Call 2

Integrated Project

BIOCOP

Faster checks on chemicals in food

Consumers and regulators both demand that food on sale should be safe to eat. A wide range of natural and man-made substances can get into food on the farm or at any point in the supply chain. They can make it unpalatable or dangerous, so tests for potentially harmful contaminants are essential. At present, such procedures are laborious and expensive, as each unwanted chemical or biological agent has to be tested for separately. Advances in biological technology offer the possibility of much faster and cheaper tests for food contaminants, but these procedures need substantial development to make them practical to use for routine monitoring purposes.

BioCop is a major five-year Integrated Project to develop novel tools and methods based on emerging biotechnologies to screen food for a range of chemical contaminants. Such an ambitious goal requires co-operation between Europe's food research organisations and expert laboratories. It involves experts and specialists in food sciences from 32 European universities, government agencies, industrial concerns and small and medium-size enterprises (SMEs). Canada will also play a key role in the project. They are focusing on the most damaging chemical contaminants which may be present in cereals, meats, seafood and processed food. The methods developed will be demonstrated to a wide range of potential end-users in government and industry.

Policing the food supply

The foreign substances that can get into foodstuffs are diverse. They include pesticide and hormone residues, heavy metals, illegal growth promoters given to livestock and toxins that shellfish can accumulate from polluted water. Many of these substances can be found in a wide range of food commodities and a huge amount of time and effort is now invested in monitoring for their presence by regulatory and industrial laboratories. Baby and infant food is of particular concern, as immature systems are especially vulnerable.

The BioCop approach is to develop a range of new tools that can measure the cumulative effect of contaminants rather than analysing each one separately. They will be based on biomarker and fingerprinting concepts, using new technologies. Transcriptomics is being used in assays of phytoestrogens, organochlorines and tricothecenes, especially in baby and infant food. Proteomics is another new technique that uses protein biomarkers to detect hormones administered illegally to promote animal growth. Novel biosensor receptors are being developed for pesticide molecules and shellfish toxins, while electrochemical sensors will assess lead and mercury contamination. The overall objective is high throughput analysis of multiple contaminants at the same time.

Another key development will be new methods for preparing samples for analysis. High-powered extraction using microwaves and pressurised liquid solvents and aptamer techniques are examples of what will be developed.

Securing food safety

BioCop will help to ensure the safety of European food and safeguard the health of the people who eat it. It will provide methods to reinforce the European Maximum Level Residue targets and other international standards for foods. Overall, the programme will deliver long-term solutions to the complex problems of food analysis for the benefit of regulators, consumers and society in general.

The analytical methods developed will advance knowledge in the field and offer commercial opportunities to a broad range of European companies. The programme contains a substantial element of training in the new techniques, which should result in new employment possibilities as the methods are adopted and widely applied not only in Europe but also worldwide.

Full title: New Technologies to Screen Multiple Chemical Contaminants in Foods

Acronym: BIOCOP
Contract n°: CT-2005-06988

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- University of Santiago de Compostela (Spain)
- University of Zurich (Switzerland)
- Xenosense Ltd (UK)
- RIKILT DLO (The Netherlands)
- National Veterinary School (France)
- Laboratoire D'Hormonologie (Belgium)
- Turku University (Finland)
- Institute of Chemical Technology (Czech Republic)
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- NESTLE Research Centre (Switzerland)
- Central Science Laboratory (UK)
- Università di Roma Tor Vergata (Italy)
- Center for Analytical Chemistry (Austria)
- Fusion Antibodies Ltd (UK)
- Institute of Biochemistry (Lithuania)
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- Clondiag GmbH (Germany)
- GeneData AG (Switzerland)
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- Biopure (Austria)
- AFSSA, EU Community Reference Laboratory (France)
- Swedish University of Agricultural Sciences (Sweden)
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SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

BIOEXPLOIT

Plant breeding to cut chemical use

Europe's two main staple carbohydrate foods, wheat and potatoes, are sprayed with 70% of the pesticides used by its arable farmers. If plant breeders could enhance natural disease resistance to the fungal infections that cause the most damage to these crops, there would be many benefits for food safety and health, and for farming. However, public resistance in Europe to genetically modified organisms has meant that, unlike elsewhere in the world, most firms have been reluctant to invest in plant biotechnology for the European market. As a result, no alternatives to harmful pesticides are being developed to protect wheat and potato yields.

As a result, promising new developments in DNA technology for disease resistance breeding are not being explored and no alternatives to chemical treatment of crops are coming forward. So, the EU is investing in a five-year Integrated Project to develop new strains of wheat and potatoes with in-built resistance to fungal diseases. It has 42 participants representing 67 research groups in Europe and beyond. As well as a considerable investigative input, the programme also contains the necessary public information and dissemination elements.

