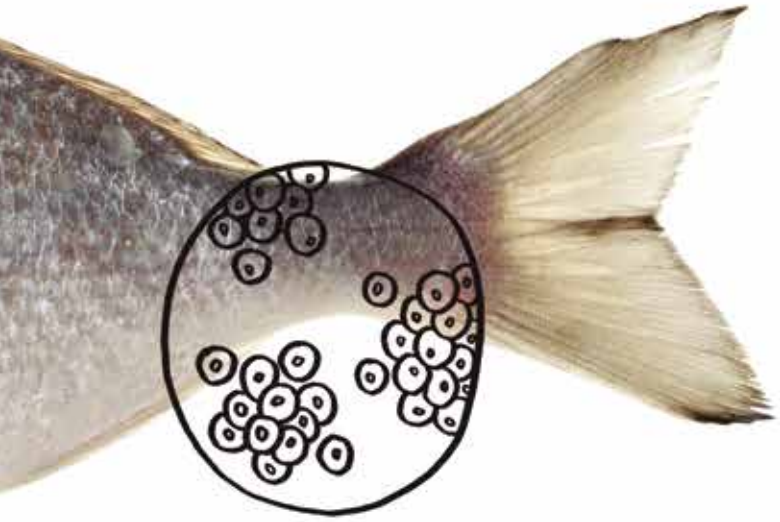

IRTA

Annual Report
2016

'WE SHARE OUR SCIENCE TO FEED THE FUTURE'

IRTA

Annual Report
2016

'WE SHARE OUR SCIENCE TO FEED THE FUTURE'

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EZT092-23

Presentation

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Director General's Report

JOSEP MARIA MONFORT
Director General of IRTA

The conceptualisation of the new management model has begun, with the goal of substituting our current programme-based structure

Since its creation in 1985, the Institute for Research and Technology in Agri-Food (IRTA) has continued to evolve, both in its structure and organisation and also scientifically, from the models inherited from the transfer of jurisdiction from the Spanish Government to the Government of Catalonia.

This model has allowed the objectives and functions for which it was created to be achieved. Now, in order to continue offering quality science, it is time to initiate a new conceptualisation, one that effectively contributes to generating value and making an impact, one adapted to new times.

Coinciding with a new strategic planning cycle, we have to prepare our organisation so that it can continue playing a leading role in the agri-food sector and contribute to transforming research findings into transformative innovations.

For this reason, in the course of 2016, a process of organisational innovation was begun with the creation of a new area-based management structure aimed at substituting the current programme-based framework, which had been used for both scientific and administrative management. Mechanisms and elements to allow the new model to become operative have also been created, mainly based on the reorganisation of currently available resources and the creation of new work plans to improve internal dialogue and coordination, not just between programmes, but also between areas of management, support and more operational departments. This process began in two areas (Animal Production and Plant Production) and will be implemented in the two remaining areas (Food Industries and the Environment) in 2017.

The chief objectives to be met with this new model include:

- To have area search-oriented organisation that is more focused on the critical challenges raised by society and the sector, and make better use of our scientific capital.
- To become a more efficient organisation, which encourages the alignment of our human resources, based on a more professional, strategy-oriented management that promotes more transversal approaches, both at a scientific level and with regard to infrastructures, personnel and investments.
- To guarantee the economic sustainability of the organisation and, at the same time, generate transformative impacts and wealth creation within society.

At the same time, in 2016 the strategic planning process was started, with an aim to indicate the priorities of IRTA's lines of research in the mid to long term, this time proactively incorporating the vision and demands of our key stakeholders.

DR. CONXITA ROYO
Scientific Director of IRTA

The SCImago 2016 report puts IRTA in the top 25% of scientific institutions in the world based on our research, innovation and social impact

During 2016, IRTA's activities aimed at capturing scientific talent continued. With public invitations through the Marie Curie Cofund and Ramon y Cajal programmes, we incorporated 3 new doctors and 14 new pre-doctorate researchers. In 2016, 3 researchers retired and the renewal of programme heads was completed.

In order to complement IRTA's Code of Ethics within the context of European certification "*Human Resources Excellence in Research* (HRS4R)", in 2016 the researchers making up IRTA's Ethics Committee were selected and appointed, and criteria for selecting and hiring researchers were adapted to meet the standards of the HSR4R seal of excellence.

As for scientific productivity, it is worth noting that the average number of scientific papers per researcher has increased by 8.6%, while the average number of citations of researchers has increased by 8.4%. Of all the papers published by IRTA in significant journals, 53% resulted from collaborations with researchers from foreign institutions, and over 70% were published in journals in the first quartile of their scientific category.

The 2016 edition of the SCImago report was taken into account, as were the habitual biometric indexes on scientific production from previous reports, the level of innovation and the scientific impact generated by the 5,147 scientific institutions evaluated worldwide. The SCImago 2016 report put the IRTA in the top 25% of scientific institutions in the world based on research, innovation and social impact.

With this in mind, and in order to possess data that allows us to evaluate the degree to which IRTA has fulfilled the mission it was assigned by the law that created it, in 2016 the first study in Spain evaluating the level of social return of investments in research and development in the agri-food sector was conducted. The results of this study showed a clear and positive relationship between the knowledge generated by IRTA from the time of its creation and the productivity of the Catalan agricultural system. The same study concluded that the average return obtained for each euro that society has invested in IRTA from 1986 to 2015 was 30%. This is similar to the estimated value for referential international research institutions in our sector, such as INRA in France or the University of California at Davis.

We can therefore affirm that the scientific activities carried out by IRTA from the time of its creation have significantly helped to strengthen not only the research system, but also information transfer and innovation for the Catalan agri-food sector.

Presentation

The Institute for Research and Technology in Agri-Food (IRTA) was created in 1985. Attached to the Department of Agriculture, Livestock, Fisheries and Food, it is a public body whose aim is to become a strategic partner of the agri-food sector and a scientific point of reference and a driving force of innovation and technology transfer in this sector.

MISSION

To contribute to the modernisation, competitiveness and sustainable development of the agriculture, food and aquaculture sectors, and to the supply of healthy and quality products to consumers and, in general, to improve the well-being of the population.

