

Consumer welfare



**National Strategic Research Agenda for Food Research:
Sustainable and profitable production and
consumer welfare lay the foundations for the
success of the Finnish food chain**



Preface

This national Strategic Research Agenda (SRA) for food research has been compiled by the ETP Food for Life Finland cooperation platform. It is based on the research, development and commercialization strategy for the food and nutrition sector published by the Finnish National Fund for Research and Development (Sitra) as part of its Food and Nutrition Programme (ERA) in 2007. The research focus of this strategy was on health and research into and development of healthy products and solutions.

Health is no less important today. Many consumers are coping with issues such as weight management, allergies and hypersensitiveness, the maintenance of mental and physical well-being and various lifestyle diseases, and they need concrete, research-based information and support in the form of suitable food and nutrition. Since 2007, environmental concerns and the widely-accepted need to operate according to the principles of sustainable development have created new industry requirements for raw produce, processes, packaging and products. High energy costs, limited resources and international competition make more efficient processes a necessity. This document places greater emphasis on sustainable development and effective production, translating these requirements into research needs.

This SRA covers the entire food chain, but the point of view is clearly that of food industry. The changes to primary production and development areas are viewed at a relatively general level from the point of view of food industry needs.

The 2007 strategy proposed the establishment of a strategic centre for science, technology and innovation (SHOK) for the food sector. As this proposal has not been followed up, this strategy seeks to identify other means for developing cooperation in order to secure strategy implementation. The need for multidisciplinary research remains, where technology development is steered by the cooperation of parties in the fields of nutrition and medicine, and also by the national food culture.

Some areas requiring additional research, and where the need for information remains great, have been identified in joint discussions during the compilation of this SRA for food research. The presentation of these topics contains an extensive list of very detailed research needs, expressed by parties in the food chain consulted during the strategy work. In the next phase, we need to prioritize these research topics in order to select the first ones to be studied. I would like to invite all parties to continue active discussion on the final selection of research topics, and to establish research programmes to ensure the future success of the Finnish food chain.

I would like to express my thanks to the research committee of the Finnish Food and Drink Industries' Federation (ETL), the ETP Food for Life Finland steering group and the numerous active parties in the food chain for participating in the discussion and presenting various points of view. Seppo Heiskanen from ETL deserves a special mention for his support during all stages of the strategy work.

Espoo, 26 May 2011
On behalf of the strategy working group
Anu Kaukovirta-Norja



Abstract

The competitiveness and continuous renewal of the Finnish food chain form the foundations for welfare in Finland. The food chain is an important employer, providing jobs across the country. The challenges of the Finnish food chain are both local and global in nature, making improved operational efficiency a necessity. Variations in the market prices of energy and other resources, as well as global procurement chains, affect day-to-day operations also in Finland. An understanding of consumers and consumer behaviour is increasingly important in order to provide consumers with the kind of products and experiences they want. Sustainable development is a megatrend that is expected to remain topical and increase in importance, affecting the operations of the food chain in numerous ways. Water has been identified as a new factor. It is vital for the operation of the entire food chain as an indispensable raw material and as drinking water for farmed animals.

Sustainable and profitable production and consumer welfare are the two key focus areas of this national SRA for food research. In addition, there are three strategic focus areas that apply throughout the food chain and support its ability to compete and renew itself:

- Understanding consumer values, needs and choices;
- Safety and traceability; and
- Systems used by the logistics and production chains.

Cooperation between all parties in the chain and the open transfer of information are the cornerstones of strategy-based operations. To support this, the strategy proposes the establishment of a food policy programme for matters that fall within the scope of different ministries in order to clarify and simplify the dispersed administration and management of food chain-related matters, and additionally, the establishment of a “Food policy working group” to monitor strategy implementation.



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Strong food chain is a pillar of welfare in Finland

The food industry ranks fourth in Finland after the metal, forest and chemical industries. The gross production value of the food industry totals EUR 10.4 billion, and the value added totals EUR 2.4 billion. The industry employs more than 34,000 people in Finland. The entire food chain employs some 300,000 people, or some 12 per cent of the employed workforce. In 2009, the value of food exports was EUR 1.2 billion and the value of imports EUR 3.2 billion. Finnish food companies operate actively in neighbouring regions such as the Baltic countries, Sweden and Russia.

