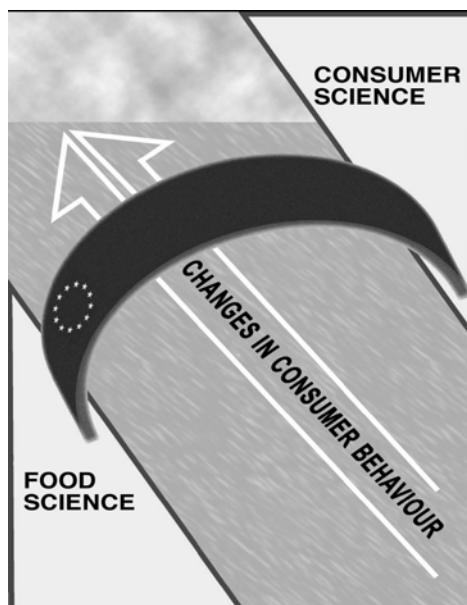


“CONSUMER SCIENCE IN FOOD”

Rationale by : FLORENCE TECH and EGOCREANET



1. Scientific and/or technical quality, relevant to the topics addressed by the call

1.1 Concept and objectives

The overall strategy of food and health in EU countries focuses on concerted and orchestrated research in the nutritional – food – and consumer sciences, and food chain management to deliver new and functional food products for, and to, national, regional and global markets, in line with consumer's behavioural and social changes, needs and expectations. It is estimated that these products, together with recommended changes in dietary regimes and lifestyles, will have a positive impact on public health and overall quality of life by adding “life to years”.

Health and wellness remains the top priority for food manufacturers and consumers alike. The typical consumer is bombarded daily with a plethora of healthy diets that keep changing. What one is supposed to eat and/or avoid? What causes cancer, heart disease, brain disease? What prevents them? Does being a teenager, man or a woman, or pregnant or elderly affect what is good or bad for one to eat and drink? Does it matter in picking diet if one is British, French, Italian, German or Romanian, ...? Do the EU consumers differ also in their perceptions of foods, association and trust of new technology and health claims? These fundamental questions are extremely complex as the science for studying them are still evolving. In addition, it is well established that humans do differ genetically and by lifestyle choices. Moreover, how to communicate effectively with the consumers and how to bridge the gap between the individuals and the food industry to produce the 'right' products is a topic of immense scientific and economical significance. The need for scientific and consumer understanding requires a more sophisticated level of comprehension on one hand, and interaction and communication on the other. Only through this co-operation can consumers' confusion, due to the growing quantity and specificity of scientific information available, be prevented. This bridge will also enhance credibility by leveraging sound science and creating compellingly positioned products so that consumers can purchase with pleasure and confidence.

Food is reshaping its role to take its next major step in value—personalizing health. This step will not be easy and will require a renewed research and development efforts to complement the knowledge base of traditional foods. Consumers can readily perceive and appreciate many of the

inherent values of current foods, such as taste, texture and convenience, yet improved health is not immediately perceivable as being associated with particular foods. Similarly, the metabolic differences between humans are not obvious without assessment technologies to measure them. Because of this lack of self-knowledge by consumers, foods and diets that are capable of dealing expertly with the differences among consumers are not yet available. The cardinal role of personalized foods for health as a next logical step in improving quality of life calls for immediate paradigm shift, corresponding to new multidisciplinary knowledge and harmonized working methods in Consumer Science. The leisurely pace of consumer research needs to be refocused. It is imperative for the scientific research to understand the variations in consumers and human metabolism in order to offer personalized food choices. The paradigm shift calls for new technology and more advanced consumer studies are needed to quantify health attitudes, life-style, culture, and other consumer attributes, for better understanding how to communicate new technology, processing, innovation and health related issues.

To ensure that the European consumers have available and actually consume new products produced by innovative technologies and biotechnologies and enriched with functional ingredients, it's extremely important to address their unique expectations and needs. *Only if the foods are actually consumed will the health of the European consumers be increased and the food industry benefit from increased markets for their products.* Thus, data base and in depth understanding, communication and interface with the consumers are necessary in improving the strategic frontline between scientific knowledge of food production and better quality of food perception by boosting consumer skills. Developing optimal concepts and new product and education and communication it is today strategic in order to build a bridge between innovation and consumers and is a part of the suggested paradigm shift.

Knowledge Based Bio-Society (KBBE) can be enhanced in Europe by bringing food-consumers directly in touch with research and industrial challenges. Understanding consumer behaviour and consumer preferences is a major factor in the competitiveness of the food industry.

Hence it is necessary to focus consumer perception and attitudes towards food, including food innovation and traditional foods, in order to understand social and cultural trends and to identify determinants of food choices and consumer access to food. The food consumer thought is critical especially in relation to new products (e.g. Functional foods) and production bio-technologies (e.g. GMO safety and bio-pollution control). Therefore, there is a need to develop new integrated knowledge as well as new working and dissemination methods in the study of consumer behaviour to involve the most important disciplines and to promote new knowledge through strengthening a bridge between Food Science and Consumer Science in Europe.

Malnutrition affects not only physical health (obesity, heart condition, etc.), there is growing concern across Europe about how food habits affect social behaviour and the learning process; both aspects appear to be especially affecting young children. It is well known to social anthropologists that attitudes to food and drink are culturally construed; edible/inedible, tasty/disgusting, etc. are cultural categories determined by culturally specific classificatory criteria that affect good or bad integration of basic energy sources. Equally well known is the key role played by marketing in influencing consumer attitudes, transforming them into compulsive feeding habits. This Project addresses the growing demand for safer, healthier and higher quality food production. This major aim of the "**CSE-ONNS**" Project has been started by EGOCREANET in collaboration with the Italian Food For Life Platform launched by the FEDERALMENTARE. The priorities are:

- 1) to establish an EU-wide network;
- 2) to develop a complex multi-disciplinary research strategy with the objective of building up awareness among Scientists and Consumers about the importance of improving good and well-informed nutrition and dietary styles
- 3) to establish the key relationship between new knowledge and new methods of food

production, focusing on new neurological and genetic knowledge and its impact on consumers perception of changes.