VISION

To become a scientific point of reference, driving innovation and the transfer of technology. We want to be a strategic ally to the agri-food sector.

VALUES

1. Commitment
2. Creativity
3. Learning
4. Innovation
5. Leadership
6. Respect
7. Service Vocation

BOARD OF DIRECTORS

ADVISORY COUNCIL

SCIENTIFIC ADVISORY COMMITTEE

GENERAL MANAGEMENT
Josep Maria Monfort

CENTRE DIRECTORS

COMMUNICATION
Albert Gurri

LEGAL SERVICES
Miquel Portals

INTERNATIONAL RELATIONS
Eliecer López

SCIENCE DEPARTMENT
Conxita Royo

PROGRAMME COORDINATORS

PROGRAMME DIRECTORS

GENERAL SUB-MANAGEMENT
Agustí Fonts

CORPORATE DEVELOPMENT, TECHNOLOGY WATCH AND SCIENTIFIC DOCUMENTATION
Anna Pallí

INFORMATION TECHNOLOGY AND COMMUNICATIONS
Josep Solé

ADMINISTRATION, FINANCES AND ACTIVITY MANAGEMENT
Jordi de la Cuesta

HUMAN RESOURCES AND ORGANISATION
Montse Satorra

INNOVATION AND TRANSFER
Rosa Cubel

Area	Programmes	Sub-programmes
FOOD INDUSTRIES	PRODUCT QUALITY *Maria Font*	
	FOOD SAFETY *Sara Bover*	New Technologies in Preservation *Margarita Garriga* Abiotic Safety of Foods *Massimo Castelari* Biotic Safety of Foods *Teresa Aymerich*
	FOOD TECHNOLOGY *Pere Gou*	Food Engineering *Pere Gou* Processes in the Food Industry *Dolors Guàrdia* New Processing Technologies for the Food Industry *Josep Comaposada*
ANIMAL PRODUCTION	AQUACULTURE *Alicia Estévez*	Aquatic Cultures *Alicia Estévez* Marine Monitoring *Jorge Diogene*
	ANIMAL BREEDING AND GENETICS *Raquel Quintanilla*	Porcine Genetics and Breeding *Raquel Quintanilla*
	ANIMAL NUTRITION AND WELFARE *Enric Esteve*	Animal Welfare *Antoni Velarde* Monogastric Animal Nutrition *Enric Esteve*
	ANIMAL HEALTH *Joaquim Segalés*	Epidemiology and Risk Assessment *Jordi Casal* Endemic Diseases *Ignasi Badiola* Exotic Illnesses *Francesc Accensi*
	RUMINANT PRODUCTION *Maria Devant*	

Area	Programmes	Sub-programmes

PLANT PRODUCTION

FIELD CROPS
Fanny Álvaro

FRUIT CULTIVATION
Simó Alegre

- Fresh Fruit
  Joan Bonany
- Olive Production, Oil Processing and Dried Fruit
  Ignasi Batlle

GENOMICS AND BIOTECHNOLOGY
Amparo Monfort

POST-HARVEST
Josep Usall

- Pathology in the Post-Harvest
  Josep Usall
- Post-Harvest of Fruit and Vegetables
  Christian Larrigaudière
- Processed Fruit and Vegetables
  Immaculada Viñas

SUSTAINABLE PLANT PROTECTION
Cinta Calvet

- Plant Pathology
  Cinta Calvet
- Entomology
  Jordi Riudavets

ENVIRONMENT AND GLOBAL CHANGE

AQUATIC ECOSYSTEMS
Carles Ibáñez

INTEGRAL MANAGEMENT OF ORGANIC WASTE
Francesc Xavier Prenafeta

ENVIRONMENTAL HORTICULTURE
Carme Biel

WATER USE EFFICIENCY USE
Jaume Casadesús Brugues

AGRI-FOOD ECONOMY

AGRI-FOOD ECONOMY
José Mª Gil

The Centres

The Centres

20
Locations

11
IRTA centres and experimental stations

3
Experimental consortium centres and stations

5
Province of Barcelona

6
Province of Tarragona

7
Province of Lleida

2
Province of Girona

- IRTA work centre
- Centres in partnership
- IRTA experimental stations
- Experimental stations in partnership
- Collaborating estates and farms

IRTA Torre Marimon

IRTA work centre / Corporate Services

Director: **Joaquim Adillón**

29
Researchers

45
Support staff
(Torre Marimon farm)

57
Support staff
(Corporate Services)

Programmes

- **Fruit cultivation**
- **Genomics and Biotechnology**
- **Environmental Horticulture**
- **Integrated Management of Organic Waste**
- **Animal Genetics and Breeding**
- **Ruminant Production**

Ctra. C-59, Km. 12.1. 08140 Caldes de Montbui. Barcelona 934 674 040

IRTA Cabrils

IRTA work centre

Director: **Josefina Nin**

26
Researchers

28
Support staff

Programmes

- **Sustainable Plant Protection**
- **Genomics and Biotechnology**
- **Environmental Horticulture**
- **Integrated Management of Organic Waste**

Ctra. de Cabrils, Km 2. 08348 Cabrils. Barcelona 937 507 511

Mas de Bover

IRTA work centre

Director: **Joaquim Brufau**

16 Researchers

40 Support staff

Programmes

- **Fruit Cultivation**
- **Animal Genetics and Breeding**
- **Animal Nutrition and Welfare**

Ctra. de Reus - El Morell, Km. 3.8. 43120 Constantí. Tarragona 977 328 424

IRTA Monells

IRTA centre

Director: **Joan Tibau**

Programmes

- **Product Quality**
- **Food Safety**
- **Food Technology**

Building A: **New Technologies and Food Processes**

15 Researchers

25 Support staff

Building A. Finca Camps i Armet. E-17121 Monells. Girona 972 630 052

Building B: **Food technology**

16 Researchers

16 Support staff

Building B. Finca Camps i Armet. E-17121 Monells. Girona 972 630 052

Building C: **Porcine Genetics and Breeding**

4 Researchers

12 Support staff

Building C. Veïnat de Sies, s/n. E-17121. Monells. Girona 972 630 052

IRTA Fruitcentre

IRTA work centre

Director: **Simó Alegre**

36 Researchers

59 Support staff

Programmes

- **Fruit Cultivation**
- **Post-Harvest**
- **Animal Genetics and Breeding**
- **Efficient Water Use**