Of the raw produce used by the industry, 80 per cent is of domestic origin. Continued profitable domestic primary production is important to the industry. According to the Finnish Food and Drink Industries' Federation (ETL), critical industry success factors include safe domestic high-quality raw produce, a skilled and competent workforce and strong consumer confidence in the industry and its brands. ETL's Finnish food industry strategy 2010–2020 identifies as its key themes the profitability of the entire value chain and responsible production of food products.

In recent years, low profitability has been the food industry's key challenge. As a process-intensive industry, the food industry is burdened by the rapid increases in energy and transport prices. On the other hand, the industry is also facing increased demands in relation to product safety and environmental responsibility. Many food industry companies have joined the energy efficiency agreement system and committed to concrete energy saving targets.

The proposed Finnish food strategy published in 2010 contains the following vision of future food. In 2030, Finnish consumers will eat tasty, healthy and safe food that has been produced sustainably. Consumers can make informed decisions, and their demands are met by a transparent, competent, flexible and internationally competitive food and service system. Food industry growth and development are supported by well-coordinated high-level research and development.

The food strategy pinpoints the following as prerequisites for strategy implementation: consumer-orientation and an increased appreciation of food and food producers as well as a new type of administration model for food policy and food-related matters. However, the most important prerequisite is a joint decision to turn the food industry into a growth industry. To this end, the strategy sets the following objective: doubling Finnish food production by 2030, which translates to an annual growth target of some four per cent. According to the strategy, growth builds on the capacity for rapid change in a small country, abundant natural resources of which water is gaining in importance, the national and international impacts of climate change and high-level expertise. Global competitiveness is possible only through cooperation by all parties in the chain, top-quality research, product development and market expertise.



Objectives of the national SRA for food research

The Finnish food industry invests more in research and development than similar industries in most other countries in Europe (2.9 per cent of production value in 2009). However, the total sums (EUR 68 million in 2009) remain modest because Finland is a small country. Challenges include the prevention of dispersed financing, the selection of suitable focus areas and the steering of R&D efforts into areas that best support the success of individual companies and the food chain as a whole.

The purpose of this national SRA for food research is to identify the common R&D needs of the food chain and actions that support open, top-quality Finnish research activities in the future. The SRA has the following key objectives: supporting the business and competitiveness of all parties in the food chain and promoting the establishment of new value chains and new business where the food chain intersects with other industries. The SRA also seeks to enhance the appeal of the food industry in ensuring the future availability of skilled and competent employees. In strategy implementation, securing research funding for strategic focus areas is a key objective.

Finland is becoming increasingly integrated with the rest of Europe. Most of our food legislation is drafted by the EU, which supports the free movement of food products by means of the maintenance of international competition for both raw produce and end products. The SRA makes us better equipped to communicate our national objectives in the EU and improve the chances of research topics important to Finland being included in EU research programmes. The food industry is the largest industry in Europe, and it seeks global business leadership (European Technology Platform on Food for Life: The vision for 2020 and beyond, CIAA, 2005). As a country known for its top-level expertise and research, Finland can contribute to this joint European objective.

The national SRA builds on the strengths of the Finnish food chain and innovation system

Strengths and challenges of the Finnish food chain

The greatest strength of the Finnish food chain is its ability to act as a uniform entity. Cooperation works well, and common objectives are agreed as part of day-to-day operations. As a result, there is a quality strategy in place that covers the entire food chain, and production is safety-oriented with regard to the entire chain. It would be beneficial to include the water management sector in the chain. Finland's water resources are good, and water is seen as a strength of the food sector and also as an integral part of the food chain. The high standards of education and technological expertise in Finland are evident in the food chain as competence and quality. Finnish research in the field of food and nutrition is of high quality, reaching the international top level in selected areas. Finland has been a forerunner in innovation related to food products that promotes welfare and has health benefits. Since legislation on nutrition and health claims made for foods was tightened in 2006, productization must now seek new focus areas or increase investments in clinical studies to be able to provide sufficient research evidence to support the claims and secure EFSA approval.