The main goal of the CONSUMER SCIENCE in EUROPE – OPEN NETWORK FOR NEW SCIENCE (acronym: CSE-ONNS) proposal are:

- to realize a bridge between Food Science Innovation and Consumer Science development;
- to enhance the power and the consciousness of European consumers in decision making regarding health, food safety and nutritional claims;
- to provide a support in understanding new food technologies in relation to Human Health and Well Being.

The CSE-ONNS proposal will contribute towards the EU goal of a Knowledge Based Bio-Economy to European consumers through providing a more conscious dynamic of food consumption in Europe.

To summarise, CSE-ONNS project is aiming to enhance the knowledge of food Consumers in Europe by means of promoting the development of Consumer Science and its application to food production and consumption through an active participation of trans-disciplinary partners, establishing an effective bridge between FOOD SCIENCE and CONSUMER SCIENCE.

Food Science is based on understanding food, its components and production. Food Science builds upon the basic sciences of Biology, and Biochemistry and it interacts with such diverse scientific disciplines as Human Nutrition, Microbiology, Biochemistry, Biotechnology and Process Engineering. All play an important role in the understanding of the foods we produce, manufacture and consume. Some of the topics addressed by Food Science include: food manufacturing (product development, processing, packaging, labelling); food constituents (food chemistry and analysis); food additives (vitamins, preservatives, colour, flavour); food stability (shelf life, microbiology); food safety (contaminants, poisoning); sensory properties (taste, appearance, smell, texture).

Consumer Food Science is the study of what influences our food choices and the acceptability of new food products based on biotechnological research and experimentation. In a Knowledge Based Society, the CONSUMER FOOD SCIENCE search to reach an understanding of consumer behaviour is becoming a very complex KBBE area which includes: food cultures, food fashions, levels of education and awareness, sensory perception, diet and nutrition studies, changing lifestyles and incomes, marketing influences. Advancements of this complex new area of studies also provides an opportunity to combine new scientific knowledge in areas of research such as Sensory Science, Neurology applied to Marketing and Management, Nutritional genetics and other cognitive and social sciences that can be considered as advanced sections of "Consumer Food Science".

Thus the state of the art of "Consumer Food Science" represents a need to develop new knowledge and new working methods in all matters relating to new research, advancing the study of what influences food choices, from anthropology and sociology of food and behavioural science to food research. In particular, the new working methods will be based on a strategy of diffusion of the advancements of Consumer Science via the Internet. It is immediately obvious that there are huge challenges facing mature consumers and a modern consumer policy with appropriate use of these new technologies.

In the light of these issues the CSE–ONNS partners consider that it is becoming increasingly necessary to strengthen the creative forces originating from the spirit of the Internets interactive communication, so enabling open innovation. Globalisation and digitalisation have entered into a

symbiosis in a way that is fundamentally changing the world of consumption and work. The appropriated utilization of the Internet makes distance meaningless and waiting times are being transformed into real time in global communication. Virtual worlds are coming into existence in industry. The transformation of the economy has begun, and consumers' co-organization in coordination with Food Research advancement can represent a new symbiosis of Knowledge-Based Bio-Economy development.

This new knowledge area of Consumer Science is a trans -disciplinary study that provides an opportunity to combine multi-factorial partners "from fork to farm". These include: Nutrition Science, Food Marketing and Management, Food Production and Processing (i.e. biotechnology related to GM and novel foods) and various food services. Improved communication and coordination will transform this complexity in a better definition of "Consumer Food Science" in Europe. Therefore, the CSE-ONNS project is aiming to develop an European Strategy to establish a bridge between Food Science and Consumer Science Innovation. Key to the project is including consumers throughout the process so that they will be actively informed on scientific policy setting and decision making regarding food health and security. More crucially we aim to enable end-users of research to influence the direction of future research in an informed and positive manner. The expected results of the project (NoE format) will be to be a positive influence on the behaviour of consumers through advancing forward a better diffusion of the contents of "Consumer Food Science", so favouring the development of a KBBE model which will work towards overcoming the unacceptable disproportion between alimentary consumptions and renewable resources in the global context.

More specifically, the **main objectives** are:

1. To identify the critical and emerging Knowledge Based Bio-Economy for improving advanced consumer's behaviour in relation to an increase of synergies among food science consumer's societal models and European food agro-industry competition.
2. To develop new Consumer Science methodologies and practices in regard to the changes in consumer attitudes and understanding towards food nutrition and safety in relation to a personalized food addressing unique requirements focusing on diet, nutrition, health and wellness,
3. To forecast future Consumer Research and creating new KBBE resources/tools utilizing web-technology to integrate emerging new knowledge on genomics, metabolomic health, genetics and mind/brain cognitions and consumers' expectations and food demands.
4. To Build up and manage a great contribution to the European Virtual Centre of Food Consumer Science to advance consumer's confidence in new food production and new food process innovation.

The state of the art in consumer science

Premise: Consumer sciences have been until now a fascinating interdisciplinary field for researchers working in consumer associations, as well as in social and economic studies. Currently studies are normally interested in a business approach to human behaviour and trends but in future will need to focus on a scientific approach to consumer science.

This field focuses on the consumer-oriented business practices in the fields of merchandising, technology, entrepreneurship, retailing, e-tailing etc. In the past Consumer science has looked to knowledge-based consumer sciences to advance marketing, especially devoted to Retail Management and Merchandising. In contrast, there have been more specialized relationships of communication such as in: public safety and food labelling, food communication statistics and journalism, social health services and public administration. These all focus on both the problems of consumer protection and consumers satisfaction.

