in the frequency of illnesses linked to microbiological contamination by *Salmonella*, *Campylobacter* and *Listeria*.

Another problem is the exposure to chemical elements contained in food, whose source is much more difficult to trace. These may be natural toxic products (such as mycotoxins) or a whole range of contaminants (compounds originating in pesticides, dioxins, mercury, lead, and radionuclides).

Questioning the innovations There is, however, more to food safety than quality control and monitoring. Biotechnology has opened up a vast field of exploration into new methods of agricultural production, including the creation of genetically modified plants and nutritional inventions such as so-called 'functional' foods or 'pharmafoods'.



Bio-packaging

It is not just the content – the container, too, must pass all the tests. Various research projects, in particular on bio-films made from natural polymers, are developing packagings providing increased safety, especially for 'ready-to-use' products.

The GMO debate is currently raging between the promoters of these innovations, who justify them in the name of the progress they bring (in particular for solving environmental problems as well as problems of hunger and food shortages in the world's poorest countries), and their opponents, who condemn a profit motive and a lack of both health and environmental precautions. But the debate is going nowhere – a situation which created yet another reason for intensifying research. It is by further exploring the potential of biotechnology that an objective light can be shed on these issues.

The media spotlight Science has an uncomfortable role in food safety. Called in by politicians, especially at times of crisis, it is often asked to provide certainties and principles of precaution when all it can offer are presumptions. On this basis, it is then asked to approve intervention plans which can have very major economic and social repercussions. Finally, and above all, it is propelled into the media spotlight where the experts – sometimes unsure, sometimes contradicting one another – often fail to impress the public, which further fuels a growing distrust of science. ●



Sir John Krebs

Communication: a challenge and a duty

Consumer concerns about food safety and their level of confidence in the information provided on the subject are a major challenge for European politicians and scientists. In responding to this challenge, everything rests upon the reliability of the information provided by research. The important role awarded to food quality and safety in the Sixth Framework Programme is not only a very desirable development but also a very timely one, with a view to a coherent approach to this issue within the European Research Area.

The particularly complex scientific issues at stake in this sector require co-operative research and shared expertise if coherent answers are to be provided to the questions raised. The multinational and international projects and networking encouraged by the new Framework Programme for R&D meet this requirement. Increased coordination between research programmes will also make it possible to define the objectives of the scientists engaged in this work, while the mobility of researchers and access to resources will ultimately help to create a genuine community of researchers working in this area in Europe.

Organising such a vast and ambitious co-operative effort will require efficient management and the production of tangible statistics, the high quality of which must be demonstrated. The priority given to research on food safety and quality differs to other more exclusively technological research areas, as in this case the sector's 'final' customers are European consumers themselves. Integrating research in this context involves more than encouraging interaction between European researchers and multidisciplinary projects. At the end of the day, it is not enough to undertake 'good scientific research'. To increase food safety and consumer confidence, the results must be used effectively by translating them into policy, and must also be backed up by sufficient and open communication. This means that, apart from the limited community of researchers, the programme must be transparent to consumers and other users – from programme and project development through to accessing the results.

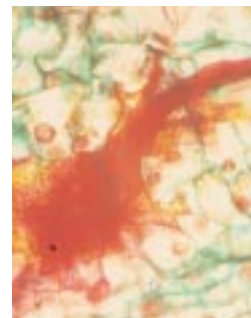
Sir John Krebs

President of the *Food Standards Agency* (UK)

Plant proteins
Rubisco, as found in luzerne, contains essential amino acids and could replace other food proteins.



Resistant plants
Research on plants which are resistant to nematodes, the minute worms which destroy their roots.



Freshness control
The QIM (quality index method) used in several European countries evaluates various characteristics (eyes, gills, skin) to evaluate the freshness of fish products.



Of major economic and social importance

The agriculture and food sectors are vitally important to the European economy as a whole. The food industry is a leading sector in the EU, with the highest annual production in the world at close to €600 billion, or about 15% of the total for the processing industry as a whole. It is the third industrial employer, employing over 2.6 million workers, 30% in small and medium-sized businesses. The agricultural sector has a total production of about €220 billion and provides the equivalent of 7.5 million full-time jobs.

Exports of agricultural products and food are worth about €50 billion a year. Given the economic stakes involved and the omnipresence of food in our lives, society in general, and the public authorities and producers in particular, have an obligation to attach the greatest possible importance to food safety.

From the farm to the fork

Since the devastation caused by the bovine spongiform encephalitis crisis, the Union has, so to speak, 'taken the bull by the horns' in carrying out a thorough review and draconian restructuring of its political responsibilities in the area of food safety. Research on this subject under the Sixth Framework Programme will be in line with this goal.

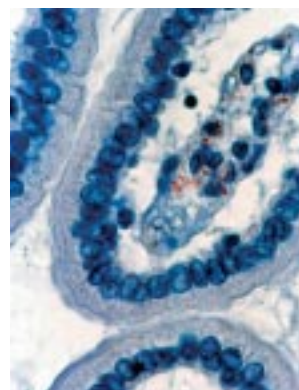
In 1997, all the European Commission's powers of scientific consultation and decision-making in the field of food safety were brought together under the Directorate-General for Health and Consumer Affairs. Under the slogan of 'from the farm to the fork', this restructuring was designed to group and coordinate all the sensitive issues relating to food safety and quality at every stage of the agri-foodstuffs chain: animal health and feed, quality of crop production (including GMO innovations), safety of agricultural inputs (fertilisers, pesticides, etc.), quality and monitoring of processed foods and products (including rules on labelling), and the problem of food safety in international trade.