Key challenges in the food chain are, on the one hand, related to a continuous maintenance of the ability to renew, and, on the other hand, related to improved profitability of basic operations. The ability to renew builds on R&D activities. Because of limited resources, these activities must be better aligned with projects that support the regeneration of business. A vital and strongly growing SME sector is a prerequisite for industry regeneration, and SMEs should be better supported by means of research activities, new types of value chains and financing. Other food industry challenges include an all-round improvement in the industry's image and promotion of the strengths of Finnish food culture and food chain.

The Finnish food chain is characterized by a strongly managed chain business model and electronic maintenance of information and product flows by two dominant retailers. They seek to keep the prices at levels attractive to consumers by means such as international purchasing organisations and online auctions, at the same time making the system very strict from the point of view of domestic suppliers, particularly in the SME sector. Versatile supply systems must be developed in order to ensure local operators' ability to conduct business. Consumers cannot get their hands on new products unless those products are available in nearby shops. Added versatility in supply chains will support greater product availability.

Finnish food research is part of the valued Finnish innovation system

The Finnish innovation system has received high praise internationally in recent years, and many studies use it as an innovation model example. The Finnish system has managed to create new and useful practices that have generated benefits such as increased discussion and cooperation between researchers and business decision-makers.

On the other hand, according to a review commissioned by the Ministry of Employment and the Economy, the system would benefit greatly from future development. The management and control of the innovation chain often lacks efficiency: the time span between research and product idea and the launch of the final product is often too long.

Challenges faced by the Finnish innovation system are related to the versatility of parties and the dispersed nature of operations, actions and decision-making. The food industry innovation system (see Figure 1) has several parties: various research, development and communication organisations, finance providers and food companies. Several different ministries are responsible for the basic funding of research organisations, which results in overlapping and even distorted competition between research organisations. National programmes (the Finnish Funding Agency for Technology and Innovation (Tekes), Ministry of Agriculture and Forestry and Academy of Finland) and EU programmes steer research funding. Centres for Economic Development, Transport and the Environment (ELY), development organisations, local development programmes and expert networks (such as the Food Finland theme group) support and conduct development activities with particular focus on the needs of the SME sector.

The Centre of Expertise Programme (OSKE) and the Food Development Cluster of Finland have assumed important roles in the transfer and utilization of knowledge, particularly in the SME

sector. In its current form the OSKE programme will end in 2013. ETP Food for Life Finland has been established as a networking platform for food industry players, disseminating EU-level research knowledge to companies and promoting Finnish national interests in the EU. The operation of this platform in its current form will cease in the autumn of 2011.

Even though it seeks to promote the health of Finns, the Ministry of Social Affairs and Health has only had a minor role in food chain innovation activities. The ministry does, however, play an important role in the development of food industry's use of domestic water. A suitable diet and products and services supporting healthy lifestyles are an important way of preventing lifestyle diseases and increase welfare.

The industry needs greater discussion between the different parties in the innovation system, joint planning, common objectives and joint financing of their implementation. Some tasks and roles of the parties in the innovation system also require clarification.