Parc Científic i Tecnològic Agroalimentari de Lleida (PCiTAL). Fruitcentre Building Parc de Gardeny 25003 Lleida 973 032 850

IRTA Lleida Agronomists

IRTA work centre

Director: **Simó Alegre**

22 Researchers

10 Support staff

Programmes

- **Extensive Crops**
- **Sustainable Plant Protection**
- **Animal Genetics and Breeding**

Av. Alcalde Rovira i Roure, 191. 25198 Lleida 973 032 850

The Centres

Lleida Experimental Station

IRTA work centre

Director: **Simó Alegre**

7 Researchers

16 Support staff

Programmes

- **Fruit Cultivation**
- **Extensive Crops**
- **Efficient Water Use**

Parc Científic i Tecnològic Agroalimentari de Lleida (PCiTAL). Fruitcentre Building Parc de Gardeny 25003 Lleida 973 032 850
Stations: Les Borges Blanques, Gimenells, Mollerussa, Ascó and Llesp

Alcarràs Experimental Farm

IRTA work centre

Director: **Carles Rosell**

- Researchers

4 Support staff

Programmes

- **Animal Genetics and Breeding**
- **Animal Nutrition and Welfare**
- **Ruminant Production**
- **Animal Health**

Partida Montagut, s/n. 25180 Alcarràs. Lleida 973 032 850

IRTA Sant Carles de la Ràpita

IRTA work centre

Director **Dolors Furones**

30 Researchers

37 Support staff

Programmes

- **Aquaculture**
- **Aquatic Ecosystems**

Ctra. Poble Nou, Km 5,5. 43540 Sant Carles de la Ràpita. Tarragona 977 745 427

Ebro Experimental Station

IRTA work centre

Director: **Tomàs Fosch**

5 Researchers

8 Support staff

Programmes

- **Extensive Crops**
- **Fruit Cultivation**
- **Sustainable Plant Protection**

Ctra. Balada, Km 1. 43870 Amposta. Tarragona 977 267 026

IRTA CReSA

CReSA Animal Health Research Centre

IRTA work centre

Director: **Joaquim Segalés**

39 Researchers

51 Support staff

Programmes

- **Animal Health**

Edifici CReSA. Campus Universitat Autònoma de Barcelona. 08193 Bellaterra. Barcelona 935 813 284

Mas Badia

Centre in partnership

Director:
Josep Mª Pagès (until June 2016);
Joan Bonany (starting in June 2016)

11 Researchers

15 Support staff

Programmes

- **Extensive Crops**
- **Fruit Cultivation**
- **Post-harvest**
- **Sustainable Plant Protection**

Mas Badia. 17134 La Tallada d'Empordà. Girona 972 780 275

CRAG

Agricultural Genomics Research Centre

Centre in partnership

Director: **José Luis Riechmann**

140 Researchers

58 Support staff

Programmes

- **Genomics and Biotechnology**

Campus UAB. Edifici CRAG. Bellaterra. 08193 Cerdanyola del Vallès 935 636 600

CREDA

Economics and Agri-Food Development Research Centre

Centre in partnership

Director: **José M. Gil**

9 Researchers

2 Support staff

Programmes

- **Agri-Food Economy**

Parc Mediterrani de la Tecnologia. ESAB Building C/ Esteve Terrades, 8. 08860 Castelldefels. Barcelona 935 521 124

The IRTA in Figures

Human Resources 20
Finances 20
Scientific and Technical Production 20
International Activity 21
Technology Transfer and Communication 21

HUMAN RESOURCES

IRTA staff and associated staff

615
IRTA staff

112
Associated staff

66
Doctoral students

1,002 People from the cooperative system

IRTA staff

335 **54%**
Women

280 **46%**
Men

6%
Foreign staff

23
Different nationalities

433
IRTA
Support staff

182
IRTA RTD staff

FINANCES

32%
Contributions of the Government of Catalonia

68%
Own Funds

PROJECTS AND CONTRACTS

€14.3 M
Revenue by contracts and services

251
Activities with competitive funding

180
Research projects

947
Current contractual activities

512
Clients

SCIENTIFIC AND TECHNICAL PRODUCTION

Scientific production

344
Technical journals

23
Articles in scientific publications

6
Full-length books

10
Doctoral theses

2
Published technical reports or monographs

28
Book chapters

335
Communications/ lectures at congresses

92
National

243
International

Technical production

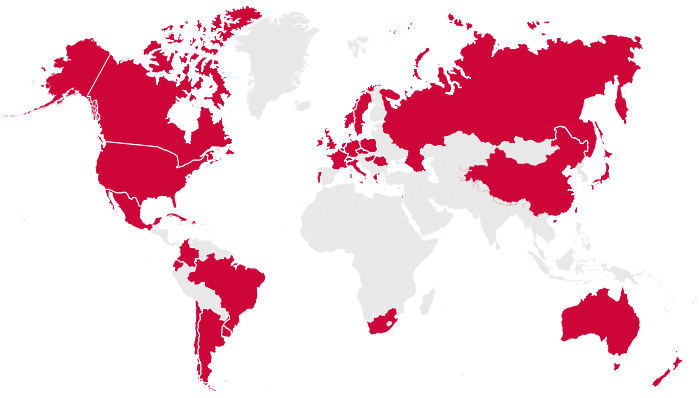
107
Articles in technical journals or broad-based publications

63
Technical articles or articles promoted through portals and web pages

INTERNATIONAL ACTIVITY

312
Current activities

36
Countries with activity



Economic volume

37% of total current activity at IRTA

€9.4 M
Private contractual activity

€13.1 M
Projects with international funding

TECHNOLOGY TRANSFER AND COMMUNICATION

710
Publications of technology transfers

167
Technical and broad-based articles

3,169
References in the press

6
Innovation registries

Total activities

292
Seminars

69
Technical courses

22
Sector courses

103
Field trials

184
Transfer activities

24
External staff visits

18
Technical missions

Activities by area

49%
Plant Production

21%
Animal Production

8%
Food Industries

19%
Environment

3%
Others

Transfer from IRTA

23%
outside of Catalonia


IRTA

2016 News Highlights

Apple production in Girona may be compromised by global warming

IRTA investigators have made a projection up to 2070 of how an increase in temperatures may affect the flowering of apple trees on the lower Fluvià river.