Introduction - State of the art

Food choice is a complex process that involves many different factors. Some of these are cognitive, dealing with one's attitudes toward the food and the way that the marketer presents the food in the media. Other factors are sensory-based, dealing with the actual experience with the food. Nutrition is another factor that has a paramount impact on food choices. The relative importance of the different factors influencing food choice can be determined by understanding the relations between attitudes, beliefs, subjective norms and intentions. Attitudes toward health and taste-related factors have been thoroughly studied and specific scales were developed to measure the importance of health claims and taste aspects of food in the choice process. Sensory satisfaction is often very important, despite issues growing health concern. Typically, consumers perceived product health dimensions only in second place after taste. Despite current concerns about reducing dietary fat in the formula, for instance, health remains a secondary factor. Only for very few consumers, health concerns may supersede taste as the primary determinant of food choice. Understanding this contrast is important for interpreting consumer choice behaviour and for effective marketing. Expectations can exert powerful influences on sensory judgments in consumer tests and these impressions can be manipulated by the use of nutritional labels. Some consumers are even showing an 'impression management' which leads to significant bias response, heading to overemphasizing the importance of health-related concerns in consumer-based studies (Moskowitz et al., 2005).

Attitudes toward health and taste-related factors have been studied intensively (e.g., Roininen, et al., 2001). The Health and Taste Attitude Scales (HTAS; Roininen et al., 1999) measure the importance of health and taste aspects in the food choice process. These multi-item scales comprise sets of statements, ranging from "strongly disagree" to "strongly agree". Three statements in the system relate to health interests (i.e., general, light product and natural product), and three relate to taste (craving for sweet foods, using food as a reward and pleasure). FDA Task Force report (<http://vm.cfsan.fda.gov/~dms/nutttfoc.html>) on consumer health information for better nutrition initiative, indicated that significant public health benefits will result when consumers have access to, and use, more and better information to aid them in their purchases, information that goes beyond just price, convenience, and taste. Challenging the industry to channel competitive energies into disseminating health information in food labelling and promoting food products on the basis of nutritional value, as well as simply taste, price, and amount has been recognized as significant opportunity to improve public health. There are many other issues involved in food that are important to consumers, or better though from the business perspective taste, sensory satisfaction tends to be regarded as the most important, followed now by health/wellness aspects.

Although health and taste have been found to be important predictors for food liking and consumption, only a few studies have simultaneously investigated both the health and taste aspects of foods. Despite issues involving health concern, sensory satisfaction is generally extremely important, even when health and taste are in conflict. In spite of current concern about reducing dietary fat, health remains secondary to taste in the selection of a product such as corn chips for consumers in this population. It is important to note that for the elderly consumers, sensory appeal for this age group becomes less important, and no longer shows the massive determining effect on purchase intent.

Consumers differ also based on countries. For instance, a study in Europe (Germany, France, UK) showed differences in the utilities of different concept elements that were translated from a US study with some adjustment for country brands. Furthermore, the same elements performed differently in a specific country, depending upon the food with which it was presented (Aarts et al., 2002). The conclusion reached was that product development and nutritional communications need to recognize the differences across countries and across foods.

Traditionally, consumer information has been obtained by simplistic, limited, one-off surveys, focus groups, or large-scale opinion polls. The traditional knowledge bases for consumer preferences may no longer be adequate in light of the growing complexity of food as the carrier of nutritional features, the increasing interest among consumers in 'good for you foods,' and the competitive environment that shapes product development and marketing. Companies now recognize the need for new approaches because of the complexity of the marketplace in which they operate.

To develop knowledge base of the consumers, mega-studies were developed in order to better understand the consumer mind and subjective product/nutrition/technology. The term 'mega-study' refers to the very newly developing technology that comprises a series of conjoint studies linked together in a common structure (e.g., Luckow et al., 2003; Moskowitz et al., 2005). The objective of the mega-study, like the genomics approach, is to understand the algebra of the consumer's mind with respect to each individual food, but it is done in a study that encompassed many foods. Like the genomics approach, the mega-study was designed to simultaneously understand both one food in-depth and the meta-pattern across many foods, at both an individual and a group level (Moskowitz et al., 2005).

Food choice is a complex process that involves different factors across many disciplines. Some of these are cognitive, dealing with one's attitudes toward the food, and the way that the marketer depicts the food in the media. Other factors are sensory-based, dealing with the actual experience with the food. Identifying consumer expectations (real and perceived) and taste preferences, and integrating them into product development, so as to bridge over geographical borders and age differences, is possible through mega studies. The factors that could be included in mega studies are:

- New food technology (e.g., high pressure, GMO, biotechnology, nanotechnology)
- Product health messages (probiotic, probiotic, functional foods, health and well-being supplements).
- Product matrix (solid, liquid, milk, etc.)
- Marketing and sales.
- Education.
- Government and other organizations.

References

Aarts, P., Paulus, K., Beckley, J. and Moskowitz, H.R. 2002. Food craveability and business implications: The 2002 EuroCrave™ database. Paper presented at the ESOMAR Congress, Barcelona.

Luckow, T., Aarts, P., and Moskowitz, H.R. 2003. A comparison of purchasing habits and sensory preferences for cola consumers across France, Germany, the United Kingdom, and the United States. *Journal of Food Technology*, 1(3):84–96

Moskowitz, H.R. German, J.B. and Saguy, I.S. 2005. Unveiling health attitudes and creating goodfor- you foods via informatics & innovative web-based technologies. *Critical Reviews in Food Science and Nutrition*, 45:165–191.

Roininen, K., Lähteenmäki, L. and Tuorila, H. 1999. Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite*. 33: 71-88.

Roininen, K., Tuorila, H., Zandstra, E.H., de Graaf, C., Vehkalahti, K. Stubenitsky, K. and Mela, D.J. 2001. Differences in health and taste attitudes and reported behaviour among Finnish, Dutch and British consumers: a cross-national validation of the Health and Taste Attitude Scales (HTAS). *Appetite*. 37: 33-45.

Going beyond KBBE innovation, dissemination and expected impact.

The state of the art can be developed by taking into consideration the emergence of the genomics revolution, which has opened new insight in nutri-genomics and in nutraceutical food ingredients

(e.g Functional foods), and also the advancements in neurological studies applied to neuromarketing. All these developments permit consumers to become more self confident in adopting the proper behaviour for food consumption and more conscious about the rational choices for improving a better nutrition and establishing a healthy lifestyle.