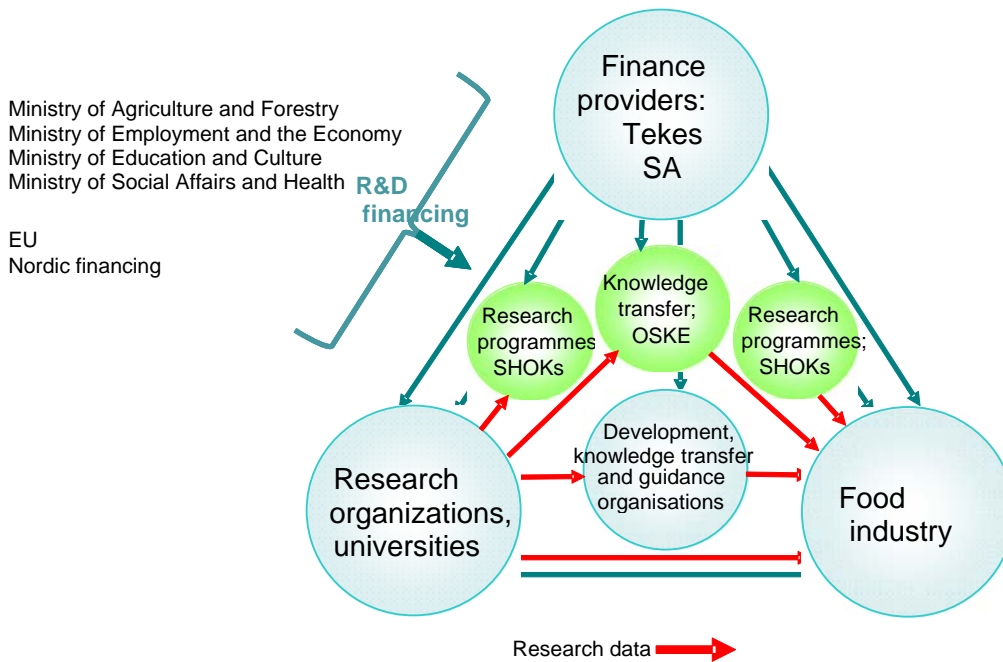


Figure 1. Research and innovation system parties in the Finnish food industry.

Focus areas of the national SRA for food research

To be able to renew continuously, the food chain must be able rapidly to identify global trends, react to changes and understand the consumer. The consumer seeks all-round personal welfare. The food chain seeks to support consumer welfare. Sustainable and profitable production is at the core of an industry that operates effectively and is evolving. High-quality product is its goal.

The focus areas of the national SRA for food research are based on the following vision: *Sustainable and profitable production and consumer welfare lay the foundations for the success of the Finnish food chain.*

Focus of the SRA

In addition to the two key focus areas of the SRA – sustainable and profitable production and consumer welfare – the following three strategic focus areas applying throughout the food chain also support its ability to compete and renew: understanding of consumer values, needs and choices; safety and traceability; and systems used by the logistics and production chains (see Figure 2).

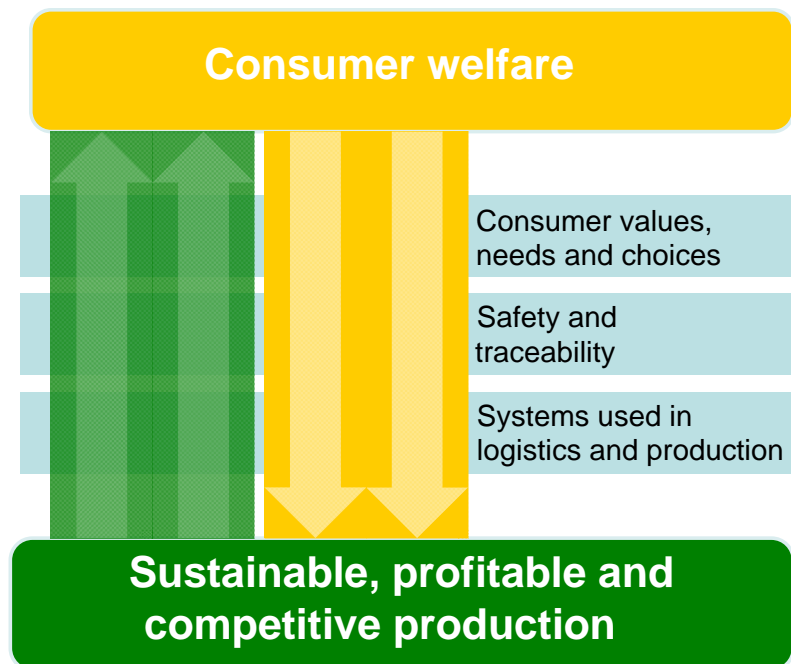


Figure 2. The two key focus areas of the national SRA for food research and the three strategic focus areas applying throughout the food chain and supporting its ability to compete and renew.

