# Major Challenges to the European Agri-Food Industry

**Dr Mike Knowles**
Chairman, European Technology Platform “Food for life”

European Technology Platform
Food for Life

# Content of the Presentation

- About FoodDrinkEurope
- The Role of the ETP Food for Life
- Challenges:
  - Principal challenges
  - Safe food production
  - Improvement of  health, well-being and longevity
  - Sustainable and ethical production
  - Food processing, packaging & quality
  - Food & Consumers
  - Food chain management
  - Training and technology transfer
- Policy recommendations
- Conclusions



European Technology Platform Food for Life

# Key Figures on Europe's F&D Industry

| Turnover | Employment | Sme's | |
|---|---|---|---|
| €954 billion<br>(-4,0% compared to 2008)<br>Largest manufacturing sector in the EU (12,9%) ahead of the automobile and chemical industries | 4,2 million people<br>(-1,5% compared to 2008)<br>Leading employer in the EU (13,5%) ahead of fabricated metal, machinery & equipment industries | 48,2% of food and drink turnover<br>62,8% of food and drink employment | |
| **External trade** | **Number of companies** | **Value added** (% of EU GDP) | **Consumption** (% of household expenditure) |
| Exports €53,7 billion<br>(-8% compared to 2008)<br>Imports €50,8 billion<br>(-14,2% compared to 2008)<br>Trade balance €3,0 billion<br>(net exporter of food and drink products) | 310 000 (2007 data)<br>(fragmented industry) | 2%<br>(stable) | 13,1%<br>(slight increase) |
| | EU share of global exports<br>18,6% (20,4% in 2000)<br>(shrinking share in global exports) | R & D (% of food and drink output)<br>0,37% (2006 data)<br>(unsufficient R & D expenditure) | |

European Technology Platform
Food for Life

# FooddrinkEurope Membership Base

Members include:

- National federations (26 including 3 observers)
  - Observers: Croatia, Norway, Turkey
- Sector associations (26)
  - E.g.: Bakery, beer, breakfast cereals, chocolate, biscuits & confectionary, dairy, ice cream, margarine, soft drinks, oils, pasta, snacks, coffee, starch, sugar, tea & herbal infusions, yeast, etc.
- Member companies (19)
  - E.g.: Barilla, Cargill, Coca-Cola, Danone, Ferrero, General Mills, Heineken, Heinz, Kellogg, Kraft Foods, Mars, Nestlé, PepsiCo, P&G, Sudzucker, Tate & Lyle, Ülker, Unilever

# Challenges! Emerging and Extant

- Burdensome Regulatory Framework
  - Complex and lengthy process
  - Unpredictable outcomes
  - Regulatory inconsistencies between DG's
  - National regulations
  - Uneven application of Internal Market Rules
  - Incomplete and/or inappropriate use of science

# Challenges! (contd)

- Finance
  - EU food industry investment in R&D is low by comparison with other industry sectors, and lower than USA and Japan
  - EU supports through DG R&I
  - EU Proposal 'Towards Single Market  Act' for new sources of capital
- Consumer Attitudes
  - Not convinced of benefits in food innovation – prefer 'natural'
  - Recent surveys (eg UK FSA) indicate support if safe and has benefits to consumers
  - No risk-taking cf. US, Japan
- MS's attitudes to technology: variable: North ↔ South
- Technology Transfer (SME's): ETP – Food For Life



European Technology Platform Food for Life

# Challenges! (contd)

- EU – MS's coordination of research: ETP Food For Life
- Qualified Personnel / Creative Thinking!:
  - need to increase graduate's entering food research and food industry for multiple disciplines
- EU 'Single Market Act' Proposal
- Competitiveness:
  - EU 'Single Market Act' Proposal: 'being competitive in global markets'
  - Helping SME's

# Creation of the European Technology Platform in 2005


European Technology Platform
Food for Life

# The Role of the ETP Food for Life

- To deliver innovative, novel and improved food products through an effective integration of strategically-focused, trans-national research, in the nutritional, food and consumer sciences, and food chain management
- These products, together with recommended changes in dietary regimes and lifestyles, will have a positive impact on public health and overall quality of life (‘adding life to years’)
- These activities support a successful and competitive pan-European agro-food industry which has global business leadership securely based on economic growth, technology transfer, sustainable food production and consumer confidence



European Technology Platform Food for Life

# Scientific Working Groups

| Key Thrust Groups | Title |
|---|---|
| KT 1 | Improve health, well-being & longevity |
| KT 2 | Build consumer thrust in the food chain |
| KT 3 | Sustainable & ethical production |

| Delivery Tools Groups | Title |
|---|---|
| 1 | Communication, Training & Technology Transfer |
| 2 | Food processing, packaging & quality |
| 3 | Food & Consumers |
| 4 | Food chain management |