Approaches to breeding

BIOEXPLOIT aims to force a breakthrough by developing efficient and rational breeding strategies using genomic and post-genomic tools to exploit the host natural resistance to fungal diseases. It will go down two separate paths: marker-assisted breeding and full genetic engineering. While genetic engineering has received most publicity in recent years, there has been a quiet revolution in marker-assisted breeding. The project will develop high-throughput diagnostics methods using genetic markers for selecting seedlings in an offspring from crosses that will shorten the time needed to produce these new varieties. It is expected that, with the continuous advances in high-throughput DNA technologies, marker-assisted breeding of disease resistance will become more efficient than genetic engineering.

The first stage will be to find the genes in wild relatives of wheat and potato which confer resistance to those fungal diseases causing such high crop losses. Biodiversity offers a huge pool of potential disease resistance, but only 0.1% of it has been exploited. BIOEXPLOIT has set its target much higher. It will explore the molecular components involved in conferring lasting resistance to the target species and put them into integrated databases for wheat and potato phenotype and genotype samples. The database will then be used to combine multiple disease resistance in a single crop. The project will give high priority to marker-assisted breeding for the exploration of natural disease resistance. Genetic engineering will be deployed to produce naturally resistant varieties in case insurmountable obstacles appear in attempts to combine several resistance traits into a single crop by controlled crosses.

The main target pathogens are the most harmful to crops: potato late blight, one of the world's most destructive plant diseases, and four fungal pathogens of wheat. Fusarium species will also be covered because their toxins make cereals dangerous to human health.

Harvesting public trust

Since all the material comes from naturally occurring wild species and their close relatives, there will be no suggestion of transgenic manipulation. The project partners hope the public will be more prepared to accept GMOs of this type. The varieties produced by marker-assisted breeding would not only be free from GMO implications, but could also be recognised by organic farmers. Their in-built natural resistance would make them highly suitable as organic crops. SMEs, which make up the bulk of plant breeders, will play a pivotal role in BIOEXPLOIT.

Full title: Exploitation of natural plant biodiversity for the pesticide-free production of food

Acronym: BIOEXPLOIT
Contract n°: CT-2005-513949

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EU contribution: €15.78m

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- Sainsbury Laboratory (UK)
- University of Dundee (UK)
- Rothamsted Research (UK)
- Institute of Plant Genetics and Crop Plant Research (Germany)
- Stichting dienst landbouwkundig onderzoek (The Netherlands)
- Max-Planck Institute for Plant-Breeding Research (Germany)
- Royal Veterinary and Agricultural University (Denmark)
- Danish Institute of Agricultural Sciences (Denmark)
- University of Helsinki (Finland)
- Plant Research International (The Netherlands)
- Plant Breeding and Acclimatization Institute (Poland)
- Institute of Field and Garden Crops (Israel)
- University of Haifa (Israel)
- University of Bologna (Italy)
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- Romanian Academy Institute for Biochemistry (Romania)
- University of Amsterdam (The Netherlands)
- Instituto Nacional de Investigaciones Forestales Agricolas y Pecuarias (Mexico)
- Swiss Federal Institute of Technology Zurich (Switzerland)
- University of Zurich (Switzerland)
- Agricult. Research Institute Hungarian Academy of Sciences (Hungary)
- RISØ National Laboratory (Denmark)
- European Association for Plant Breeding (Europe)
- European Association for Potato Research (Europe)
- Keygene N.V. (The Netherlands)
- National Institute of Agricultural Botany (UK)
- Società Produttori Sementi Bologna (Italy)
- Stichting Stimulering van Aardappelonderzoek (The Netherlands)
- FNPPPT (France)
- BioPlante (France)
- AgroVegetale SA Spain)
- Zamarte Breeding Company (Poland)
- SZELEJEWO Breeding Company (Poland)
- APPACALE (Spain)
- Saaten-Union Resistenzlabor (Germany)
- SaKa Forschung GmbH (Germany)
- ARC Seibersdorf Research GmbH (Austria)
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SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

CO-EXTRA

Keeping track of GMOs

Following the end of a de facto moratorium on GMO approvals, the European Union is set to face an increasing influx of imported and domestic transgenic food products and plants, despite opinion polls that show many Europeans are wary of these products.

The EU must satisfy consumer demands that transgenic products be clearly and reliably labelled and controlled, but it must also comply with international trade laws. A major Integrated Project (IP) – Co-Extra which has 52 partners from 18 countries – has been set up to help accomplish this two-pronged task.

A mixed reception

Following major discoveries in molecular biology during the 1970s, transgenic plants were first grown in 1984 and marketed in 1994. Large-scale cultivation began two years later. As the acreage of GMOs expands worldwide, transgenic products have been mostly accepted in the USA and some other countries, but not in Europe.

Although safety assessments have uncovered no adverse health effects, European public objections revolve around the uncertain long-term health and environmental effects of gene manipulation. Additionally, some consumer reluctance stems from a perceived lack of direct benefits. Whatever their opinions and attitudes, most consumers demand reliable labelling and coexistence regimes.