Bringing sediments to rice fields could help to prevent the disappearance of the Ebro Delta

The LIFE+ Ebro-Admiclim project aims to detect which areas of the Ebro Delta are most vulnerable to subsidence and to apply measures to lessen its causes and effects.

IRTA participates in the Special Working Group on the Zika virus created by the Global Virus Network

Agreement with Sorigué to promote innovation in agri-food

Collaboration with CT TECNOVA to promote innovation and technological development

19/04/2016

New strategy for biologically controlling grape rot

The new product is based on *Candida sake*, an innocuous micro-organism used in biocontrol and one of the most interesting alternatives to chemical fungicides

25/04/2016

IRTA collaborates with the Barcelona Municipal Institute for Individuals with Disabilities in its city vegetable garden

A scanner for living animals, a new tool for the meat industry

The computerised tomography can take pictures of different types of tissue and provide growth models without the need for animal sacrifice

Research into the impact of insecticides and pesticides on bees

IRTA works in collaboration with EFSA to investigate food poisoning from ciguatera

The goal of the project is to establish the real impact of these toxins in Europe, to help develop methods and standards for its detection and to prevent future ciguatera outbreaks.

16/06/2016

IRTA presents its research on anaerobic digestion at the European Space Agency

International Watering Course organised together with UC Davis

Catalan scientists look for new varieties of rice to fight the apple snail and the effects of climate change

The NEURICE project, which includes the participation of research centres from 6 different countries, is coordinated by the University of Barcelona and involves IRTA , CRAG and a number of Catalan companies.

26/07/2016

The INNOAPAT food community, coordinated by IRTA

51 companies and organisations collaborate to promote the competitiveness of the Catalan agri-food business. The RIS3CAT Action Plan will invest €11 million in the coming three years.

European and Chinese scientists work to make pest control more sustainable

The EUCLID project works to identify the most sustainable methods for agricultural management without the need for chemical phytosanitary products.

28/09/2016

Participation in a study that allows for the resolution of the structure of an infectious prion

Prions cause illnesses like mad cow disease or Creutzfeldt-Jakob.

29/09/2016

Rice production in the Ebro Delta may fall by 10% by the end of the century

IRTA has elaborated a model predicting the effects of rising sea levels on rice production in several different scenarios until 2100.

IRTA prepares prototypes of juices and purées for the elderly enriched with proteins, vitamins and minerals

The research is part of the European OPTIFEL project.

A pilot programme for preventing food waste is developed in Spain

The study is part of the European REFRESH project, with 26 international members. The goal is to prepare a European-wide protocol that intervenes throughout the value chain.

European project on prevision technology and the use of data on dairy farms

4D4F wants to promote the use of sensors and devices on farms to improve decision making.

19/10/2016

A new, more productive model for the production of Conference pears

24/10/2016

Two new technologies presented for processing milk more sustainably

The new systems allow for the sterilisation of milk using solar thermal energy and radio frequencies.

Collaboration with the Barcelona Provincial Council on the future of chestnut production in Montseny Natural Park

02/11/2016

Project for sustainably intensifying bovine husbandry with Uruguay, Ireland and New Zealand

14/11/2016

Pork producers in Colombia to use BDPorc

14/11/2016

Renewal of the Joint Research Unit with New Zealand's Plant and Food Research

IRTA and Ilerfred promote a mixed cold engineering unit

Pinsos Grau's Marganell farm in Barcelona wins the 2016 Porc d'Or amb Diamants (Golden Pig Award with Diamonds)

28/11/2016

The Australian Society of Viticulture and Oenology recognises a study on the use of remote sensing for watering vineyards

29/11/2016

Water use in apple production in Girona is reduced with a watering system based on the Internet of Things

