

PLAN



Action Plan 2010-2013

**Food Science and
Technology Area**

EXECUTIVE SUMMARY

N.B.: If you require any further information about the specific content of any particular Area 7 Centre or Institute's Strategic Plan, please ask for it by sending an e-mail to: pe2010-13@csic.es. Thank you

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7 Food Science and Technology Area

1. GENERAL INFORMATION

DESCRIPTION OF THE AREA AND SHORT HISTORY

The CSIC's Food Science and Technology Area was created in the late 1940s, motivated by a desire to exploit Spain's considerable potential for food production, and the strategic interest of certain sectors such as fruit and vegetables, wine, and olive oil. In 1947 the first of the Area's institutes was set up in Seville, under the name of the Instituto de la Grasa y Derivados (Institute of Fat and Derivatives). In the 1950s the Institutes of Refrigeration, Industrial Fermentations and Dairy Products were created (these institutes no longer exist, and their researchers were transferred to the Instituto del Frío y Fermentaciones – Institute of Refrigeration and Fermentations) and the Instituto de Agroquímica y Tecnología de Alimentos (Institute of Agrochemicals and Food Technology) in Valencia. During the same period the Food Technology Department of the Instituto de Investigaciones Marinas (Marine Research Institute) in Vigo and the Centro de Edafología y Biología Aplicada del Segura (Segura Pedology and Applied Biology Centre) in Murcia were created. In the 1970s the Instituto de Nutrición y Bromatología (Institute of Nutrition and Bromatology) was created in Madrid (now defunct, its researchers having been relocated to the Instituto del Frío) and in 1990 the Instituto de Productos Lácteos (Institute of Dairy Products) was created in Villaviciosa. The previous CSIC Action Plan approved the restructuring of the Instituto del Frío (Institute of Refrigeration) and the Instituto de Fermentaciones Industriales (Institute of Industrial Fermentations) with the creation of two new institutes in the Madrid Region, the Instituto de Ciencia y Tecnología de Alimentos y Nutrición (Institute of Food and Nutritional Science and Technology) and the Centro de Investigación en Ciencias de la Alimentación (Food Science Research Centre). In 2008 the Instituto de Ciencias de la Vid y del Vino (Institute of Sciences of Wine and Viticulture) was created in Logroño through an agreement between the La Rioja regional government, the University of La Rioja and the CSIC.

The Food Science and Technology area currently has a workforce of almost 240 scientists and 413 support staff. Together with its institutes it has nine associated units, which are the result of its ongoing collaboration with university departments.

Mission and Vision

Mission

The Food Science and Technology's Area's mission is to promote the development of highly competitive research for the generation of knowledge of the first order, development and innovation regarding technologies, products and processes, which in the final analysis, lead to quality, safe and healthy foods.

Its mission is highlighted by its high profile in the national and international environment, with significant influence on the structuring of the food science and technology RTD system. Additionally, the Area's mission includes active participation in training, dissemination and knowledge transfer to society, so as to contribute to the well being of citizens through their nutrition.

Vision

The Food Science and Technology's Area's vision is for it to be a benchmark in the area of its research and technology development at the national and international level. To do so it needs collaboration and multidisciplinary, and an optimal coordination of its activities so as to exploit synergies that may be obtained through collaboration with other Areas within the CSIC or other PROs, and in particular, on the international stage.

Institutes and Centres that comprise the Area

The Food Science and Technology's Area comprises 6 Institutes and two departments in institutes belonging to other areas, as listed in the table below.

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Table 1. Institutes and Departments belonging to the Food Science and Technology Area (FST)

INSTITUTE	INITIALS	LOCATION	AREA to which assigned	% in FST
Fats Institute	IG	Sevilla	FST	100
Agrochemicals and Food Technology Institute	IATA	Valencia	FST	100
Dairy Products Institute	IPLA	Villaviciosa	FST	100
Institute of Sciences of Wine and Viticulture	ICVV	Logroño	FST	50
Industrial Fermentations Institute*	IFI	Madrid	FST	100
Refrigeration Institute*	IF	Madrid	FST	100
Institute of Food and Nutritional Science and Technology	ICTAN	Madrid	FST	100
Centre for Food Science Research	CIAL	Madrid	FST	100
Marine Research Institute	IIM	Vigo	NR	32
Segura Pedology and Applied Biology Centre	CEBAS	Murcia	AS	16