In 2004, in addition to the general traceability 'food law' (regulation 178/02/EC), tough new Union legislation (1829/03/EC and 1830/03/EC) on the labelling and traceability of GMOs entered into force. The rules mean that any food containing more than 0.9% EU-approved GMOs or 0.5% of EU-unapproved GMOs but with a positive safety assessment, has to be clearly labelled as such. For the first time, the new regime also covers animal feed.

The new rules state that GMOs must be traceable throughout the entire production and distribution process. This obliges each stakeholder to inform any purchaser of the presence of GMOs. The EU-backed European Network of Genetically Modified Organisms Laboratories (ENGL) helps to provide the analytical tools of underwrite coexistence.

Coexistence tools

Co-Extra is studying and validating biological containment methods and model supply chain organisations. It will identify and share existing best practices and provide new tools and methods that can be integrated with existing ones as part of a broad decision-support system.

It will enable the tracing of transgenic products along the food and feed chains. The project will survey practices and legal regimes within and outside the Union. It will collect data on the costs and benefits of the implementation of traceability and coexistence systems.

The IP will study consumer attitudes and their propensity to buy transgenic products. It will create guidelines to help farmers choose cultivars and culture practices that will decrease cross-contamination. If admixtures do occur, there will be guidelines on the best ways to deal with them and determine liability. Co-Extra will exchange findings with all the stakeholders – producers, intermediaries, retailers and politicians.

Innovative European approach

The IP will produce innovative techniques and guidelines to overcome the limits of current methodologies, for example, for reliable multiplex PCR detection. It will develop and validate cost-effective, fit-for-purpose methods for sampling and detecting GMO. It will produce proposals for reliable, complete and cost-effective traceability information management throughout the food and feed chains, with a long-term goal of standardisation.

Co-Extra will assess the reliability of some bio-confinement methods in real conditions and the effects of culture practices on a large scale. It will develop mathematic models of pollen emission and long-distance dissemination. Generic and case-study-based models of supply chain organisations will take into account economic and other critical factors.

Full title: GM and non-GM supply chains: their CO-EXistence and TRAceability

Acronym: Co-Extra
Contract n°: CT-2005-7158
Website: http://www.coextra.org/

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EU contribution: €13m

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- National Institute of Biology (Slovenia)
- National Veterinary Institute (Norway)
- AgroBioInstitute (Bulgaria)
- RIKILT Institute of Food Safety (The Netherlands)
- Genius Biotechnologie GmbH (Germany)
- Bundesinstitut für Risikobewertung (Germany)
- NIAB (UK)
- Institut Scientifique de Santé Publique (Belgium)
- Flanders Interuniversity Institute for Biotechnology (Belgium)
- University of Applied Sciences of Weihenstephan (Germany)
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- ADRIANT (France)
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SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

DiOGenes

Understanding the genetics of fat

Obesity used to be a problem mainly of maturity, but more and more children are now seriously overweight, too. This entails many health and social problems: a tendency to heart disease, diabetes, impaired joint and skeletal function, as well as reduced mobility and limitation of lifestyle choices. In Europe, obesity now uses up about 5% of total health care budgets. Dieting is rarely an answer, as dieters tend to put more weight back on when they stop dieting than they lost during their regime. Susceptibility to weight gain is largely genetic, but more sedentary lifestyles and poor eating habits also contribute.

To try and turn the tide of obesity, the EU has launched a major five-year Integrated Project DiOGenes (Diet, Obesity and Genes), bringing together experts in genetics, nutrition, public health and behaviour from 14 European countries. They aim to shed light on how genetic make-up and diet interact to encourage weight gain and develop a better understanding of what measures could be undertaken to reverse the trend. It has the potential to make significant improvements to the overall health of Europeans.

Are you what you eat?

One strand in the project is to try and define what major components of diet could influence weight gain and regain. Of particular interest are the glycaemic index (GI) of carbohydrates, which reflects how quickly they are converted into glucose in the bloodstream, and high protein diets, which make people feel full more quickly. A diet chosen to maintain weight loss will be tried out for up to a year on 350 families across Europe, each with at least one adult and one child who are overweight.

These family trials run in parallel with large-scale studies at population level. Data from no fewer than 145 000 adults from five countries will be collected to see whether the GI index and protein content of their diet affects their weight and general health. Molecular genetics studies will be carried out on a significant proportion and an equal number of controls. Existing data from 6 000 pairs of genetically identical twins will be analysed, based on intensive clinical tests for 1 000 and detailed surveys for the rest. The aim is to relate genetic, shared and non-shared environmental influences and key dietary habits to the development of obesity.

The field trials will be complemented by laboratory work to identify gene-nutrient interactions associated with changes in body weight and to study genetic variation in candidate genes. Researchers will look for biomarkers of dietary intervention and predictors of weight and metabolic variation.

Fight the flab partnership

Food technology will play an important role in the fight against obesity. One goal is to develop foods that consumers will like and choose to eat but that also contain ingredients that prompt them to feel full and stop eating at a reasonable point. New food products will also have to meet the criteria determined in a study of the key psychological/behavioural predictors of weight gain. Lifestyle and psychosocial attitudes contribute to consumers' decisions about what to buy and eat. The strategy for producing new foods will have to take into account the project's findings about these attitudes.