# Safe Food Production – towards a future Strategic Research and Innovation Agenda (1)

Priority research challenges

- Evaluation of risks-versus-benefits
- System innovation methodologies in the food production chain
- Consumer studies



European Technology Platform Food for Life

# Safe Food Production – towards a future Strategic Research and Innovation Agenda (2)

Predicting and monitoring the behaviour and fate of relevant known and emerging biological hazards and challenges

- Improve knowledge on persistence of microorganisms in food matrices and food processing environments
  - Application of ‘omics technologies to understand, monitor and predict microbial behaviour
- Enhanced understanding of  virulence traits coupled to food safety and mechanisms of emergence

# Safe Food Production – towards a future Strategic Research and Innovation Agenda (3)

Predicting and monitoring the behaviour and fate of relevant known and emerging chemical hazards including toxins of biological origin

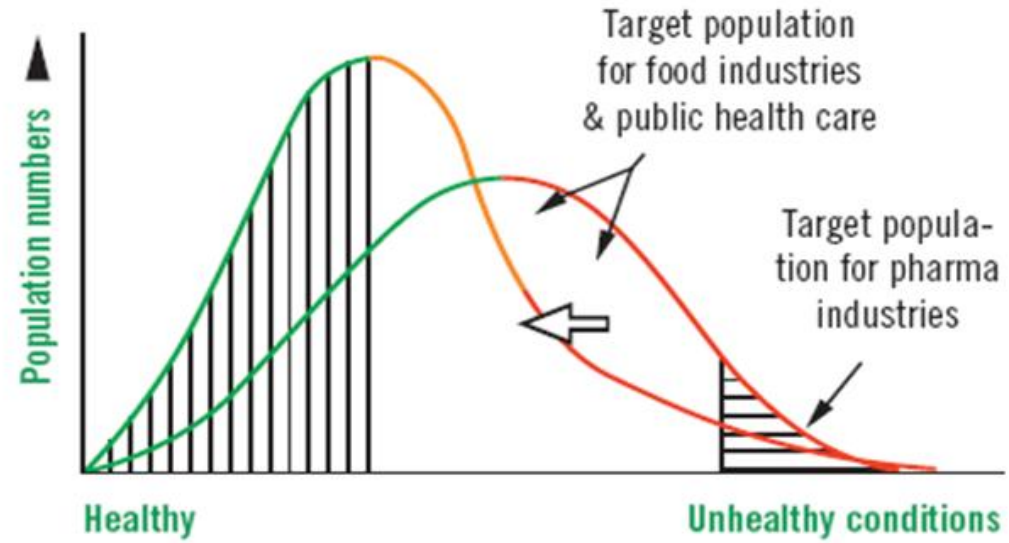
- Interaction between pollutants and between pollutants and food matrices (synergies, antagonistic effects,…)
- Safety assessment of mixtures of chemical contaminants and complex foods with e.g. uncharacterised ingredients
- Research into inherent toxins e.g. plant toxins, like alkaloids, both in crops and in weeds should be high in priority.
- Continued research into heat generated contaminants

# Safe Food Production – towards a future Strategic Research and Innovation Agenda (4)

Development of robust and cost effective RA (Risk analysis) concepts

- Novel approach for assessment of emerging risks and issues, e.g. virtual methods based on molecular information (e.g. structure in the case of chemicals, such as medicines)
- Renew focus on GMO's and perception by consumers
- New methods of exposure assessments

# Improvement Health, Wellbeing & Longevity - towards a future Strategic Research and Innovation Agenda (1)




Source: Green MR and van der Ouderaa F, Nature Pharmacogenomics, 2003



European Technology Platform Food for Life

# Improvement of health, well-being and longevity - towards a future Strategic Research and Innovation Agenda (2)

- Understanding brain function in relation to diet, e.g. prevention of cognitive decline
- Understanding dietary effects on immune and intestinal function, e.g: Knowledge and tools to positively modify systemic inflammatory activity by diet, especially with regard to the intestinal system, metabolic disorders such as type 2 diabetes, cardiovascular diseases and the ageing process
- Understanding the link between diet and metabolic function (obesity and associated metabolic disorders), e.g: development of dietary strategies to counteract ageing-associated muscle wasting (sarcopenia) and decrease of bone quality