FST - Food Science and Technologies

NR – Natural Resources

AS – Agricultural Sciences

Two institutes, the IF and the IFI, have undergone a restructuring of their scientific programmes from which they have emerged as the Instituto de Ciencia y Tecnología de Alimentos y Nutrición (Madrid) (Institute of Food and Nutritional Science and Technology, ICTAN) and the Centro de Investigación en Ciencias de la Alimentación (Centre for Food Science Research, CIAL)(Madrid) . Both of them will be fully operational in 2010. For the purposes of the 2010-2013 Strategic Plan, the new institutes (ICTAN and CIAL) have been considered. The historical data for the period 2003-2007 correspond to the research lines and groups that will be included in each institute in the future.

Table 2. Research lines in each Institute

IG
1. Biotechnology and agrofoods processes
2. Characterisation and quality of fats, oils and lipid-based foods
3. Foods, functional ingredients and health
4. Metabolism of plant-origin lipids
ICTAN
1. Development and application of technological processes
2. Quality, safety and utilisation of traditional and functional foods and ingredients
3. Nutrition in the prevention and treatment of illnesses
IATA
1. Food quality and properties
2. Food conservation and safety
3. Food biotechnology
CIAL
1. Microbiology and biotechnology for safer and healthier foods
2. Analysis and advanced processes in food science
3. Foods and functional ingredients
IPLA
1. Quality and safety of dairy products
2. Functional dairy products, probiotics and health
3. Dairy product technology and biotechnology
IIM
1. Characterisation and quality of caught and farmed fish products
2. Modelling, simulation, optimisation and control of bioprocesses
3. Microbiological food safety
4. Utilisation of waste materials and empirical modelling applied to environmental bioprocesses and technologies
CEBAS
1. Quality, safety and bioactivity of plant-origin foods
ICVV
1. Oenology

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The research lines at the institutes can be grouped into five broad thematic areas:

Functionality and Nutrition
Food Quality and Safety
Food Biotechnology
Process Modelling and Development
Food Characterisation

In the case of researchers who work on sectorial research lines, their activity may be divided between two or more thematic areas. This also happens in the case of other research lines with a more horizontal focus, which, either as a result of a reorientation towards research lines of greater socio-economic interest during the four-year period, or as a consequence of the scientific progress of the originating lines, also share thematic areas. In terms of the number of researchers per line, the Functionality and Nutrition (32%), Food Quality and Safety (29%) and Food Biotechnology (21%) lines dominate, with the Food Characterisation (9%) and Process Modelling and Development (9%) lines having the smallest numbers of researchers.

CRITICAL ANALYSIS OF THE AREA

SWOT ANALYSIS

Weaknesses

- Existence of duplication of various scientific activities in the FST Area, while others are underrepresented in relation to their critical mass.
- Insufficient interaction between the various different institutes and researchers in the FST Area.
- Shortage of technical and support personnel.
- Difficulties upgrading equipment and infrastructure.
- Insufficient resources for technology transfer.
- Excessively rigid administration.
- Scant participation and leadership in European projects.

Threats

- Global economic crisis.
- Drop in number of trainee personnel.
- Scant investment in RTD by the Spanish agro-foods industry.
- Restructuring of the Area's institutes.

Strengths

- Highly qualified human capital.
- Multi-disciplinarity.
- High rate of funding, through competitive projects and contracts with industry.
- Capacity for training of researchers and technicians.
- Interaction with the socio-economic environment.
- Capacity for collaboration.

Opportunities

- Transformation of the CSIC into a State Agency and entry into force of the new Science Act.
- Opportunities for research lines.
- Existence of sector-specific bodies.
- Young and competitive human capital.
- Strategic axes.
- Societal demand for high quality, safe and healthy foodstuffs.
- Energy crisis: bio-fuels.
- Environmental awareness.
- The CSIC embraces a wide spectrum of scientific and technical areas.