A software-based screening tool will be developed to assess individual risk of obesity and give advice on a personal diet programme. Finally, the weight management software will be put through a broad demonstration and the results of the project given wide publicity to consumers, policy-makers and food producers.

Full title: Diet, Obesity and Genes

Acronym: DiOGenes
Contract n°: CT-2005-513946
Website: www.diogenes-eu.org

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- National Medical Transport (Bulgaria)
- Nestec S.A (Switzerland)
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- NetUnion (Switzerland)
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SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

EARNEST

Determining how you become what you eat

How many Mothers know that what they eat during pregnancy and what they feed their babies might influence their children's health and capabilities as adults? Recent data indicate that the connection between perinatal nutrition and adult health is significant and measurable. In one study, improved early nutrition and infant weight led to a sharp reduction in adult diastolic blood pressure and the attendant risks of heart disease and stroke. It also doubled the beneficial effect of non-pharmacological means of reducing blood pressure, for example weight loss, salt restriction or exercise. In another study, male pre-term babies fed enriched formula for just one month had a 13-point advantage in verbal IQ tests seven to eight years later compared with similar babies fed a standard formula. Based on this compelling evidence, the European Union's large Integrated Project EARNEST has gathered a multidisciplinary team of scientists from 16 countries to find ways that public health practice can manipulate foetal and infant nutrition to reduce the prevalence of major adult diseases and to improve infantile development.

Recipes for healthier diets

In animal studies, and prospective human observational and experimental studies, perinatal nutrition has been shown to determine or 'programme' adult disposition to obesity, diabetes, vascular, bone and immune diseases, and cancer, as well as to affect brain development. However, many questions remain about the health and social impacts of whole diets and individual nutrients in pregnancy and infancy in both healthy and high-risk populations.

The five-year EARNEST project will collect the best possible data from large randomised, controlled human and animal trials, as well as prospective studies to examine the extent to which early nutrition programmes affect long-term adult health. For example, studies will measure how iron, zinc and long-chain polyunsaturated fatty acids affect cognitive, neuro-motor and behavioural health. One study will focus on which periods of a child's development are critical to particular health outcomes.

Nourishing European health and wealth

EARNEST will also assess the socio-economic costs of poor nutrition and analyse consumer knowledge and attitudes about nutritional programming. It will establish the potential of public health interventions to prevent and reverse harmful programming. It will also provide quantitative estimates of how European wealth creation would be enhanced by improved early nutrition.

This will furnish a strong scientific basis for promoting health across the board, helping to correct social inequalities in healthcare, education and economic development. Large animal studies, as opposed to just rats and mice, give EARNEST farm-to-fork significance in terms of its potential to improve meat and dairy production, creating added value for EU competitiveness. The project will team with industry to refine European standards for making and testing infant formula and food products for pregnant mothers.

As the economic burden of adult ill health eases, so should the drain on public health care resources. Work capacity should increase, and the number of sick days taken off by workers should decline. In addition to the economic benefits, the quality of life will improve in large population groups. The EARNEST consortium will act as a virtual institute of nutritional programming. This will create a pan-European critical mass of expertise, fostering nutritional standards, influencing education, helping shape EU policy and transferring technology to industry. This will help promote commercial competitiveness and nurture a new generation of internationally respected scientists.

Full title: Early nutrition programming - long-term follow-up of efficacy and safety trials and integrated epidemiological, genetic, animal, consumer and economic research

Acronym: EARNEST
Contract n°: CT-2005-007036
Website: www.metabolic-programming.org

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SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

EUROPREVALL

Understanding food allergies

Developed countries have seen a marked increase in the numbers of people of all ages, but especially children, who suffer from food allergies. Allergies to foods, such as cereals, eggs, dairy products, nuts and fish cause symptoms ranging from mild shortness of breath to life-threatening anaphylactic shock. Yet the underlying reasons for the apparent growth in the prevalence of the condition are not really understood, nor do we know why some people develop allergies and others do not. We do not even have reliable figures about the incidence and growth of allergies.

The EU has started a major four-year integrated project, EUROPREVALL, which will increase our understanding of the demographic patterns of allergies and their impact, and seek a holistic management of its symptoms for sufferers. It involves over fifty food, medical and agricultural research organisations throughout the EU, including some from new Member States.

Gauging allergies

The project will investigate the patterns and prevalence of food allergies throughout Europe, by surveying a large number of newborn children in five centres, and cross-sectional groups of adults and children in at least nine and possibly ten other centres. This will reveal any regional variations and determine which children 'grow out' of allergies and which do not. These broad studies will be complemented by more detailed investigations of referrals to 12 allergy clinics. All the information obtained will be analysed to try and identify risk factors for food allergy. They could be environmental, resulting from food eaten, infections or pollen in the air. Genetic or microbial sources are other possible triggers, as is exposure as a foetus to some sensitising influence.