12/12/2016

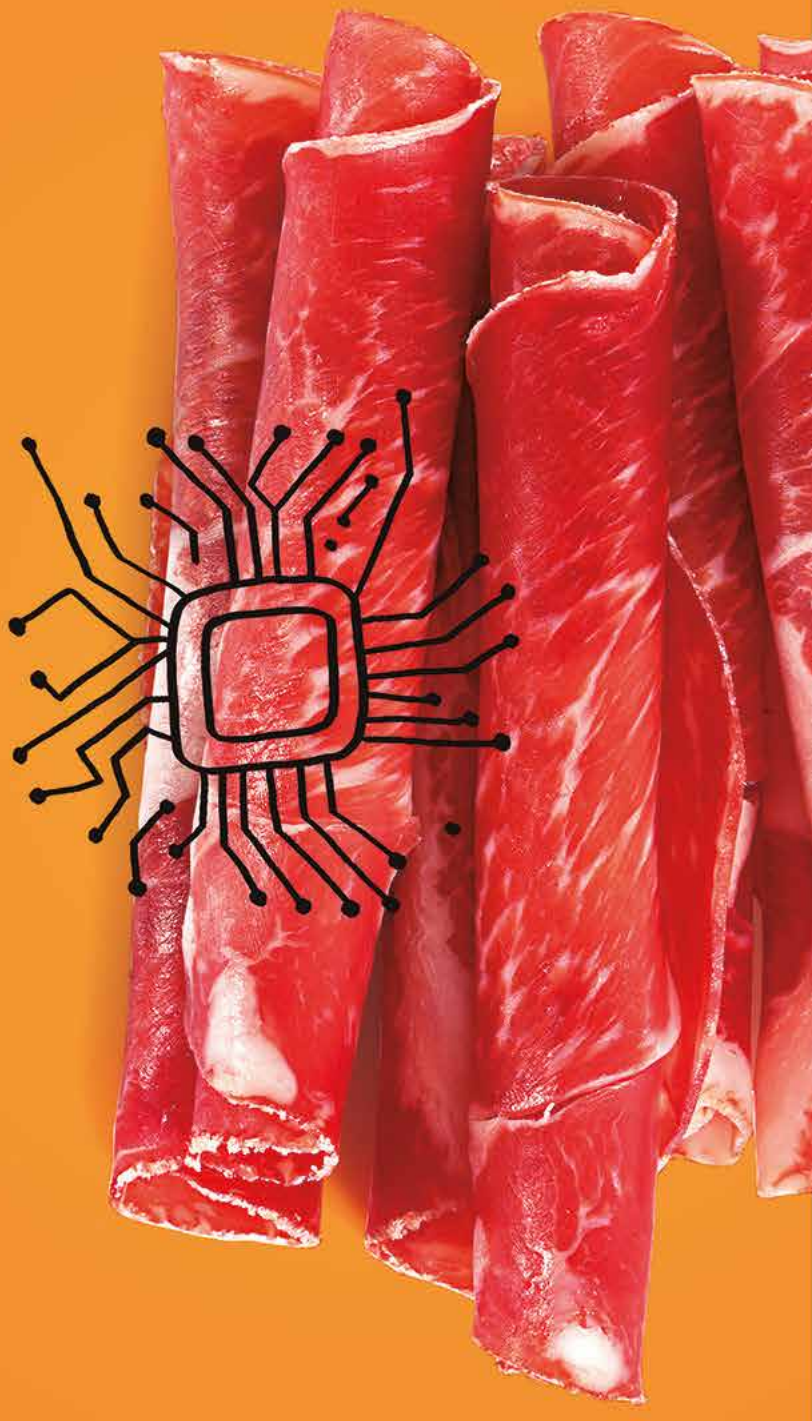
Best agronomic practices are evaluated to promote saffron cultivation in Catalonia

IRTA experts participate in the selection of Spain's best hams


B
354
B
373

Programme Activities

Food Industries	31
Animal Production	39
Plant Production	51
Environment and Global Change	63
Agri-Food Economy	73



Food Industries

Product Quality

Food Safety

Food Technology

PRODUCT QUALITY

Director
Maria Font

Work centres
Monells

7
Researchers

8
Support staff

This multidisciplinary group is devoted to assessing the quality of meat from a technological, nutritional, sensory and social point of view in relation to genetics, feeding and *ante* and *post mortem* treatment. Research areas include new and existing systems for automatically classifying pork and beef carcasses, the characterisation and optimisation of the composition of the carcass using different technologies applied to living animals or carcasses, the prediction and evaluation of the quality of meat on the production line, improving the quality of feed, optimising veal curing, evaluating the quality of meat from alternative production systems, and determining functional bioactive compounds in different food matrices and/or in subproduction so that they can be used for innovation and improving the quality of other foods.

Projects and Contracts

16
Activities with private funding

3
National projects

4
European projects

3
Other projects

Technology transfer

4
Technical seminars

13
Scientific papers

11
Communications and posters

2
Technical and broad-based articles

1
Theses

Featured project

TREASURE. Diversity of local pig breeds and their production systems to obtain quality traditional products and maintain sustainable production chains. Innovations in fresh products from the Majorcan *Porc Negre* swine variety have been developed. These innovations have sought to produce healthier products with an improved shelf life while maintaining traditional aroma, taste and texture. Products coming from local breeds are very important to European culture and identity, with consumers showing growing interest in such products. As a result, hamburgers and sausages have been made of *Porc Negre* together with mushrooms as a natural source of dietary fibre and beta-glucan, as well as blueberries as a natural source of anti-oxidants. In addition, work is being done on consumer preferences in new market niches for these traditional fresh pork products.

Start: April 2015 End: March 2019

Financing body: EU (H2020)

Budget: Total, €3,395,987 (IRTA €311,628)

Partners: 25

Other notable projects

- Improvement of the technological quality of pork for the fabrication of cooked ham through optimum genetic selection.
- Influence of the restriction and contribution of phosphorus to the diet of female pigs on *in vivo* tissue growth, evaluated by means of computed tomography, bone resistance and the sensory properties of the meat.
- Research, development and innovation in new functional foods for metabolic syndrome.

Featured publications

Font-i-Furnols, M., Čandek-Potokar, M., Daumas, G., Gispert, M., Judas, M., Seynaeve, M. (2016). Comparison of national ZP equations for lean meat percentage assessment in SEUROP pig classification. *Meat Science,* 113(0) 1-8.

Borrisser, F., Panella, N., Zammerini, D., Olivares, A., Garrido, M.D., Martinez, B., Gil, M., García Regueiro, J.A., Oliver, M.A. (2016). Prevalence of boar taint in commercial pigs from Spanish farms. *Meat Science,* 111(0) 177-182.

Zomeño C, Gispert M, Brun A, Carabús A., Font-i-Furnols M. (2016). Predicting the carcass chemical composition and describing its growth in live pigs of different sexes using computed tomographies. *Animal,* 10(1), 172-181.

Borrisser, F., Kallas, Z., Panella, N., Avena, M., Ibáñez, M., Olivares, A., Gil, J.M., Oliver, M.A. (2016). Towards entire male pigs in Europe: A perspective from the Spanish supply chain. *Research in Veterinary Science* 107, 20-29.

Panella-Riera, N., Blanch, M., Kallas, Z., Chevillon, P., Garavaldi, A., Gil, M., Gil, J.M., Font-i-Furnols, M., Oliver, M.A. (2016) Consumers' segmentation based on the acceptability of meat from entire male pigs with different boar taint levels in four European countries: France, Italy, Spain and United Kingdom. *Meat Science,* 114, 137-145.

FOOD SAFETY

Director
Sara Bover

Work centres
Monells

6
Researchers

4
Support staff

The Food Safety programme develops, optimises and validates protocols for the analysis of chemical and biological hazards. It supports the agri-food sector by means of assessing the impact of traditional, new and emerging preservation technologies on the quality, safety and shelf life of food through durability studies, challenge tests and predictive microbiology, as well as quantitative risk analysis. The programme has a collection of strains of technological (starter cultures), bio-protective (anti-listeria) and functional (probiotics) relevance.