The following sections discuss the challenges and objectives related to the two key focus areas of the SRA, as well as the three strategic focus areas applying throughout the food chain, and their respective research needs. Packaging-related research needs are discussed separately after these, because packaging is related to all five focus areas. The list of research needs is extensive and, in many cases, very detailed. This is intentional in order to communicate the versatile knowledge requirements related to these areas. At the strategy implementation stage, it is important to select research topics on which the entire chain wishes to focus.

Key focus area 1: Sustainable and profitable production

The food chain must react to demands and challenges originating from various quarters. In order to remain dynamic, the food chain must improve its profitability, which is one of the main challenges at the moment. This is possible by making the correct raw material choices, developing further the utilization of process commodities and ensuring high-quality operations throughout the entire chain. At the same time, consideration of environmental issues and sustainable development in all operations has quickly emerged as an important driver affecting society in general, the authorities and consumers and their respective operations, choices and legislative approach.

The objectives of this focus area are competitive domestic raw produce and effective, ethical and environmentally sound production methods and processes enabling the production of high-quality products.

Research needs:

1. Competitive, domestic raw produce; tailored raw produce
 - Selection and breeding of strains and breeds that succeed in Finland as well as the development of cultivation and feeding technologies;
 - Target-driven verification of the special qualities of selected Finnish raw produce; with special focus on crystallizing the image of brand Finland here, in neighbouring regions and in selected export markets;
 - Supporting the strengths and cooperation of the water maintenance and food sectors; opportunities and risks;
 - Ensuring the availability of domestic, plant-based sources of protein;
 - Development of production materials that create added value from domestic raw produce.
2. Effective, ethical and environmentally sound production methods and processes
 - Development of eco-efficient processes; reduced consumption of energy;
 - Utilization of side-streams and alternative means of use;
 - Development and standardization of meters to monitor environmental impacts (e.g. lifecycle analyses);
 - Review of the potential and profitability of organic production;
 - Improved welfare of farmed animals;
 - Effective utilization of modelling and simulations in process development; utilization of automation in processes and process monitoring;
 - Development of flexible use of production lines to tackle the problem of low volumes and improve eco-efficiency;
 - Reduction of waste by more effective monitoring during the process;
 - Utilization of biotechnological process methods;
 - Development of natural production methods that do not require the use of E-coded food additives;
 - Review of the possibilities of GMO and nanotechnology (potential, profitability, acceptance);
 - National and international development of the information and product flows, providing consumption information to manufacturers.

Key focus area 2: Consumer welfare

Consumer health is no longer a key research interest. It has been replaced by the wider focus of all-round consumer welfare. Enjoyment and food-related experiences have gained greater importance. We need to find new approaches to understanding how exactly a consumer experiences welfare. The consumer is seeking information and experiences from different media, and social media are becoming increasingly important. This means that the parties in the food chain must also be skilled users of social media. Health-related considerations remain topical, too. In their day-to-day lives consumers tackle issues such as weight management, allergies and hypersensitiveness, maintenance of mental and physical well-being and various lifestyle diseases. In order to support consumer welfare and health, the industry needs to provide health-promoting foods, as well as services and information related to nutrition and welfare. Tailoring is very topical at the moment.

This focus area has the following objectives: supporting consumer health and welfare, preventing diseases, enhancing the enjoyment of food and promoting Finnish food culture. We need a strong multidisciplinary approach to meet these objectives, a combination of knowledge from the humanities and social sciences as well as biosciences, health sciences, information technology and communication.

Research needs:

1. Health-promoting foods
 - Ways of bringing high-quality vegetables, berries and fruit in different forms to the consumer's table;
 - Measuring the combined effects of diet;
 - Development of health-promoting foods;
 - All-round need for clinical research to support health-related claims;
 - Understanding and improvement of nutritional quality and physical response, in particular the importance and combined effect of carbohydrate quality, the state of starch and proteins as well as the fat quality of the end product;
 - Role of meal rhythm, importance of meal quality;
 - Products that support weight management.
2. Understanding and measuring welfare
 - Understanding and measuring the enjoyment of food;
 - Developing methods for the measurement and assessment of welfare;
 - Understanding of humans as physical and mental beings; utilization of system biology;
 - Understanding weight management psychology;
 - The combined effect of food and exercise on welfare.
3. Use of communication and media to support welfare, services promoting welfare
 - Use of social media and mobile applications.
4. Utilization of public catering to support the welfare of different consumer groups
 - Definition of a good, every-day cafeteria meal;
 - Needs and effects of additional funding in public catering for children/workforce/pensioners.