The project is looking for new biochemical or genetic predictive markers for allergies. These would make it easier to adopt preventative measures, for example, during pregnancy. Current procedures for diagnosing allergies are cumbersome and unreliable. EUROPEVALL is investigating better tests to replace 'challenge' tests in which sufferers or samples of their tissue are exposed to allergenic material. The candidate tests are serological, using purified food allergens and novel detection with peptide or protein chips, as well as more conventional methods. Detection will also depend on a library of well-analysed allergens, ranked according to the severity of the reactions they induce. The new tests will improve diagnosis and reduce the impact of allergies.

Reaping the social rewards

Another question is whether increasing consumption of more highly processed foods has played a part in the growth of allergic response or the severity of reactions. The whole food matrix will be investigated and the possibility of harnessing food processing to reduce allergenicity will be considered. This work will be linked to international studies of whether threshold values can be established for allergenic foods. One effect would be to improve food labelling and help the food industry, which now incurs high costs in implementing strategies to manage food allergies.

All in all, food allergies impose a high cost on individuals and society, in terms of reduced quality of life and economic losses due to symptoms and the stress of living with the condition. The improved management and control of food allergies that will result when EROPREVALL results are gathered in should hep to reduce this impact. The consensus position on the best way to reduce the incidence and effect of food allergy offers the hope of reversing the trend of increasing food allergies. The results will be published widely and training materials will be prepared for patients, health professionals and the food industry.

Full title: The prevalence, cost and basis of food allergies across Europe

Acronym: EUROPREVALL
Contract n°: CT-2005-514174
Website: www.europrevall.org

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EU contribution: €14.06m

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- University Medical Centre, Utrecht (The Netherlands)
- EHI-EuroHandelinstitut GmbH (Germany)
- Tepnel BioSystems Ltd (UK)
- BIOMAY Produktions- und Handelsaktiengesellschaft (Austria)
- Institute of Animal Reproduction and Food Research, Polish Academy of Sciences (Poland)
- Aarhus School of Business (Denmark)
- VBC-Genomics Bioscience Research GmbH (Austria)
- University of East Anglia (UK)
- University Hospital Groningen (The Netherlands)
- Consorzio Interuniversitario Risonanze Magnetiche de Metalloproteine (Italy)
- Agricultural University of Athens (Greece)
- Consiglio Nazionale delle Recerche – Istituto de Scienze delle Produzione Alimentari (Italy)
- Medical University of Lodz (Poland)
- Central Manchester and Manchester Children's University Hospital NHS Trust (UK)
- Pharmacia Diagnostics AB (Sweden)
- RefLab ApS (Denmark)
- Anaphylaxis Campaign (UK)
- Medical University, Sofia (Bulgaria)
- Faculty Hospital in Hradec Králové, Charles University Prague, Czech Republic
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- IP Pragmatics Ltd (UK)
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SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

HEALTHGRAIN

Extracting every grain of goodness

Cereal grains are an essential component of daily diet and a major source of dietary fibre, which is important for gut health and provides protection against colon cancer. Recent studies have shown that bioactive compounds in whole grains also provide significant protection against several 'Western' diseases, including a rapidly expanding epidemic of type 2 diabetes. European diets generally do not include adequate quantities of cereal grains, and cereal grain in European foods is usually in a refined form that greatly diminishes its nutritional qualities. As part of its overall plan to improve food safety and quality, the European Union wants the food industry to develop new healthy foods based on European cereal grains. The Integrated Project HEALTHGRAIN joins 43 partners from 15 countries working to increase availability of high-quality, health-promoting cereal-based foods, with the goal of increasing the average European citizen's intake of protective whole grains.

Whole grain for maximum gain

Wheat makes up most of Europe's cereal consumption, but usually only in the form of refined white wheat flour in such foods as baked goods, pasta, and breakfast cereals. Wheat milling focuses on flour extraction and, for durum wheat, on semolina, from the endosperm, discarding about 25% of the kernel for use as animal feed. These discarded outer kernel layers (bran and aleuron) and the germ contain dietary fibre and a range of bioactive nutrients such as vitamins, phytochemicals (folate, choline, sterols, tocols, alkylresorcinols and phenolics) and oligosaccharides. Rye grain in whole meal or whole-grain bread has high nutritional value but its taste does not appeal to most Europeans.

The 60-month HEALTHGRAIN project aims to produce new wheat varieties with optimal bioactive content, used in foods that are appetising to Europeans. It will start by conducting studies of consumer expectations in four European countries. The project's interdisciplinary research team will then employ plant biotechnology, including 'omics' technologies, and nutrition science, to reveal the physiological mechanisms behind whole grain's benefits. They will determine the bioavailability of bioactive compounds, for example, establishing how cereal foods' glycemic properties reduce risk factors for diabetes. The project will create a toolkit of molecular markers, as well as kits and calibrations for use by plant breeders. New fractionation and bioprocessing (enzyme and fermentation) technologies will help concoct grain foods combining good taste and nutritional benefits.