Therefore the CSE-ONNS project proposal would go beyond the current situation by opening a network for new sciences, enabling it to manage the complexity in food and health in the context of development of the knowledge based bio-economy.

This challenge essentially means :

- to connect life science systems research and ecologic-economy innovation systems with a better consumers understanding and consciousness of the proper needs and power in the food market for improving the European strategy of KBBE development.
- to deal with the harmonization of new integrated knowledge and networking methods in order to get an increase of consumer science, by means of involving through interactive diffusion systems on the internet, an open network for new science (ON-NS) based on the aggregation of relevant industrial and SME's communities of food production, with Food research teams in Europe including various stakeholders and in particular in a good agreement with the policies of the European Health and Consumer Protection Directorate. Finally the CSE-ONNS program would reply to the growing urgency in Europe to develop novel bio-based products and to exploit new and emerging research opportunities and to explore new categories of "novel foods" (e.g., bio-products, functional foods), food additives and ways of enriching the final product using advanced bio-technological research information.

Certainly a decisive milestone remains the growing demand of consumers for safer, healthier and higher quality of food production and for a sustainable growth of traditional typical foods. Hence, the mega studies integrated with the other participants of this study will develop the tools allowing KBBE development in order to form a better understanding of consumers' need and expectations and simultaneously provide new in-sights and tools for communications bridging over geographical distances and barriers. Thus, within a contribution of CONSUMER SCIENCE COMMUNICATION it will be possible to ensure the utilization of innovation technology and knowledge for the creation of healthier food products at affordable prices.

Understanding consumer trends in food choice – State of the art

UNDERSTANDING CONSUMER BEHAVIOUR: THE EUROPEAN PROJECTS

Consumers' behaviour in purchase choice of food products is a complex process influenced by several factors. Price is not the only determinant one any more and other variables have acquired importance in this process.

The complexity of consumer food choice can be viewed as a result of increasing differentiation of the food products to choose between on the one side and increasing dynamic, complexity and heterogeneity of consumer demand on the other side.

Few European projects have tried to make clear the mechanisms that lead the consumers, with studies regarding the way they perceive some types of food as a healthy and nutrition meal.

- The EU project *SEAFOOD* has the primary strategic purpose to improve general health in Europe via increased consumption of fish. The consumers' demand for information as well as the influence and effect of messages about health, safety and ethics with regard to fish were studied. The result found was that the main problem why consumers do not eat fish is price.
- The EU project *CONDOR* had as main purpose to get a better understanding of consumers' decision-making regards buying organic foods. The results show considerable differences between the consumer segments with regard to attributes and self-relevant consequences connected to ecology and the purchase of organic foods. The study show that both individual

and collective values have impact on why some consumers buy organic foods and others choose not to.

- The EU project “*Food in Later Life*” highlighted the food sector’s product development options in three areas: the development of food focusing on taste and flavours; development of food packaging that takes into account the weaker physique of the elderly as well as their needs for smaller portions; the development of health-promoting products tailor-made to counter the physiological effects of ageing.

THE EUROPEAN TECHNOLOGY PLATFORM *FOOD FOR LIFE*

European Technology Platform Food for Life gives to consumer and their interests the central role.

“Food and consumer” has the aim to develop fundamental understanding of consumer food choice behaviour in an actionable format to include progress made in nutritional sciences, food quality and food technology. The research programme aims to:

- understand the consumer food-related perception process and particularly where discrepancies occur between consumers and experts which may lead to lack of confidence;
- understand consumer food choice processes and the underlying fundamental processes;
- understand the process of behavioural change and the key factors the drive, facilitate and inhibit such change in a more healthy and sustainable direction;
- understand fundamental food values, food cultures and eating habits with their diversity and dynamics across Europe (European Technology Platform Food for Life, The vision for 2020 and beyond).

Conjoint Analysis was used to determine the relative importance of a set of attributes which influence purchase decision for different types of food products (Martinez, 2006) and the attributes considered were function the products (e.g.: brand name, packing, stores, prices, damages, certification, pesticide regulation, production method, size, origin, information, place of purchase, quality, easy of preparation, characteristics etc.). An instrument useful to organize the wide variety of food choice determinants comprehensively is the Food Choice Questionnaire (FCQ). FCQ contains 36 items representing health and non-health related food characteristics (Eertmans, 2006).

LIFESTYLES AND FOOD DEMAND

A wealthier society assigns more functions to food than simple subsistence. We also savour our food, use it as an opportunity to socialise, even as a status symbol. In addition, our changing lifestyles affect the sort of food we demand. Busy careers have created a large market for readymade and semi-prepared food and more people are eating out at restaurants than ever before. Moreover, an ageing population and the growing obesity epidemic caused by unhealthy diets and sedentary lifestyles have placed increased emphasis on healthier food products (Kettlitz, 2005).

The emerging convenience food market demonstrates a number of innovative new products offered in the global marketplace. International trends and regional preferences play a role in the types of convenience foods being developed and available to consumers. Busy consumers are demanding greater flexibility and more convenience in the foods they eat; whether it is a snack or a meal. The consumers’ desire for greater variety and options is driving the competitive field of opportunities (Sanders, 2005; Smail 2005, Pohjanheimo, 2005).

DIETARY ADVICE AND CONSUMER RECEPTIVITY

Key challenge for the nearest future will be to avoid creating consumer confusion as a result of growing quantity and specificity of scientific information available, to enhance credibility by

leveraging sound science and to create compellingly positioned products so that consumers can purchase with confidence. While some messages are straightforward, such as that associated with reduced consumption of trans fats and nutritional labelling of them, others are much more complicated or ambiguous, such as identifying and labelling specific, individual omega-3 fatty acids. Consumers are becoming both less receptive to dietary advice and confused when recommendations made one day are later refuted. To some extent, consumer scepticism of the latest information is on the rise for this reason.

FOOD SAFETY AND CONSUMER CONFIDENCE: THE REGULATION EC 178/2002

Recent food crises have also shown how important, in consumers' behaviour, the confidence in food safety. Food safety and the protection of consumer's interests are of increasing concern to the general public, consumers' associations, professional and trade organizations.