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HORIZONTAL ANALYSIS OF THE RESEARCH LINES

An analysis of the Area's research lines has been performed, grouping the lines into the five thematic areas listed above. In general, the values of the Food Science and Technology Area's scientific indicators compare well with those of its competitive environment.

An analysis of the activity of the thematic areas in the Area has been carried out, bearing in mind the indicators considered to have greatest weight in its scientific/technical activity. These are: the raising of resources on a competitive basis; SCI publications, giving greater relative weight to contributions published in journals with a high impact index; knowledge and technology transfer, through contracts with industry, patents applied for and licensed, creation of technology-based companies; training activities, through doctoral theses supervised and postgraduate courses given as a part of masters' degrees, doctoral courses, etc.; and internationalisation activities through collaborations with groups of other institutions and co-authorship of research papers. The scientific/technical activity per researcher for the indicators mentioned above is, in general terms, similar across all the Area's major lines (Figure 1).

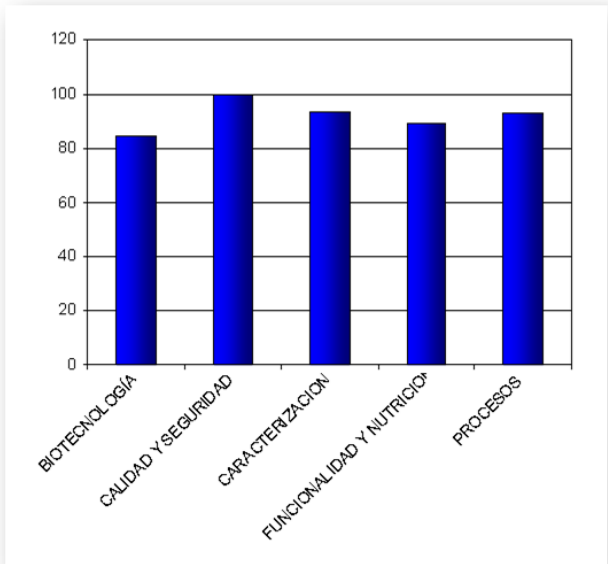


Figure 1.- Index of productivity per researcher and year, result of the integrated evalua-

tion of the indicators of scientific/technical activity during the period 2003-2007 for the thematic areas (Biotechnology, Food Characterisation, Process Modelling and Development, Food Quality and Safety, Functionality and Nutrition) into which the activities of the Food Science and Technology Area are grouped.

ANALYSIS OF INSTITUTES

Figure 2 shows the relative weight of the various institutes in the overall productivity of each thematic area. In general, the large institutes contribute to productivity to a greater extent. The results for the research lines show a degree of dispersion between them across the various institutes. This is particularly important in institutes with a low critical mass. A given research line may be spread across several institutes as a result of a process of horizontal grouping in which sector-specific research lines support a thematic area's productivity, contributing to complementing its weight. In other cases, however, there is a danger of overlap between activities in the different institutes.

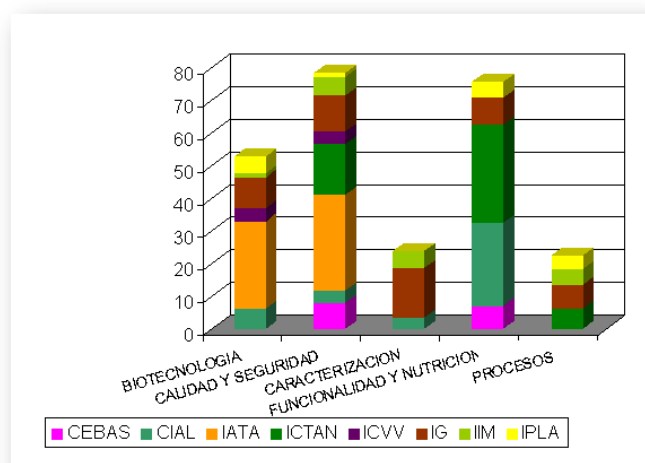


Figure 2.- Relative weight of the overall productivity of the institutes in the various thematic areas (Biotechnology, Food Characterisation, Process Modelling and Development, Food Quality and Safety, Functionality and Nutrition) in which the activity of the Food Science and Technology area is grouped.