A la carte grain

HEALTHGRAIN will provide health professionals with new nutritional tools to combat such diseases as obesity, type 2 diabetes and heart disease, as well as certain cancers. This will help reduce health-care expenditures linked to Western lifestyles and ageing populations. Europe produces about 36% of the world's wheat and 94% of its rye, but at a higher cost than many of its competitors. The project will give European grain producers new technologies to develop globally competitive, healthier grain traits, and for the processing industry, including a large number of small-and-medium-size enterprises, to develop new, competitive, grain foods that are good for health. These will include foods for individuals sensitive to particular cereal constituents, for example, gluten-free products.

Full title: Exploiting bioactivity of European cereal grains for improved nutrition and health benefits

Acronym: HEALTHGRAIN
Contract n°: CT-2005-514008
Website: www.healthgrain.org

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EU contribution: €14.4m

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- Tate & Lyle (Belgium)
- ANET – New Media Solutions (Austria)
- Barilla G. e R. Fratelli - Società per Azioni (Italy)
- Federal Research Centre for Nutrition and Food (Germany)
- BOKU – University of Natural Resources and Applied Life Sciences (Austria)
- Branscan Limited (UK)
- Budapest University of Technology and Economics (Hungary)
- BÜHLER AG (Switzerland)
- Cereal Chemistry Equipment CVBA (Belgium)
- Danish Institute of Agricultural Sciences (Denmark)
- DPRNUTRITION LTD (UK)
- The Technical University of Denmark (Denmark)
- International Association for Cereal Science and Technology (Austria)
- Institute of Food Research (UK)
- IGV Institut für Getreideverarbeitung GmbH (Germany)
- Institute of Plant Breeding and Acclimatization (Poland)
- Institut National de la Recherche Agronomique (France)
- Istituto Nazionale di Ricerca per Gli Alimenti e la Nutrizione (Italy)
- The Royal Veterinary and Agricultural University (Denmark)
- Katholieke Universiteit Leuven (Belgium)
- Lunds Universitet (Sweden)
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- Puracor NV (Belgium)
- Raisio Nutrition Ltd (Finland)
- Rothamsted Research (UK)
- Swedish University of Agricultural Sciences (Sweden)
- SNF Swedish Nutrition Foundation (Sweden)
- Technoalimenti S.C.p.A. (Italy)
- Netherlands Organisation for Applied Scientific Research (TNO) (The Netherlands)
- University College Cork-National University of Ireland (Ireland)
- University of Helsinki (Finland)
- University of Kuopio (Finland)
- Maastricht University (The Netherlands)
- Federico II University of Naples (Italy)
- University of Surrey (UK)
- Università degli Studi della Tuscia (Italy)
- University of Ulster (UK)
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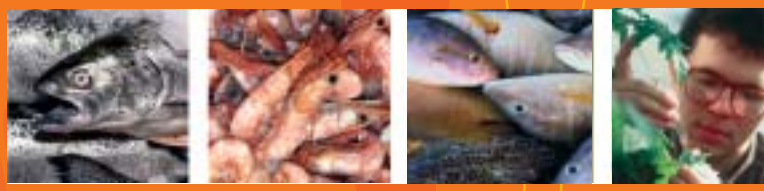
SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

IMAQUANIM



Fishing for new solutions for improved health in the aquaculture sector

The use of antibiotics, drugs, and chemical disinfectants in the fish-farming industry can leave residues in food products and the environment. These can have harmful health effects on humans. In particular, released antibiotics can promote human disease causing agents to acquire resistance to anti-microbial drugs. More efficient vaccines, better diagnosis of diseases that affect fish, and improved sanitary controls have helped to reduce significantly antibiotic use in aquaculture, particularly for Atlantic salmon. This has led to better acceptance of fish farming among Europeans, boosting growth in this industry.

However, use of antibiotics continues. In order to curtail this practice, IMAQUANIM has brought together 17 universities and governmental research institutes, as well as five small and medium size enterprises (SMEs) working to develop technology to improve the disease immunity of Europe's major aquacultured species.

Overcoming immunity knowledge gaps

The immune system is not as well understood for finfish and shellfish as it is for mammals and other higher vertebrates. Successful bacterial vaccines were developed for salmon based mostly on trial and error. However, despite years of research, just a few vaccines have recently emerged against fish viruses, while none currently exist against fish parasites.

One of IMAQUANIM's priorities is to improve basic knowledge of how fish acquire immunity to diseases. The research team will develop tools, such as gene arrays and antibodies , as well as assays for monitoring immune-relevant molecules and cell populations. The team will use these tools to characterise fish immune systems, to determine how efficient protection against disease can be induced by vaccination, and to identify immuno-competent individuals for selective breeding.