Before the enacting of specific European laws some Member States had adopted horizontal legislation on food safety from a long time, however they applied different basic criteria. Given these different approaches, and because of the total absence of horizontal legislation in other Member States, the functioning of the internal market in food could have been jeopardised where it had been impossible to trace the products.

Even though the European institutions, since their birth, have striven hard to approach and to harmonize national legislations, after the food crises of the last years it was the time to establish a comprehensive system of traceability so that targeted and accurate withdrawals could be undertaken, thereby avoiding unnecessary wider disruptions in the event of food safety problems. Moreover, the Community needed to reinforce its system of scientific and technical support on food, which was no longer able to respond to increasing demands on it. The Community should have had access to an independent authority – with the role of a scientific point of reference in risk assessment – giving opinions on contentious scientific issues, thereby enabling the Community institutions and Member States to take informed risk management decisions and avoiding the fragmentation of the internal market through the adoption of unjustified obstacles to the free movement of products.

Finally, the Community needed a rapid alert system covering food, cast in the same mould of the existing one in the framework of Council Directive 92/59/EEC on general product safety. This system would have made it possible to improve coordination of efforts and to determine the most effective measures on the basis of the best scientific information.

Moving from the previous considerations, the European institutions decided to adopt a Regulation aiming to achieve the following goals:

- The recovery of consumers' confidence through an open and transparent development of food law and through public authorities taking the appropriate steps to inform the citizens where there are reasonable grounds to suspect that a food may present a risk to health;
- The availability, for the Community, of a high-quality, independent and efficient technical scientific support through the establishment of a specific Authority;
- The creation of practical and powerful procedures for food crises management.

For these reasons the European Parliament and the Council adopted the Regulation EC/178/2002 of 28 January 2002, laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.

Its substance is well resumed in its first article:

"This Regulation provides the basis for the assurance of a high level of protection of human health

and consumers' interest in relation to food, taking into account in particular the diversity in the

supply of food including traditional products, whilst ensuring the effective functioning of the internal market. It establishes common principles and responsibilities, the means to provide a strong science base, efficient organisational arrangements and procedures to underpin decision-making in matters of food and feed safety.

For the purposes of paragraph 1, this Regulation lays down the general principles governing food and feed in general, and food and feed safety in particular, at Community and national level. It establishes the European Food Safety Authority. It lays down procedures for matters with a direct or indirect impact on food and feed safety.

This Regulation shall apply to all stages of production, processing and distribution of food and feed. It shall not apply to primary production for private domestic use or to the domestic preparation, handling or storage of food for private domestic consumption.”

CONSUMER GROUPS, DOCTORS AND SCIENTISTS: THE MOST TRUSTED SOURCES OF INFORMATION

On February 2006 was published a special Eurobarometer survey, aiming to assess how people in the EU perceive risk, focusing in particular on food safety. The survey, conducted in the twenty-five Member States of the European Union by way of face-to-face interviews, was requested by Directorate-General Health and Consumer Protection as well as the European Food Safety Authority and coordinated by Directorate-General Press and Communication.

Among other things, the survey has shown that consumer groups, physicians or doctors, and scientists, are the most trusted sources when it comes to providing information about food risks, followed by public authorities. The media generates a fairly low level of trust while, as found in other consumer research, economic operators (manufacturers, farmers and retailers) are cited as being among the least trusted sources.

According to the collected statistics, we can assume that information provided by consumer association, doctors and scientists could gain together the trust of a percentage of people included between 62% and 92%. This datum helps us to understand how it can be useful – for the success of a project aiming to provide information on nutrition, food quality and safety – the availability of a virtual net which puts together all the subjects that consumers trust in.

References

- European Technology Platform Food for Life, The vision for 2020 and beyond
- Martinez, L.M-C, Molla-Bauza, M.B., Del Campo Gomis, F.J., Poveda, A.M., 2006, Influence of purchase place and consumption frequency over quality wine preferences, Food Quality and Preferences 17: 315-327;
- Eertmans, A., Victor, A., Notelaers, G., Vansant, G., Van de Bergh, O., 2006, The Food Choice Questionnaire: Factorial invariant over western urban populations? Food Quality and Preferences, 17: 344-352
- Kettlitz Beate, 2005, New Perspectives on the Knowledge-based bio-economy, EU Conference Report;
- Sanders, L., 2005, Overview of trends in convenience foods, ICC Conference "Cereals-the Future Challenge, Vienna)
- Smail, V.W., 2005, Trend in bread-health, quality, regulation and traceability, ICC Conference "Cereals-the Future Challenge, Vienna)
- Elaine Tecklenburg, 2007, "Ingredients Affecting Health and Wellness: Innovations and Trends to Watch in 2007", MarketResearch@com, <http://www.marketresearch.com/product/display.asp?productid=1282386&xs=r&SID=56200779-382727155-362184120>;
- Bech-Larsen, T., Grunert, K.G., Poulsen. J.B., 2001, The acceptance of functional foods in Denmark, Finland and the united states a study of consumers' conjoint evaluations of the

qualities of functional food and perceptions of general health factors and cultural values, Working paper no 73, The Aarhus School of Business, <http://130.226.203.239/pub/mapp/wp/wp73.pdf>;

- Steptoe, A., Pollard, T.M., Wardle, J., 1995, Development of a Measure of the Motives Underlying the Selection of Food: the Food Choice Questionnaire, *Appetite* 25(3):267-284.
- Pohjanheimo, T., Hakala, M., 2005, The effect of consumer demographic on the preferences of rye bread in Finland, ICC Conference "Cereals-the Future Challenge, Vienna;
- Grunert, K.G., 2003, How changes in consumer behaviour and retailing affect competence requirements for food producers and processors, ERS/USDA workshop on Global Markets for High Value Food, Washington DC;
- Duffy, Rachel, 2005, Reconnection in the UK food chain-Bridging the communication gap between food producers and consumers, *British Food Journal*, 107(1):17-33.
- SCHWARTZ, Peter, 1992, *The Art of The Long View*, Doubleday Currency.
- Popper, Rafael, 2004, *Scenarios&Foresight*, 1st International Capacity Building Workshop, Romania.
- Official Journal L 031, 01/02/2002, Regulation (EC) 178/2002 of the European Parliament and of the Council of 28 January 2002.
- Special Eurobarometer 238 / Wave 64.1 – TNS Opinion & Social, 2006, Risk Issues – Executive Summary on Food Safety.