Projects and Contracts

30
Activities with private funding

1
National projects

3
European projects

3
Other projects

Technology transfer

14
Technical seminars

5
Scientific papers

6
Communications and posters

0
Theses

2
Technical and broad-based articles

Featured project

MUSE-Tech. Multisensory technology for managing food processes The European MUSE-Tech project seeks to be a point of connection between the latest technology in optoelectronics and the need to improve process control in the food industry. It aims to develop a multi-sensor system (photo-acoustic, Vis-NIR and multi-point temperature) for the real-time on-line monitoring of different parameters associated with quality and chemical safety. It will be used in industrial processes related to bread-making, frying potato crisps and beer production.

Start: October 2013 End: October 2016

Financing body: EU

Budget: €478,500 (IRTA)

Partners: 12

Other notable projects

- Filling knowledge gaps for evaluating the risk of *Listeria monocytogenes* in ready-to-eat (RTE) foods.
- Incidence of pyrrolizidine alkaloids in foods.
- Microbiological safety by means of predictive microbiology and quantitative assessment of the risk to ready-to-eat meat products that are nutritionally enhanced and/or treated at high pressure.

Featured publications

Picouet, P.; Hurtado, A.; Jofré, A.; Bañón, S.; Ros, J.M.; Guàrdia, M.D. (2016) Effects of thermal and high-pressure treatments on the microbiological, nutritional and sensory quality of a multi-fruit smoothie" *Food and Bioprocess Technology* 9 (7): 1219-1232

Bianchi, T., Guerrero, L., Gratacós-Cubarsí, M., Claret, M., Argyris, J., Garcia-Mas, J. and Hortós, M. (2016) Textural properties of different melon (Cucumis melo L.) fruit types: Sensory and physical-chemical evaluation. *Scientia Horticulturae* 201:46–56.

Tudela, R., Ribas-Agustí, A., Buxaderas, S., Riu-Aumatell, M., Castellari, M., López-Tamames, E. (2016) Ultrahigh-Performance Liquid Chromatography (UHPLC)–Tandem Mass Spectrometry (MS/MS) Quantification of Nine Target Indoles in Sparkling Wines. J. Agric. *Food Chem.* 64 (23): 4772-4776.

Baeza, A.N., Urraca, J.L., Chamorro, R., Orellana, G., Castellari, M., Moreno-Bondi, M.C. (2016) Multiresidue analysis of cephalosporin antibiotics in bovine milk based on molecularly imprinted polymer extraction followed by liquid chromatography-tandem mass spectrometry. *Journal of Chromatography A,* 1474: 121-129.

Anna Jofré, Margarita Garriga, Teresa Aymerich, Fernando Pérez-Rodríguez, Antonio Valero, Elena Carrasco, Sara Bover-Cid (2016) Closing gaps for performing a risk assessment on Listeria monocytogenes in ready-to-eat (RTE) foods: activity 1, an extensive literature search and study selection with data extraction on L. monocytogenes in a wide range of RTE food (DOI: 10.2903/sp.efsa.2016.EN-1141) EFSA *Supporting Publications:*13 (12) pp184.

FOOD TECHNOLOGY

Director
Pere Gou

Work centres
Monells

16
Researchers

13
Support staff

The Food Technology programme is a multidisciplinary group focused on research and transfer in the food industry sector (meat, dairy, fish, fruit, cereals, etc.). The programme carries out research aimed at resolving problems existing in the sector. The principal lines of research study processing technology (drying, heat treatment, high pressure, microwaves, radio frequencies, packaging...) and process control systems. The programme also offers highly qualified analyses (sensory, rheology, spectroscopic...) and specialised services.

Projects and Contracts

63
Activities with private funding

6
National projects

5
European projects

4
Other projects

Technology transfer

23
Technical seminars

23
Scientific papers

15
Communications and posters

4
Technical and broad-based articles

0
Theses

Featured project

i³-Food. The i³-food project aims to implement three innovative technologies for food processing in industrial conditions to ensure their rapid incorporation into the market. The intention is to ensure the optimal control of the process for these technologies is validated: preservation by means of high-intensity pulsed electrical fields (PEF-P) for liquid food products (fruit juices or milk shakes, for example), high-pressure heat sterilisation (HPTS) for ready-to-eat foods and low-pressure extrusion for cold food products (mostly frozen foods). The project will provide validated sensors or sensor-type measurements for the constant control of the process and the development and evaluation of a Hazard Analysis and Critical Control Points (HACCP) system for each technology.

Start: March 2015 End: March 2018

Financing body: EC

Budget: €2,159,275

Partners: 10

Other notable projects

- **ENTHALPY**. Improving the drying process to save energy and water, bringing efficient processes to the dairy product chain
- **OPTIFEL.** Optimised food products for the elderly
- **SOLTEXJAM.** Characterisation and objective detection of texture defects in cured ham using non-destructive technologies. Development and evaluation of corrective measures.

Featured publications

Benet, I.; Guàrdia, M.D.; Ibañez, C.; Solà, J.; Arnau, J.; Roura, E. (2016) Low intramuscular fat (but high in PUFA) content in cooked cured pork ham decreased Maillard reaction volatiles and pleasing aroma attributes. *Food Chemistry,* 196: 76-82.

Ares, G.; Gimenez, A.; Vidal, L.; Zhou, Y.; Krystallis, A.; Tsalis, G.; Symoneaux, R.; Cunha, L.M.; Pinto de Moura, A.; Claret, A.; Guerrero, L.; Cardello, A.V.; Wright, A.; Jefferies, L.; Lloyd, M.; Oliveira, D.; Deliza, R. (2016). Do we all perceive food-related well-being in the same way? Results from an exploratory cross-cultural study. *Food Quality and Preference* 52 :62-73.

Fulladosa, E.; Gou, P.; Muñoz, I. (2016) Effect of dry-cured ham composition on X-ray multi energy spectra. *Food Control,* 70: 41-47.