The strategic focus areas supporting the operation of the entire food chain

1. Understanding consumer values, needs and choices

Faced with conflicting information flows and changing values, the consumer remains an unknown, mystical end of the food chain. The understanding and identification of consumer needs involves significant challenges also in the food chain. The behavioural sciences and identification of new types of approaches to predicting consumer behaviour are of key importance.

Objective: Understanding and prediction of consumer behaviour and understanding of consumer trends.

Research needs:

- Improved understanding of consumer wishes and expectations;
 - a. In particular, the development of methods that make prediction easier
- Consumer attitudes towards production technologies (organic, GMO, nanotechnology, use of processing aids and additives);
- Characteristics of a responsible consumer; Values and choices of a responsible consumer; ;
- Consumers and the social media
 - a. Social media as a means of consumer influence;
 - b. Social media as a consumer information channel.

2. Management of safety and traceability

Ensuring safety all the way from the sea or field to the consumer's table is a vital part of food chain operations. Climate change and new production methods create new safety challenges, and the food chain is already anticipating and preparing for these in its everyday operations. Water is an integral part of food production. Water quality and availability will have an impact on the future competitiveness of the Finnish food chain. Meeting these needs requires cooperation in areas such as the development of traceability control systems, the management of new safety risks in the raw produce chain and processes, and the development of systems to manage the quality of domestic waters.

Research needs:

- Risk management
 - Identification of chemical and microbiological risks and control of these in raw produce and processes;
 - Management of challenges related to climate change (animal and plant diseases and pathogens);
 - Risk management and opportunities related to longer supply chains and storage life;
 - Assessment and management of risk related to new technologies;
 - Condition of water management networks and the development of product safety systems for domestic water in food production use;
 - Combined effect of additives;
 - Joint review of product flows from the point of view of product safety by different parties, e.g. temperature control of fresh produce;
- Development of monitoring and control systems for traceability
 - E.g. utilization of information technology and electronic applications;
- Commercialisation: Commercialization of Finnish food research expertise.

3. Systems and methods used by the production and logistics chains

Different parties make conflicting demands on a food product. The consumer wants food that is as fresh and natural as possible, but the long logistics chains and waste management needs of centralized trade require a long storage life. Increasing the operational efficiency of the entire chain and ensuring that a product travels through the chain quickly are of key importance. Advanced information and automation technologies enable improved management of the entire chain and support information flow throughout. Information on consumption, and changes in consumption in particular, are also a means of using power in the chain, and it is important to develop cooperation further to acquire comprehensive information. It is also important to develop rapidly responding control and information collection systems that are used by all parties and are well suited to flexible production. Alternative primary production methods (GMO and organic) can provide competitive advantage in selected areas.

Research needs:

- Improved flexibility in the use of production lines, chaining of production;
- Flexible information flow, transparency and traceability throughout the chain;
- Future supply channels and chains; international and national;
- Utilization of IT solutions to reduce waste or provide foods that meet consumer needs, for example;
- Increasing the energy-efficiency of information and product flows and matching them with consumer values (freshness, organic produce, local produce);
- Meaning and operation of new supply channels, such as Internet orders;
- Risk management in the field of national self-sufficiency in food.

Joint research topic for all focus areas: packaging

During the strategy work, we identified various package-related needs and research topics that are linked to all five focus areas of the national SRA for food research.

The selection of packaging materials and methods affects the industry's production technologies, product storage life and safety, logistics solutions, storage needs (cold/hot) as well as product appeal and usability. Packaging plays an important role in the environmental impact of a product. Packaging is also a key method of conveying information. The information may be related to the product, its health effects, origin or production method.