1.2 Long-term integration

Food & Health Consumer Science innovation strategies in Europe can be viewed as a fundamental factor determining the quality of understanding of KBBE in the development of human resources.

Therefore developing the healthy market through creation of favourable conditions for better informed food consumer choice and promotion of a healthy life-style should be a priority of the EU's policy for the innovative production of foods.

This general objective as a macroeconomic framework is a necessary, but not sufficient, condition to achieve food products innovation in what is an increasingly competitive global economy.

Therefore a long term integration between conceptual innovation of FOOD SCIENCE and CONSUMER SCIENCE in the context of development of European KBBE will be necessary to develop new food product design and new food processes innovation.

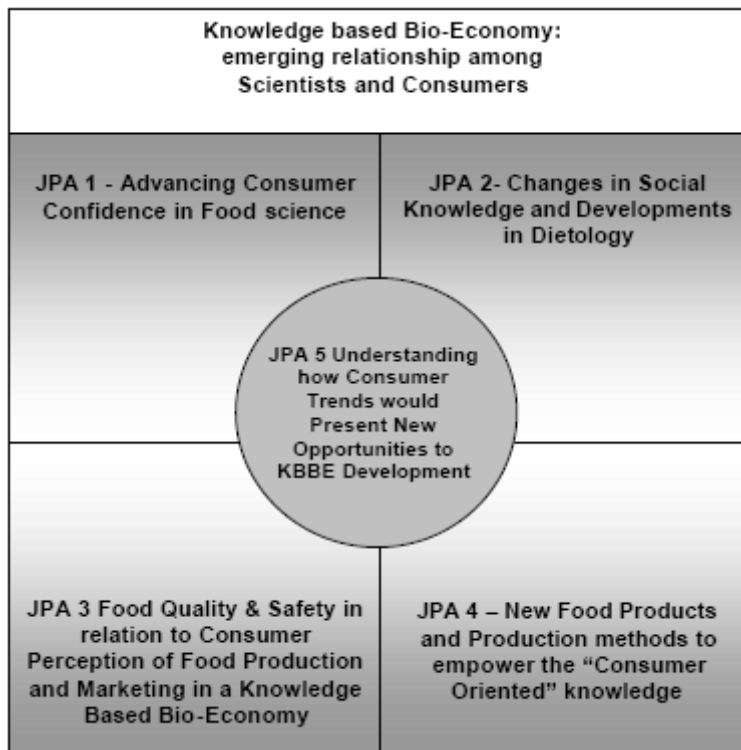
Looking to achieve these long term objectives and demands the CSE-ONNS proposal has the courage to push forward with all the radical long term conceptual reforms based on an integrated relationship between "Food intake and Biological Regeneration ". It is necessary to enhance food quality and productivity in correspondence to a better development of consumer's self-protection strategies based on the promotion of consumers' potential skills in LIFE SCIENCES research development.

Therefore, the vision for 2020 and beyond, of the CSE-Open Network for New Science, will benefit from long term integration through an active participation with the Food For Life Platform. In the area of Consumer Research joint activities will be:

- a) Actions with shared resources,
- b) Supporting members and stakeholders involvement in collaborative R+D activities,
- c) Disseminating CSE-ONNS ongoing and final results, to the benefit of Food For Life National Platforms
- d) Ensuring an exchange of participation to contribute to the creation of the CONSUMER VIRTUAL CENTRE of excellence in Europe
- e) Opening discussion forums on the CSE-ONNS PORTAL for diffusing successful experiences and best practices of Consumer Science Innovation in view of the long term activities

f) Design campaign and roadmap of Food & Health education in European schools to ensure appropriate human resources in future food for life.

Launch of the “FOOD for THINK” International Award to award European youth consumers in the schools, in order to sustain long term activities of the CSE-ONNS EUROPEAN project proposal till 2008 and over the 2012. The “FOOD for THINK “ competition among European youth consumers” would be launch as a WEB -Poster Competition, organised by the CSE-ONNS project to forecast the future of Consumer Science. An European Award international meeting will be held in Roma each two years from 2011 – to 2020. The Prize winners will get a not costly statuette and a “FOOD for THINK” poster, to highlight the campaign’s messages of the importance to see the food as a good components of thinking about personal and societal well being. The “FOOD for THINK” competition, provides children with an excellent opportunity to learn about food safety issues whilst being creative and having a personal life styles. The aims of the “FOOD for THINK” Award will be to promote a strong and broad based consumer movement in each European country, particularly at youth level, in both urban and rural areas of the CSE-ONS participating countries, aiming to assess the consciousness of consumers’ rights in food healthy diets and well being. Eligibility and awards rules will be discussed during the CSE-ONNS Project with partners and stakeholders. The Award will run no for profit It should not be run for profit for any individual or group of individuals but should serve the general public without distinction of, political creed, and religions.



1.3 The Joint Programme of Activities (JPA) - OVERALL STRATEGY OF THE WORKING PLAN:

- JPA 1 - Advancing Consumer Confidence in Food Science
- JPA 2 - Changes in Social Knowledge and Developments in Dietology
- JPA 3 - Food Quality & Safety in relation to Consumer Perception of Food Production and Marketing in a Knowledge Based Bio-Economy.
- JPA 4 - New Food Products and Production methods to empower the "Consumer Oriented" knowledge
- JPA 5 - Understanding how Consumer Trends would Present New Opportunities to KBBE development.

The CSE-ONNS Work Plan would be oriented to improve the strategic frontline between scientific knowledge of food production and better quality of food perception by boosting consumer skills and communication with science and industry.

The new European strategy of Knowledge Based Bio-Economy needs to put at the centre of gravity the consumers skills growth, in order to facilitate personal food choices and living styles which will promote more consciously their own health and well-being.