Mora, H.; Guàrdia, M.D.; Serra, X.; Gou, P.; Arnau, J. (2016). Sensory characterisation and consumer acceptability of potassium chloride and sunflower oil addition in small-calibre non-acid fermented sausages with a reduced content of sodium chloride and fat. *Meat Science* ,112: 9-15.

Marcos, B.; Gou, P.; Arnau, J.; Comaposada, J. (2016). Influence of processing conditions on the properties of alginate solutions and wet edible calcium alginate coatings. *LWT-Food Science and Technology,* 74: 271-279.

Animal Production

Animal Nutrition and Welfare

Ruminant Production

Animal Health

Aquaculture

Animal Genetics and Breeding

ANIMAL NUTRITION AND WELFARE

Director
Joaquim Brufau

Work centres
Mas de Bover, Monells

12
Researchers

27
Support staff

The challenge for this programme is to provide sustainability to animal production under the new provisions and requirements of the European Union. Therefore, the research values new alternative products to antibiotic growth promoters, and generates knowledge about the conditions of the digestive processes of the animals in situations which compromise animal welfare. It also studies how to improve animal welfare under the new conditions required by the new animal production model.

Projects and Contracts

147
Activities with private funding

7
National projects

5
European projects

3
Other projects

Technology transfer

44
Technical seminars

23
Scientific papers

29
Communications and posters

16
Technical and broad-based articles

2
Theses

Featured project

ECO-FCE. Global focus on systems for optimising food efficiency and reducing the environmental footprint of monogastrics. The objective of the IRTA's participation in this project is to evaluate different feeding strategies for pigs and chickens, focusing on how the feed is given to the animals and its composition. Current studies in fattening swine seek to identify feeding strategies for improving feeding efficiency. Improving the precision with which feed is given to animals (with the use of more homogeneous groups and more frequent adjustment of feed formulation) presents advantages over a conventional two-phase system. This work contributes to improving the understanding of how to optimise the feeding of pigs and chickens in order to achieve the maximum efficiency of the feed and to minimise the environmental footprint.

Start: February 2013 End: January 2017

Financing body: UE-FP7-KBBE-2012-6

Budget: €6,000,000 (Total); €700,000 (IRTA)

Partners: 17

Other notable projects

- **Feed-a-gene.** Adaptation of the feed, animal and feeding techniques to improve the efficiency and sustainability of production systems in monogastric livestock.
- Influence of the restriction and contribution of phosphorus to the diet of female pigs on *in vivo* tissue growth, evaluated by means of computed tomography, bone resistance and the sensory properties of the meat.
- **4D4F.** Farm data that help to improve decision making by farmers.
- Feeding and management strategies to reduce the effects of heat stress on production, meat quality and welfare in pigs raised in Spain.

Featured publications

Brufau, MT; Campo-Sabariz, J (; Bou, R; Carne, S; Brufau, J 5] ; Vila, B Marques, A (2016). Salmosan, a Beta-Galactomannan-Rich Product, Protects Epithelial Barrier Function in Caco-2 Cells Infected by Salmonella Enterica Serovar Enteritidis. *Journal of nutrition* 146: 1492-1498.

Casal, N., Manteca, X., Escribano, D., Cerón, J. J., Fàbrega, E. (2016). Effect of environmental enrichment and herbal compound supplementation on physiological stress indicators (chromogranin A, cortisol and tumour necrosis factor-α) in growing pigs. *Animal, in press, doi:* 10.1017/S1751731116002561.

Torrallardona, D.; and Polo, J. (2016) Effect of spray-dried porcine plasma protein and egg antibodies in diets for weaned pigs under environmental challenge conditions. *Journal Of Swine Health And Production* 24: 21-28.

Rodehutscord, M; Adeola, O; Angel, R; Bikker, P; Delezie, E; Dozier, W A 3rd; Umar Faruk, M; Francesch, M; Kwakernaak, C; Narcy, A; Nyachoti, C M; Olukosi, O A; Preynat, A; Renouf, B; Saiz Del Barrio, A; ZSchedle, K; Siegert, W; Steenfeldt, S; van Krimpen, M M; Waititu, S M; Witzig, M. (2016).

Results of an international phosphorus digestibility ring test with broiler chickens. *Poultry Science* 2016 (in press).

Dalmau, A. Nande, M. Vieira-Pinto, S. Zamprogna, G. Di Martino, J.C.R. Ribas, M. Paranhos da Costa, K. Halinen-Elemo, A. Velarde. 2016. Application of the WelfareQuality® protocol in pig slaughterhouses in five countries. Livestock Science 193, 78-87. http://dx.doi.org/10.1016/j.livsci.2016.10.001.

RUMINANT PRODUCTION

Director
Maria Devant

Work centres
Torre Marimon

9
Researchers

4
Support staff

Activities on dairy cattle focus on the study of the metabolism of the mammary gland during drying, seeking make improvements to physiological mechanisms through handling and nutrition. This approach also includes working on designing, obtaining and evaluating the effects of substances which regulate inflammation and the regression of both *in vitro* and *in vivo*. Another critical aspect of the peripartum period are the memitris; in this case, the effects of the probiotics which regulate the inflammation have been evaluated. Work has also been conducted on foetal programming, studying how maternal nutrition can affect the metabolism of the calf. Finally, the work in dairy cattle has included the monitoring of consumption and the needs of individual cows in order to make more efficient use of the nutrients and to reduce environmental pollution. With respect to studies with replacement calves and suckling calves, further work has been performed on how the presentation of the feed can affect consumption and reduce stress during weaning. Finally, an evaluation has been made of the effects of antibiotics present in the discard milk of dairy cows in the resistance to antibiotics and the digestive flora of the replacement calves. With regard to fattening calves, studies have been performed to further the use of mangers and the presentation of feed. Finally, there has also been participation in studies on the efficient use of water on farms.