For finfish, the work will include trials with commercial and experimental vaccines. Infection trials with each major finfish and shellfish species with selected viral, bacterial or parasitic pathogens known to cause severe problems for European aquaculture will also be included.

Scientists already know that invertebrates, such as shellfish, lack adaptive mechanisms and, thus, cannot be vaccinated in the sense of activating a memory-based immunity. Nevertheless, although shellfish immunity is strictly based on innate mechanisms, recent findings indicate that it can be bolstered by 'priming' these mechanisms. Since, at low temperatures, this is also true for finfish, IMAQUANIM will employ an integrated approach in its research to maximise the data's scientific and commercial potential.

Healthier fish for healthier humans

IMAQUANIM'S data will provide a strong technological basis for qualified strategies to counteract rapidly known or new diseases in aquacultured fish. The resulting gene arrays and immune-response assays will be employed to develop efficient vaccines and feed-based immuno-stimulants for finfish species.

They will also be used for genetic typing, immuno-competence monitoring and diagnostic surveillance for both finfish and shellfish. The project results will create a basis for the breeding of aquacultured animals that are immune to devastating infectious diseases. By contributing to improved animal health, IMAQUANIM will lead to higher quality food products, free of residuals of antibiotics or other chemicals, and to more environmentally friendly and cost-efficient fish farming. This will have a positive influence on consumer perceptions of aquaculture and encourage people to include more fish and shellfish in their diets.

Full title: Improved immunity of aquacultured animals

Project acronym: IMAQUANIM
Contract n°: CT-2005-007103
Website: not available yet

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EU contribution: €8.02m

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- Friedrich-Loeffler-Institute (Germany)
- Università della Tuscia (Italy)
- Málaga University (Spain)
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- Universitat Autonoma de Barcelona (Spain)
- Instituto de Investigaciones Marinas (Spain)
- Centre National de la Recherche Scientifique (France)
- University of Padova (Italy)
- Istituto Zooprofilattico Sperimentale delle Venezie (Italy)
- Scottish Fish Immunology Research Centre (UK)
- Department of Animal Sciences, Wageningen University (The Netherlands)
- Veterinary Research Institute (Czech Republic)
- Royal Veterinary & Agricultural University (Denmark)
- Alpharma, Aquatic Animal Health (Norway)
- Bionostra (Spain)
- GeneCare, Technical University (Denmark)
- Aquaculture Diagnostics (UK)
- BioMar A/S (Denmark)

SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

PathogenCombat

Fighting new pathogens in the food chain

In recent years, several instances of food contamination have shattered European consumers' confidence in the food supply. Despite significant investment and increased scrutiny, food-derived disease is increasing in the Union, harming both the food industry and the overall economy. The Integrated Project (IP) PathogenCombat is taking a holistic, multidisciplinary approach to threats from new and emerging pathogens across the entire food chain. Seventeen small and medium-size enterprises (SMEs), three industrial partners and 24 research partners from 17 countries will work to substantially revise and improve Europe's food safety control systems and strategies.

Molecular-based approach to food safety

These systems, as applied in both public and private sectors, rely heavily on conventional microbiological testing based on sample sizes and methods, which often renders the testing worthless. Furthermore, current tests are aimed at final products and do not consider critical points where pathogens enter the food chain. PathogenCombat will develop new molecular-based methods to detect, predict and characterise pathogens along the food chain and at the time of consumption.

The IP's large number of partners offering diverse expertise will allow it to take a multidisciplinary approach to studying eight new and emerging pathogens. The project will begin by obtaining an understanding at the molecular level and end by contributing to the production of safe foods. The studied pathogens include gram-negative and gram-positive bacteria, a yeast, a filamentous fungus and two viruses. This profile is highly versatile in terms of origin, pathogenicity, physicochemical resistance, physiology and growth and survival requirements.

New weapons

The IP's overall objective is to provide essential new information and methods to the food industry and public authorities on how to reduce food-borne pathogens. It will develop advanced platforms allowing real-time, *in situ* investigation of pathogens – how they get into food and feed and survive, and how they remain viable on contact surfaces and in farm animals' intestinal tracts. Studies will target milk and dairy products, ruminants, poultry and pigs and their meat products.

The platforms, several of which will be used for the first time in food safety studies, include bio-imaging, laser tweezers, phage display and convergent evolution, functional mammalian cell models, functional genomics and DNA-microarrays. PathogenCombat will also develop new processing technologies and new hygienic designs to prevent pathogen transmission along the food chain, To enable a truly preventive approach, the new information obtained will be applied to develop a food safety management system where process-environment control is emphasised over end-product testing. This will allow proactive responses to new and emerging pathogens.

The IP's new data and methods will contribute to a strong European standard of food safety management, improving the health and well-being of EU citizens and the competitiveness of its food industry. For consumers, the goal is a European-wide attitude change regarding food safety, and a better insight into hygienic food handling at home. Increased availability of safe food and fewer reservations about processed food will boost the EU agro-food industry.