3. ANALYSIS OF THE AREA'S 2006-2009 STRATEGIC PLAN

Fulfilment of objectives

Through the commitments made by its institutes, the Area is committed to improving its research activity and has set a series of targets to be met in relation to a number of indicators of scientific and technical activity. These indicators cover four dimensions of research activity: acquiring funds through competitive calls, scientific output in the form of publication of research findings, transfer of technology and know-how to the agro-foods industry and scientific training and outreach activities. **The level of fulfilment of these objectives during the two-year period was very high.** The resources injected by the CSIC and the strength of the economy undoubtedly played an important role in the Area's scientific and technical activity.

4. OBJECTIVES 2010-13

GENERAL OBJECTIVES

Spain is the third country in the world on the topic of "Agricultural Sciences", which includes the disciplines of Agricultural Sciences, and Food and Nutritional Science and Technology. Spain's position is based primarily on the fact that the CSIC is the third-ranking institution worldwide in terms of citations and papers in these disciplines, behind only the USDA in the United States and INRA in France. Therefore, **holding on to a place on the podium of international leadership** in these thematic areas is a primordial objective to which the CSIC's Food Science and Technology Area can and must make a very significant contribution.

The Food Science and Technology's Area's general orientation is to continue progressing as a **benchmark in the areas in which it performs its research and technology development at the national and international level.** To achieve this, the Area has made a significant commitment to the thematic areas that are of clear strategic interest, with a high level of demand from society, namely those relating to the development of foods of high quality, that are health and safe, and whose authenticity and identity can be readily guaranteed with the development of new analytical strategies; the design and application of new technologies and processes for food production and conservation, including biotechnology; and promoting health based on nutrition and the development of

functional foods.

At the same time the Area needs to continue **training highly qualified personnel** who, together with knowledge transfer to the productive sector, should allow our food companies to compete under the best conditions of the market. The work of bringing scientific progress to the attention of the public needs to be stepped up, with the **running of education and outreach activities** which allow consumers to have a better understanding of the foods they consume and the healthiest eating habits. The Area needs **to raise its profile and competitiveness on the international level**, increasing its presence in European projects, and in general, strengthening collaborations with international research groups.

SPECIFIC OBJECTIVES

The objective is to continue making progress on top quality R&D with the aim of responding to socio-economic and environmental challenges, and those relating to the improved health and well being of the population, through the generation of knowledge and technology for the production of high quality, safe and healthy foods. The objectives of the mission proposed here are the outcome of the SWOT analysis and integrated analysis described previously, together with the recommendations of the advisory panel.

- **Promoting top quality research in the Area**
- **Raising the Area's international visibility**
- **Bolstering interactions with the agrofoods sector**
- **Increasing training activities for scientific and technical personnel**
- **Promoting scientific outreach activities**

5. RESEARCH STRATEGY AND ENVISAGED ACTIONS

The strategy has been designed taking into account the objectives of the mission defined for the Area. The actions that have been defined involve all members of the Area; some of the actions will be carried out by the Area Commission or the institutes' management teams. Other actions require the collaboration and effort of researchers and support staff at the institutes. The Area's SWOT analy-

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sis has been taken into account when defining this strategy. The strategic actions envisaged are integrated in the four strategic poles of the CSIC's Action Plan.

1. Promoting top quality research in the Area

The strategy aimed at fulfilling this objective is based on the Area's research lines, in particular the critical analysis of its situation and the actions that can be taken affecting the lines to improve research activity and develop their potential. This strategy rests on 4 pillars:

- I. Bolstering research lines
- II. Consolidating research lines
- III. Identifying new topics
- IV. Optimising human and material resources

The **specific actions** proposed in order to implement this strategy are actions aimed at the Area Commission, the Institutes' management teams, and the Area's researchers.