This focus on strengthening European Consumer Science in food will be based on an Scientific and Technological (S/T) methodology to increase the consumer's comprehension in a usable approach to "life-science" in the KBBE developing context. The S/T methodology of CSE-ONNS program will be developed in relation to the consumer vision of food quality related to societal and environmental problems, and a healthy life progress. The advances in European Consumer Science will be disseminated by a multimedia and multi-language portal including an "on demand" networking e-learning software that will be co-organized by the partner-consortium, for improving interaction beyond the established state of Consumer Science.

Starting from these goals the CSE-ONNS – S/T proposal would set out, as fundamental priorities, for the years 2007 to 2012, the following **Strategic Working Plan**:

JPA 1. - Advancing Consumer Confidence in Food Science.

1.1 The CSE-ONNS project will aim to empower scientists in their role and responsibilities in participating in social debate. To promote a two-way communication about food and nutrition in relation to some important issues such as: pre-natal nutrition, child behaviour and development, "healthy aging", food intolerances and allergies, diabetes, obesity, eating disorders (anorexia and bulimia). To combat food related illness it is crucial to improve our knowledge on the relationship between advanced sciences in neurology. Moreover, psychology and sociology of nutrition will be considered, to emphasise the importance of food in creating a status of well-being in the human psyche.

1.2 Nutrition during the ontogenesis and the prenatal period will be given particular emphasis in associated projects.

1.3 Consumer education which is crucial for stimulating a correct development of child behaviour in food intake, favouring a correct desire in nutrition preferences promoting the vision of the living relationships between nutrition and well being.

1.4 Psychogenetic disorders of food intake, seen in relation with the central nervous system, will be taken in to appropriate consideration, to understand the metabolic effect of basic nutrients, vitamins, and minerals on food intake behaviour. This knowledge will be utilized to develop a concrete program against obesity and its health consequences e.g. cardiovascular disorders, and also in some cases to combat defects in immunology and other kinds of disorders due to a metabolic deregulation e.g. atherosclerosis, osteoporosis, diabetes, hypertension, allergy and inflammatory diseases.

1.5 The Neuropsychological contributions to the CSE-ONNS project would aim to educate on the causes that can lead to malnutrition or to deficiency diseases within a rich society. To educate and debate with consumers the reasons, and the cures, for the depression of appetite in the case of Anorexia or the control of appetite in the case of Bulimia

1.6 Neurological knowledge will be integrated with advanced scientific knowledge about genomic nutrition, and this cognitive integration will be a basis to promote better food consumption behaviour of consumers. Recent brain image research has discovered the Principle of Pleasure as a physiological demonstration of the "Placebo Effect" (from Placeo = to be favourite). It is well known that eating favourite food preferences stimulates the release of neurotransmitters endorphins, which promote feelings of well-being, decrease pain and increase relaxation.

Conversely a different release of hormones can be generated through poor quality food and bad eating conditions (e.g. rapid eating or adverse social circumstances), resulting in a "Nocebo Effect" (from Latin Noceo = injurious to the health) which manifests as indigestion or incomplete digestion.

In this case the brain releases a neurotransmitter (CCK) that, in correlation with some hormones, is responsible for creating feelings of stress and anxiety. These issues will be brought into the discussion.

1.7 Promotion of the appropriate use of labeling information to aide consumers on with special needs i.e. food allergies and intolerances, diabetics.

JPA 2. Changes in Social Knowledge and Developments in Dietology

2.1 The CSE-ONNS project will enable consumers to make informed choices to choose a healthy diet, and thereby to improve quality of life by reducing diet-related disease. The project will open a dialog to help consumers to reflect about social knowledge changes determining new trends in dietology.

2.2 The term "Self Directed Health Care" is defined as a knowledge system that allows informed consumers to assess their own personal needs in food and nutrition. The importance of a Self Directed Health Care system is emphasised by findings that the same diets fed to different individuals generate quite distinct health effects. Genetic variability of individual metabolisms must be taken into account in dietary research and its application to public health education. Variations in metabolism are becoming more evident and more important for both the nutritional status of consumers and to the food industry that is aiming to develop new functional food products.

2.3 A key point of CSE-ONNS will be to promote a conceptual change about health and nutrition, from a current vision of food as a mechanical energy intake to a new vision of food as bio-catalyst for improving a dynamic biological growth and reconstruction of ourselves. At its essence, the body and cerebral fitness, is dependent on the quality of food intake for generating a permanent living transformation of our cells and neurons. Consumers need to be conscious that weight loss can only be a temporary solution if diets are conceived in calories. This has long been recognised by the traditional Mediterranean diet, which is not based on an energetic-mechanical consideration, but on the basis of fundamental nutritional requirements.

2.4 Promotion of functional food as an important part of an overall healthy lifestyle that includes a balanced diet and physical activity. It is important to further our understanding of the role of sport in relation to the metabolism in muscles and the consequent reduction of fat. This relationship between muscle and fat metabolism influences composition of the athletic diet in terms of the quality of food intake. The above approach will also be helpful with respect to the production of functional sport-food based on special ingredients for athletes of various ages, and needs of disabled and handicapped people.

JPA 3. Food Quality & Safety in relation to Consumer Perception of Food Production and Marketing in a Knowledge Based Bio-Economy.

3.1 "*CSE-ONNS consortium- EVC-CFS*" will aim to work towards establishing an accurate informed consumer perception, in the context of an European KBBE, on food production and marketing. This "multi-actorial" and transdisciplinary Open Network for New Science would promote new integrated knowledge and new working methods in Food Consumer Science. This approach in promoting and disseminating shared knowledge throughout joint ventures and data exchange, will be possible by means of developing a multimedia information program to advise in real time.

3.2 The CSE-ONNS project aims to link scientists to consumers in Europe, so giving advanced

information, evaluation criteria and information on European regulations regarding food quality and safety from all sectors of the food chain. Therefore the CSE-ONNS project will aggregate partners and stakeholders at an European and International level, belonging not only to academia but also to the primary food production and food manufacturing, processing and distribution industry. Diets and life-styles are not only individual but also public issues, and influencing trends in food consumption plays a major role in public health policies.