Research needs:

Packaging materials

- Suitability for food contact and traceability;
- Bio-based packaging materials;
- Materials with controlled gas permeability;
- Layers and materials comprising these (biobarriers) preventing the transfer of grease, moisture or gases;
- Effects on packaging technologies;
- Effects on safety and logistics solutions;
- Environmental effects;
- Migration of plastic material components vs. product safety;
- Packaging, communication and consumer;
- New labelling and ease of understanding;
- Data import by means of printed intelligence;



- Attractive and entertaining packaging;
 - Consumer expectations for packaging.
- Usability and functionality
- Packages that are easy to open and close;
 - Suitable package size;
 - Package suitability for the logistics chain and storage;
 - New supply chains and packaging challenges.

National SRA for food research: Communication, implementation and follow-up

The purpose of the national SRA for food research is to support the development and renewal of the entire food chain and to steer public research funding in particular into the selected focus areas. The following plan outlines strategy communication and provides a list of suggested actions to implement the strategy. The party responsible for each action is identified in brackets.

1. Communication by the national SRA for food research

- To the food industry (ETL board and committees, persons responsible for communication in companies);
- To the entire food chain (including research and financing) (ETP Food for Life Finland/ETL research committee);
- To the water management sector (ETL);
- Internationally
 - Translating the strategy into English (ETL);
 - Strategy communication (ETP Food for Life Finland/ETL research committee).

2. Increased cooperation and interaction between the parties of the Finnish food industry innovation system

- ***Intra-ministry food and welfare policy programme to clarify dispersed administration and control; Consistent Ministry-level (Ministry of Agriculture/Employment/Social Affairs) control to create a standardized method of operation for the entire food chain → establishment of a “Food policy working group” where Ministry representatives and invited experts manage matters relating to food chain operations***
 - i. The “Food policy working group” also acts as the party responsible for the implementation of this strategy.***
- As the OSKE programme in its current form will end in 2013, it is necessary to establish a development organization model that better supports the identification and review of the roles and tasks of parties in innovation systems as well as the transfer of research results and knowledge (responsibility for food research: “the Food policy working group”);
- Development and continuation of SME guidance and research support.



3. Increased knowledge transfer and interaction between the industry and the research and communication organisations

- Increasing discussion and interaction between researchers and industry representatives by organizing regular meetings (ETP Food for Life Finland/ETL research committee);
- Researchers to industry and vice versa – increased efficiency of exchange programmes (ETL research committee);
- ***Continuation and further development of the operation of the ETP Food for Life Finland platform (ETL);***
- Development of cooperation between developer and knowledge transfer organisations and research organisations in EU programmes and the preparation thereof (ETP Food for Life Finland/ETL research committee).

4. Securing research funding for the selected focus areas

- Establishing joint food research programmes for finance providers (“Food policy committee” and finance providers (Tekes, Ministry of Agriculture, Academy of Finland)).
- ***Utilization of the new Tekes financing tools: The industry and research organizations engage in active discussion on joint pre-competitive research topics, provide Tekes with suggestions for the financing of food research (programmes) according to the new Tekes practice and establish new value chains to support research (ETL research committee with ETP Food for Life Finland and research organisations)***
 - **Establishing an extensive research programme in areas including packaging (ETL research committee with ETP Food for Life Finland and research organizations, package manufacturers)**
- **Discussion of possibilities of financing clinical studies (ETL research committee/ETP Food for Life Finland, finance providers)**
- Some financing must be reserved for changing needs (factors such as economic recessions, disasters and new threats cannot be predicted);
- Securing research financing for the SME sector.

5. Ensuring future competence in the food chain

- Development of food industry education and increased cooperation with research organisations as well as standardization and coordination with universities of applied sciences (universities, research organisations and the “Food policy working group”);
- Development of process technology competence (universities and research organisations).

6. Future updates to the strategy (ETL research committee/ETP Food for Life Finland)

- Annual review of strategy implementation and communication of success.
- Review of changes in the operational environment, updates as required.