# Improvement of health, well-being and longevity - towards a future Strategic Research and Innovation Agenda (3)

- Understanding the variation in human metabolic energy efficiency - including the contribution of the gut microbiota to energy homeostasis
- Better understanding of the effect of diet in pregnant women for the development of the offspring in view of obesity and diabetes predisposition and for optimising fetal and early postnatal development
- Treatment of low grade inflammation by diet /dietary constituents in view of its central role in the pathogenesis of a variety of diet-dependent or affected diseases such as type 2 diabetes and other chronic diseases
- Understanding dietary effects on immune and intestinal function, for example: Knowledge and tools to positively modify systemic inflammatory activity by diet, especially with regard to the intestinal system, metabolic disorders such as type 2 diabetes, cardiovascular diseases and the ageing process
- Validation of in vitro models for the in vivo prediction of the behaviour of food ingredients in digestion, absorption, distribution, function and elimination
- Assessment of food-drug interactions for risk-benefit-analysis in use of bioactives in food and on the role of foods in drug delivery and metabolism

# Sustainable and ethical food production - towards a future Strategic Research and Innovation Agenda (1)

Reduced use of resources, increased efficiency and better governance

- Sustainability of food production, such as:
  - Optimisation and reduction of food waste
  - Reduction of environmental impact of animal biomass production
  - Availability of land resources to satisfy increasing food consumption globally
  - How are the multiple land use requirements for the bioeconomy (e.g. biochemicals, biofuel) influencing the sustainability of food production

# Sustainable and ethical food production - towards a future Strategic Research and Innovation Agenda (2)

Reduced use of resources, increased efficiency and better governance

- Sustainability of food consumption, such as:
- How will future challenges of feeding the population (hence increased productivity) ensuring health (food secure products and more balanced diets, e.g. less meat) impact the sustainability challenges of production?
- ‘Less is more’ as a concept of sustainable development
  - Does not have a problem owner
  - How to implement such a radical shift?
- “Sustainable nutrition” – Synergies between consumption and production: products, diets, costs

# Food processing, packaging & quality
# Food & Consumers - towards a future Strategic Research and Innovation Agenda (1)

- Have greater integration in research between processing, food quality and safety, nutrition and sustainability
- To revise how food science/engineering students are trained, in order to avoid exclusive specialisation, and enable initiating research across the borders of scientific disciplines
  - This should involve the integration of knowledge from other disciplines, such as medical, cosmetics, material science and economics
- Develop SME innovation platform:
  Innovation is not just about new ideas, but how to use and combine existing processes and ideas in new ways

# Food processing, packaging & quality
# Food & Consumers - towards a future Strategic Research and Innovation Agenda (2)

- Food processing aimed at managing the food structure lifecycle to obtain foods with properties aimed at PAN (preference, acceptances needs)
- Understanding the interaction between food structure and functionality, and changes resulting in modulation of functional properties resulting in new properties
- Sustainable exploitation of the endogenous potential of new plant-based raw materials via exploitation of existing methodologies and development of new methodologies aimed at new product development-even without refinement to develop new foods
- A full chain approach: Exploitation of raw materials by precision processing for specific food functional properties

# Food processing, packaging & quality
# Food & Consumers - towards a future Strategic Research and Innovation Agenda (3)

- Engineering approaches on tailor-made products for gut microbiota /Effect of the matrix on the functionality of foods which modulate the gut microbiota
- Process control-analytical tools and process sensors in the context of life history structure-life-cycle sensors, that follow the food material to test for damage of the product (post-harvest optimised design) – the need for online (or at-line) equipment for thermal and non-thermal processing
- Exploiting the wide field of packaging's innovation potential by combining rational environmental and health concerns with advanced technologies
- Increase Biodiversity and the plant base-new technologies may allow for the exploitation of raw materials not currently useful, thus broadening the raw material base

# Food & Consumers - towards a future Strategic Research and Innovation Agenda (1)

SOCIETAL CHALLENGES

- Food safety and security
  - Food sovereignty, local production and social impact
  - Trust, confidence and governance
  - Trust, authenticity and naturalness
- Health
  - Social impact of food-related diseases and the mitigation potential of functional foods
  - Consumer acceptance of reformulated foods
  - Healthy ageing and individual differences
- Sustainability
  - Sustainability communication
  - Trade offs between sustainability and other consumer benefits
  - Animal welfare
  - Protein supply

# Food & Consumers - towards a future Strategic Research and Innovation Agenda (2)

BEHAVIOUR CHANGE

- Consumer decision making
  - Nudging: affecting consumer decision at the point of purchase
  - Out-of-home consumption
  - Meal patterns and eating habits

NEW DEVELOPMENTS

- Consumer engagement
  - The role and value of social media and social networking to encourage and support longer term behavioural change in respect of healthy lifestyles.
  - Engaging consumers with (innovative) consumer research approaches
  - Price as a determinant of food choice

# Food & Consumers - towards a future Strategic Research and Innovation Agenda (3)

METHODOLOGICAL INNOVATION

- Networking the Food Consumer Science Capability across Europe
  - Integrating scientific disciplines and databases
  - Defining EU-wide standards and tools in Food Consumer Science
- Longitudinal analysis in consumer science research
  - Dietary change and obesity determinants: evidence from longitudinal analyses