3.3 In recent years, consumers have begun to look at food not only for basic nutrition, but also for health benefits. The functional food and nutraceutical (or pharma food) industry is responding to a continuing increase in consumer understanding of the link between diet and disease, rising health care costs, aging populations, and advances in food technologies. The nutraceutical industry works to produce novel substances providing health benefits, including the prevention and treatment of diseases. Such products may range from isolated nutrients, dietary supplements and specific diets to genetically engineered designer foods, herbal products, and processed foods. The industry claims to be helping citizens to reduce health care costs, support economic development in rural communities and offer producers the ability to diversify their agriculture and marine based crops.

The nutraceutical market is today global and growing. This complex scientific and cultural new approach of an Internet based prompt information system will be an essential tool to inform consumer opinion on food production and marketing.

3.4 Inclusion of studies and reports on a range of relevant issues such as – Diets and the disorders of the alimentary tract; Food Toxicology - the biological importance of the toxicants in food and the factors influencing their creation, agrochemicals, radionuclides, natural toxic compounds of plants, animals and bacteria; Food additives.

JPA 4. – New Food Products and Production methods to empower the "Consumer Oriented" knowledge.

4.1 It has been reported, in studies on views and trends on GMO and Consumers, that the acceptance of GMO food has decreased over the past years. In fact, it appears that for many people any consumer benefits from GMO food remain unclear and unproven. The potential impact of GMO crops on the environment was the issue that gave rise to most concern and emerged in all the activities undertaken by the most recent reports on this argument in Europe. The safety of GMO food was less of an issue, but suspicion and concern still surround the subject. Consumers wanted to be able to make an informed choice between GMO and non-GMO food. They also felt that it is essential that labelling is clear and effective – possibly by using a logo to allow GMO ingredients to be clearly identified. A smaller group of people in Europe considered that GMO could bring benefits in terms of better nutrition and lower prices, others questioned whether GMO food was dangerous for lowering the environmental bio-diversity.

4.2 From these reports it is clear that there is a need to improve and diffuse education to overcome the lack of consumer understanding on bio-technology development, to avoid a complete closure of consumer acceptance of GMOs in the food market and as a conceptual extension to all the advancement in biotechnological sciences. In fact it is easy to understand that consumers are definitely susceptible to being manipulated via disinformation about genetic knowledge, therefore the CSE-ONNS project would support consumers in making mature decisions based on knowledge of biotechnological developments in relation to food and health issues. This is also related to production of new medical bio-products, seen under the new conditions of future development in the knowledge-based society.

4.3 There is a growing urgency in Europe to develop novel bio-based products, to exploit new and emerging research opportunities and to explore new categories of "novel foods" (bio-products, functional foods), food additives and ways of enriching the final product. Conversely there is a growing demand from consumers for safer, healthier and higher quality food production with a

sustainable growth of traditional foods. To unite those two aspects of KBBE development, consumers need to understand clearly the problem of Cost/Benefit relationships that need to be shown in terms of what helps the increase of competitiveness of both Traditional Agriculture and Biotechnology Innovation. Recently the European Commission favoured a flexible "co-existence" of certified GMO presence in the food-market. In spite of this decision the mixing between GMO Food and traditional food is really a very complex and costly enterprise. This is because it is not easy to trace food from GMO or from organic sources separately, and to label and control the mixed composition in products. In addition with the production of GMO remains the question of bio-pollution on the environment, and in this context it is very difficult to present clear guidelines for consumer attention.

4.4 The coexistence question cannot be completely resolved through a certification scheme until consumers are more informed on the subject, giving them an increased understanding about new food biotechnologies impact on a knowledge based bio-economy. The Project CSE-ONNS would like to link scientists and consumers in a debate about those fundamental questions to obtain a common vision.

4.5 The most fundamental processes that link DNA manipulation and metabolism is not well understood or explained by contemporary science. Recently living science research has found that gene expression is dependent on both the "composition" of nucleotides sequence and the location of the gene in a particular region of the DNA. The different positions of genes in the DNA chain change the instructions necessary to activate the gene expression. Thus, knowing that different regions of the same DNA regulate a different expression of the same gene, it is more easy to understand the importance of the "precautionary principle" in relation to GMO or "novel foods" (i.e. foods or food ingredients resulting from a process not previously used for food) in order to ensure the highest level of protection of human health. Henceforth only advanced consumer knowledge about genetics would favour the correct exploitation of new emerging opportunities of biotechnological production of foods that have been modified by genetic manipulation or other biotechnology-derived foods.

4.6 In fact in a democratic society the advancing of life sciences it is becoming really possible if consumers become conscious about the problems without having making pre-conceived decisions against the development of GMO or other novel food production methods. The CSE-ONNS project would realize a Pilot section of the **EVC-CFS** named *BIOTECHNOLOGY TRANSPARENT PILOT SECTION* co-organized to clarify the level of uncertainty of biotechnology applied to food production into a cost/benefit approach in relation to bio-safety and bio-pollution measurements based on the EU regulation. In conclusion this CSE-ONNS section based on a permanent and on "demand e-learning" strategy, will be very useful to ensure consumer involvement in the building of the KBBE. This effort, in advancing the cognitive approach, permits inclusion of the consumer viewpoints, as a constructive voice in allowing living science to provide new, eco-efficient and competitive products from European agriculture, health, and related industries and enterprises and to enforce the activities of governmental and relevant networking public sectors focused on sustainable development of a European Knowledge Based Bio-economy.

JPA 5. Understanding how Consumer Trends would present New Opportunities to KBBE development.

5.1 To provide a comprehensive understanding of the current consumer trends the CSE-ONNS project will involve a broad range of scientists of several disciplines in order to understand the changes in eating styles and attitudes for various consumer ages, ethnicity, socio-economic classes and family food attitudes. A section will be dedicated to neuro-marketing to understand and to monitor the key factors that influence personal food purchase.

5.2 This study is very relevant because the consumer and business trends are changing in a way