Full title: Control and prevention of emerging and future pathogens at cellular and molecular level throughout the food chain

Acronym: PathogenCombat
Contract n°: CT-2005-007081
Website: www.pathogencombat.com

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EU contribution: €11.3m

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- Federal Research Centre for Nutrition and Food (Germany)
- Danisco A/S (Denmark)
- University of Maribor (Slovenia)
- University of Udine (Italy)
- Swedish University of Agriculture (Sweden)
- Veterinary Research Institute (Czech Republic)
- Vermicon (Germany)
- Congen (Germany)
- University of Ghent (Belgium)
- Profos (Germany)
- Corvinus University of Budapest (Hungary)
- Universidad de Burgos (Spain)
- Agricultural University of Athens (Greece)
- Universitá di Bologna (Italy)
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- Agence Française de Sécurité Sanitaire des Aliments (France)
- Technical University of Denmark (Denmark)
- The Manchester Metropolitan University (UK)
- Cocker Consulting (The Netherlands)
- Bactoforce A/S (Denmark)
- Anidral (Italy)
- Granarolo (Italy)
- Pittas Dairy Industries (Cyprus)
- Cooperativa Avicola y Ganadera de Burgos (Spain)
- Institut Technique Français des Fromages (France)
- Bergpracht-Milchwerk GmbH & Co (Germany)
- Wegerer Gerold Geflügelzucht (Germany)
- Geflügelspezialitäten Ziegler (Germany)
- Jamones Segovia, S.A. (Spain)
- Somas Ltd (Hungary)
- The Australian Food Safety Centre of Excellence (Australia)
- Wageningen University (The Netherlands)
- Warsaw Agricultural University (Poland)
- University of Stuttgart (Germany)
- EBTE Consultants (Greece)
- Scottish Agricultural College (UK)
- University of Lund (Sweden)
- Colear Castilla Sociedad Cooperativa (Spain)
- Martinez Loriente, S.A. (Spain)
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SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2

Call 2

Integrated Project

TRACE

From fork back to farm

Consumers increasingly want to have confidence in the labelling of their food and, in particular, to be certain where their food comes from. Producers of regional specialities like Parma ham also want to be sure that imitators cannot make false claims of origin. There is no coherent Europe-wide infrastructure for tracing food at present. Developments in logistical information systems are being made in isolation of the methods that can verify the origin of food. To date, new scientific techniques that could provide methods for confirming where food has come from remain largely unexploited. Europe plans to employ the latest methods and traceability systems in the major long-term Integrated Project 'Tracing the origin of food' (TRACE) in order to provide complete traceability of a range of foods from source to shop and back again. TRACE is a five-year project involving more than 50 institutions and organisations.

Natural tracers in foods

TRACE aims to develop generic and sector-specific traceability systems for use in the food industry. The systems will include specifications relating to origin that can be checked using methodology developed in the project. Good traceability guides will be produced and global traceability language and architecture will be tested by industry in five sectors: meat, chicken, cereal, honey and mineral water. It will focus on products which are marketed on the basis of where or how they are produced. Technology transfer will be assured through dissemination activities, workshops and intensive training so that the methods and systems can be widely adopted.

Most foods contain the 'fingerprints' of the environment where they were produced. The isotopic ratios of heavy elements from the soil or lighter elements from plant materials depend very much on regional geological and climatic patterns. So, one strand of TRACE is correlating regional geochemical and bio-climatic factors with the properties of locally produced food. This mapping of local characteristics will reduce the need for a different set of data for each commodity, making tracing faster and cheaper.

Advances made in molecular biology technology will be used to create rapid, sensitive methods of identifying species, races or breeds of animal or varieties of plants. Genetic markers and microarray technology will broaden these techniques and speed them up.

TRACE will exploit recent advances in metabolite profiling methods to produce generic techniques for verifying food. Statistical techniques will be used to produce specifications that can be easily incorporated into supply chain management systems, providing a cost-effective mechanism to monitor product integrity.

Consumer Behaviour

A study will be conducted on consumer attitudes to and perceptions of traceability and food fraud. In particular, it will address the potentially contentious issue of "What information do consumers think they should be able to access from a traceability system?" Further input will be provided by a network of consumer groups throughout Europe.

Health and economic benefits

The successful completion of TRACE will have major benefits for many sectors of the European community. It will benefit the consumer by ensuring the origin and safety of food on sale. Fake or unsafe products will be quickly traced and removed from the market, reducing the considerable costs of fraud to society and business. This transparency will result in European food being viewed as of superior quality, since its characteristics can easily be checked. Increased consumer confidence in European food will be of benefit to the European food industry and will also help promote sustainable agriculture.

Full title: Tracing the origin of food

Acronym: TRACE
Contract n°: CT-2005-006942
Website: www.trace.eu.org

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EU contribution: €11.96m

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- LGL Bayern Oberschleißheim (Germany)
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- Famille Michaud Apiculteur, (France)
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SIXTH FRAMEWORK PROGRAMME

Food Quality and Safety - Call FP6-2003-Food-2