DISSEMINATION

- Dissemination to European SME's
  - Making food consumer science actionable for SMEs

# Food chain management- towards a future Strategic Research and Innovation Agenda (1)

- Reduction in waste
  - Energy
  - Water
  - Products
  - Packaging
- Newly emerging chains (analysis and optimization)
  - New information systems
  - Personalised products
  - Ethnic products
  - Flexible market driven chains

# Food chain management- towards a future Strategic Research and Innovation Agenda (2)

- Trust within the chain for better serving society and consumers
  - Building trust based on awareness
  - Consumer acceptance of claims
  - Communication with consumers
- Demographics
  - Increasing urbanisation – lower mobility
  - Erving urban consumers while supporting environment
  - Urban food systems (roof and garden)

# Food chain management- towards a future Strategic Research and Innovation Agenda (3)

- Structural change
  - Integrating food system with lifestyles, regional identification and occupation policies, etc.
  - Serving regional development
- Governance
  - Management needs from a perspective of SMEs
  - Management information systems for better cooperation , control and risk management in enterprises, chains, networks and sectors
  - Lean management concepts
  - Knowledge networks for innovation support
  - Infrastructures for SME management support
  - Flexibility for optimal response to emerging risks

# Training and technology transfer - towards a future Strategic Research and Innovation Agenda (1)

- Reformulation
  - Reformulation of products related to salt, sugar and fat contents
  - Keeping of texture, mouth feel and storability
- Support for health related product communication
  - Verification of expected Health Benefits in Foods
  - Accompanying Process for the Evaluation of existing Health related Effects during Product Development Phase
- Fast Testing and Screening Tools
  - Monitoring of Contamination
  - Easy Quality Checks
  - Product Classification
  - Fast, reliable Information

# Training and technology transfer - towards a future Strategic Research and Innovation Agenda (2)

- New processing technologies
  - High Pressure Treatment
  - Ohmic Heating
  - Adiabatic Cooling
  - PEF/Laser
- New packaging technologies
  - Active Packagings
  - Intelligent Packagings
  - SMART Packagings
- Sustainability
  - Material Management
  - Resources Management
  - Energy Management
  - Recycling
  - Waste Reduction

# Training and technology transfer - towards a future Strategic Research and Innovation Agenda (3)

Training

- Better SME Access to Science and Result Exploitation
- Good Training – requires Good Trainers, such as:
  - Scientists with Industry Knowledge

# Policy Recommendations

- Design an environmental and sustainable industrial policy
- Develop efficient authorisation procedures for novel foods
- Better support for SMEs
- Better access to finance
- Make better use of FP7 funded projects which support technology transfer
- Increase awareness of existing projects aimed at facilitating technology transfer to SMEs
- Feed the research needs gained from European and national technology platforms into the European policy level



European Technology Platform Food for Life

# Conclusions (1)

Use the ETP concept as a tool to improve the competitiveness of the European Food industry by:

- Increasing / Coordinating R&D spending with the aim to match Europe 2020 goals by:
  - Increasing the quantity/quality and the speed of innovation
- Optimising knowledge capture and dissemination of knowledge towards SME's
- Identifying the right stakeholders and organising collaboration
- Attracting the right personnel and sustain careers, for example by creating a European Academy for Innovation (Technology and Innovation Institute)
- Developing concepts for sustainable food production
- Designing 'food–you-can-trust'
- Engaging consumers in dialogue
- Playing a leading role to improve the KBBE Concept

# Conclusions (2)

- Establish the policy concepts/contacts to contribute to:
  - Linking different research areas, e.g. nutrition, agriculture, environment, health and consumer protection
  - Encouraging  public private partnerships
  - Preventing unnecessary duplication of research efforts
  - Facilitating the use of national funding to complement European funding
  - Using the ETP Strategic Research Agenda to feed into the 8th Framework Programme
  - Facilitating the involvement of SMEs and create special conditions for their involvement
  - Encouraging R & D by creating the right incentives, such as creating a legal framework facilitating bringing products to the market

# Conclusions (3)

- Promote the use of modern technologies/processes to develop innovative food products
- Drive Research to fill knowledge gaps via the Joint Programming Initiative…./ coordination of research spending across EU



European Technology Platform Food for Life

# The Way Forward

- There are formidable challenges to innovation by the European Food Industry, which must be overcome if it is to be competitive in global markets, as well as within Europe
- The opportunities for research are in place or will be soon but better coordination – EU MS's, Private Sector, Venture Capital, Public Sector – is needed to realise them to the fullest extent
- Citizens (and MS's) must be included in the dialogue on benefits of new technologies, novel foods, foods 'tailored' to specific consumer demands etc, from the outset



European Technology Platform Food for Life

# Thank you for your attention – Questions ?

European Technology Platform
Food for Life