- 1.1. Structuring of Centres and Institutes. During this four-year period actions will be taken aimed at bringing into operation the Institutes and Centres created during the previous plan of action. These are the CIAL, ICTAN and ICVV. This action is envisaged in the Vértices (Knowledge Pole) strategic line of the CSIC's 2010-2013 Action Plan.
- 1.2. Resource Assignment. According to the progress indicators and target values negotiated with the institutes set out in section 7.
- 1.3. Bolstering multidisciplinary research between research groups and exploitation of synergies. Focused trans-disciplinary research will be bolstered through actions in the FOCUS and FOCUS-sátelites projects in the Focus (knowledge pole) strategic line of the CSIC's Action Plan.
- 1.4. Personnel selection based on criteria of excellence. The policy of incorporating personnel in various functions must be guided by the merits of the candidates in order to achieve research excellence in the fields in which each is due to perform his or her activity.
- 1.5. Stepping up communications between the Area Commission and Institutes' Directors on topics of scientific policy in the Area through the directors' meetings.
- 1.6. Avoiding duplication of human and material resources. In order to achieve a better utilisation of resources the acquisition of major facilities and unique equipment will be supported, managed by the servi-

ces or institutes and intended for shared use by the greatest possible number of researchers within the institution. This action will also avoid duplication of highly specialised technical personnel.

- 1.7. Forming alliances with other organisations (universities, hospitals, research organisations). This action is in line with the "CSIC difuso" action under the CSIC's Action Plan, which is part of the "Relación" (Organisation Pole) strategic line.

2. Raising the Area's international visibility

The strategic actions envisaged to achieve this objective are consistent with those proposed at the level of the CSIC in the "Relación" (Organisation Pole) strategic line:

- 2.1. Encourage the participation of researchers from the Area in European projects.
- 2.2. Collaborations with research groups outside Spain will be encouraged by means of their participation in international forums, platforms, committees and work groups under international organisations: European Research Area (ERA), EFSA; FIL, OIV, etc.
- 2.3. From the Area Commission and in communication with researchers, active participation will be pursued in forums of debate on research agendas at the European level, in collaboration with the Vice presidency for International Relations and the CSIC's Office in Brussels.
- 2.4. The organisation of international conferences by the Area's researchers will be encouraged.

3. Encouraging interactions with the agrofoods sector

The current level of involvement of researchers in programmes for the transfer of results was given a good evaluation by the external advisory panel. We intend to improve and bolster this aspect of the Area by means of the following activities, which will be supported by various different actions under the "Lanzadera" strategic line (Answers Pole) of the CSIC's action plan.

- 3.1 Protection of results suitable for transfer. The intention is to give researchers incentives to protect their inventions and research findings

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rationality, and to use the sources of technological information available to direct their innovative potential towards more profitable goals.

- 3.2 Communicate, disseminate and publicise activities and results in target forums. New activities and transferable results that may be of interest in future collaborations with industry and the public sector will be identified.
- 3.3 Encouraging the Area's participation in results transfer projects, CENIT projects, basic research projects oriented towards the transmission of knowledge to companies (TRACE), applied industrial research projects, etc.

4. Increasing personnel training activities

Rectifying the deficit of trainee personnel is a widespread demand among many research lines and was also highlighted by the advisory panel. In order to increase the training activities for scientific personnel the following mechanisms will be put into action, consistent with the strategic lines of the Experts Pole under the CSIC's 2010-2013 Action Plan.

- 4.1 Attracting future researchers to the Food Science and Technology Area in university faculties. Dissemination of research performed in the Area in university schools and faculties to attract new trainee researchers.
- 4.2 Creating an "employment exchange" for PhDs and honours graduates to speed up the search for research personnel.

5. Promoting scientific outreach activities

The process of scientific research is an activity closely related to social practices, thus establishing a commitment by researchers with the transformation of reality. In general, the Area's researchers are committed to dissemination activities bringing the results of research to society, as is demonstrated by their participation in the Semana de la Ciencia (Science Week), Feria de Madrid por la Ciencia (Madrid Science Fair), Vive la Ciencia, lectures, radio and television programmes, etc. Therefore, participation by researchers and institutes in those outreach activities destined to increase knowledge about the knowledge of foods, their safety and the impact of nutrition on health will continue. The researchers will participate in the CSIC-informa and CSIC-divulga actions of the Difunde strategic line of the CSIC's Action Plan.

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CSIC