In January 2000, the Commission published a basic charter, the White Paper on Food Safety, which sets out a plan to reform the legislation into a coherent and transparent set of rules, reinforce controls and increase the capability of the scientific advice system. All existing legislation will be reviewed before 2007 to ensure compatibility with the new Community jurisdiction on food safety, which is now being developed.

Framework Programme support The jewel in the crown of this reform is the creation of the European Food Safety Authority (EFSA). This independent body, established in January 2002, is responsible for the scientific evaluation of risks, communicating directly with the general public and issuing health warnings if necessary (see box).

Under the Sixth Framework Programme, the choice of the priority theme *Food quality and safety* is designed to support this new agency in its essential work. Research priorities will be: the epidemiology of food-related diseases and allergies; the impact of diet on health; traceability processes throughout the production chain; methods of analysis, detection and control; the safest and most environment-friendly production methods; the effect of animal feed ingredients on human health; and environmental risks to health. ●

From TSE to BSE
Researchers are mobilising to understand the almost incomprehensible: the crossing of the species barrier and, subsequently, the nature and pathway of the prion. Right, human brain tissue showing spongiform degeneration due to new variant Creutzfeldt-Jakob disease.
© Robert Will, CJD Surveillance Unit, Edinburgh



Listeria sequencing
Under the leadership of the Institut Pasteur, ten European laboratories have completed the entire sequencing of *Listeria monocytogenes*. This research project will permit a much earlier diagnosis of listeriosis, an illness of worrying frequency which kills 20-30% of sufferers.
© Institut Pasteur

Detection of GMOs
Evaluation and validation of methods of analysis, detection and traceability of GMOs carried out at the Joint Research Centre's Institute of Consumer Health and Protection at Ispra.



EFSA: the jewel in the crown

The European Food Safety Authority (EFSA) is a major tool in Community food safety policy, based on the principles of independence, scientific excellence and transparency. It is an autonomous body, acting independently of the Community institutions and with a considerable budget at its disposal. It has a wide brief to pursue a proactive policy of scientific evaluation, advice, information gathering, risk identification and communicating with the public, including issuing emergency health warnings if necessary. It is responsible for all matters which could have a direct or indirect effect in this field (including, for example, the health and welfare of animals, GMOs not destined for human or animal food, product labelling, nutrition, etc.). Although the Commission is its principal 'customer', the EFSA is available to respond to scientific questions from the European Parliament and Member States, and can undertake scientific investigations at its own initiative. Nevertheless, risk management, including legislation and controls, remains a matter for the European institutions – although an extension of the EFSA's powers in this direction cannot be ruled out at a later date.

Food quality and safety*

OBJECTIVES

- To establish the integrated scientific and technological bases needed to develop an environmentally friendly production and distribution chain of safer, healthier and more varied food – including crops, meat and sea food.
- To improve understanding of the link between food and health.
- To control food-related risks, relying in particular on biotechnology tools and the results of post-genomic research.
- To control health risks associated with environmental changes.

SUPPORT FOR RESEARCH

Community action will cover research in the following fields:

- Production methods and processes (including knowledge of biotechnologies) for foodstuffs and animal feed which are safer, healthier, more nutritional, functional and varied, and environmentally friendly, based on systems such as integrated production, lower input farming and organic farming.
- The epidemiology of food-related diseases and allergies, including methods of analysis of food-related allergies, in particular the impact of diet on children's health.
- The impact on health of new and/or functional foods, products resulting from organic farming, foods containing genetically modified organisms, and those arising from recent biotechnology developments.



- 'Traceability' processes throughout the production chain, relating in particular to GMOs and similar products.
- Methods of analysis, detection and control of chemical contaminants and existing or emerging pathogenic micro-organisms (such as viruses, bacteria, yeasts, fungi, parasites, and new agents of the prion type, including the development of ante-mortem diagnostic tests for BSE and scrapie).
- The impact on human health of animal feed, in particular products containing GMOs, and the use of sub-products of various origin.
- Environmental health risks (chemical, biological and physical) linked to the food chain (including the cumulative risks of authorised substances, transmission routes to human beings, long-term effects and exposure to small doses, impact on particularly vulnerable groups, especially children), the impact of local ecological disasters and of pollution on food safety.

BUDGET

€685 million

* This presentation is a summary of the official text of the adoption of the Sixth Framework Programme.

www.cordis.lu/rtd2002/fp-activities/food_safety.htm

To find out more

European White Paper on Food Safety

● europa.eu.int/comm/dgs/health_consumer/library/pub/pub06_en.pdf

Dossier on food safety at the Europa Research website

● europa.eu.int/comm/research/briefings/foodsafety_en.html

Site of the European Food Safety Authority

● www.efsa.eu.int/index_en.html

Site of the pan-European conference on food safety and quality (organised by the FAO and WHO and held in Budapest in February 2002)

● www.foodsafetyforum.org/paneuropean/index_en.htm

Site of the European ENTRANSFOOD network on GMOs

● www.entransfood.nl/