Projects and Contracts

30
Activities with private funding

4
National projects

0
European projects

2
Other projects

Technology transfer

11
Technical seminars

18
Scientific papers

6
Communications and posters

5
Technical and broad-based articles

1
Theses

Featured project

AMINOCRET. Amino acid requirements for growth in nursing calves have hardly been evaluated, with focus centring on essential amino acids. In recent years, importance has been given to considering amino acids from the point of view of their functionality (as regulators of metabolism, immune system and protein synthesis stimulators , epigenetic regulators and neurotransmitters), whether or not they are essential. This project aims to identify amino acids (essential or not) that may limit the growth of nursing calves, and evaluate the possible purpose of some of them in order to improve growth efficiency, muscular development and health status of calves in their first few months of life. The use of techniques like proteomics or computerised tomography will help us to discover changes caused by amino acids in the metabolism and body composition of these animals, and their mechanisms of action in improving feeding efficiency.

Start: May 2016 End: May 2019

Financing body: Spanish Ministry

Budget: €93,100

Partners: In coordination with UAB

Other notable projects

- Optimisation of the dry period of the cow using protein nanoparticles
- Strategies for reducing nitrogen excretion in fattening calves during the finishing phase

Featured publications

M. Terré, M. Devant, and A. Bach. 2016. The importance of calf sensory and physical preferences for starter concentrates during pre- and postweaning periods. J. Dairy Sci. 99:7133-7142.

Khan, M. A., A. Bach, D. M. Weary, and M. A. G. von Keyserlingk. 2016. Invited Review: Transition from milk to solid feed in dairy heifers. J. Dairy Sci. 99:885-902.

Genís S, Sánchez-Chardi A, Bach À, Fàbregas F, Arís A.J. 2016. A combination of lactic acid bacteria regulates Escherichia coli infection and inflammation of the bovine endometrium. *Dairy Sci.* Nov 9.

Cano-Garrido O, Sánchez-Chardi A, Parés S, Giró I, Tatkiewicz WI, Ferrer-Miralles N, Ratera I, Natalello A, Cubarsi R, Veciana J, Bach À, Villaverde A, Arís A, Garcia-Fruitós E. Acta Biomater. 2016. Functional protein-based nanomaterial produced in micro-organisms recognised as safe: A new platform for biotechnology. Oct 1;43:230-9.

M. Devant, G. B. Penner, S. Marti, B. Quintana, F. Fábregas, A. Bach, and A. Arís. 2016. Behaviour and inflammation of the rumen and cecum in Holstein bulls fed high-concentrate diets with different concentrate presentation forms with or without straw supplementation. J. Anim. Sci. 94:3902-3917.

ANIMAL HEALTH

Director
Joaquim Segalés

Work centres
CReSA

46
Researchers

47
Support staff

The Animal Health programme, executed in its entirety by CReSA on the campus of the Autonomous University of Barcelona, is devoted to research, technological development, transfer and education in the area of animal health. It aims to improve animal health and the quality and safety of animal products intended for human consumption. It seeks out innovative and effective vaccines, studying epidemiology, the immunological response and the pathogenic mechanisms of diseases, and also evaluating the risks to human health and developing standardised infection models and diagnostic techniques.

Projects and Contracts

105
Activities with private funding

14
National projects

3
European projects

31
Other projects

Technology transfer

28
Technical seminars

66
Scientific papers

60
Communications and posters

9
Technical and broad-based articles

1
Theses

Featured project

ZAPI. Initiative for the anticipation and preparation of zoonotic disease. The main objective of the ZAPI project is to develop a universal platform to reduce the response time to a certain emerging infectious disease. Thus, it aims to achieve a rapid characterisation of pathogens and rapid design and production of vaccines against emerging pathogens, especially viruses. The ZAPI project is the first *One Health* project within the field of application of the IMI programme. The new methodologies and advances developed in the project will provide benefits for both animal health and public health and increase the capacity to combat zoonotic threats in Europe and the rest of the world.

Start: March 2015 End: February 2020

Financing body: IMI

Partners: 19 organisations in 5 different countries

Other notable projects

- **PPC PERSIST.** Immunopathogenesis of persistent and subclinical infections caused by the classic swine fever virus.
- **PIB-A-PRRS.** A new multi-disciplinary approach to population genetics, immunology and bioinformatics in order to understand protective immunity against PRSSV.
- **ASFVAC.** Strategies for protection against African swine fever: from basic research to the vaccine prototype
- **EPITUBER.** Epidemiology of bovine tuberculosis in Spain: risk factors, sociological aspects, involvement of other domestic species and effectiveness of control measures.

Featured publications

Vidaña B, Martínez J, Martorell J, Montoya M, Córdoba L, Pérez M, Majó N. Involvement of the different lung compartments in the pathogenesis of pH1N1 influenza virus infection in ferrets. *Vet Res.* 2016 Nov 8;47(1):113.

Vázquez-Fernández E, Vos MR, Afanasyev P, Cebey L, Sevillano AM, Vidal E, Rosa I, Renault L, Ramos A, Peters PJ, Fernández JJ, van Heel M, Young HS, Requena JR, Wille H. The Structural Architecture of an Infectious Mammalian Prion Using Electron Cryomicroscopy. *PLoS Pathog.* 2016 Sep 8;12(9):e1005835.

Correa-Fiz F, Fraile L, Aragon V. Piglet nasal microbiota at weaning may influence the development of Glässer's disease during the rearing period. *BMC Genomics.* 2016 May 26;17:404.

Napp S, Allepuz A, Purse BV, Casal J, García-Bocanegra I, Burgin LE, Searle KR. Understanding Spatio-Temporal Variability in the Reproduction Ratio of the Bluetongue (BTV-1) Epidemic in Southern Spain (Andalusia) in 2007 Using Epidemic Trees. *PLoS One.* 2016 Mar 10;11(3):e0151151.

Haagmans BL, van den Brand JM, Raj VS, Volz A, Wohlsein P, Smits SL, Schipper D, Bestebroer TM, Okba N, Fux R, Bensaid A, Solanes Foz D, Kuiken T, Baumgärtner W, Segalés J, Sutter G, Osterhaus AD. An orthopoxvirus-based vaccine reduces virus excretion after MERS-CoV infection in dromedary camels. *Science.* 2016 Jan 1;351(6268):77-81.

AQUACULTURE

Director
Alicia Estévez

Work centres
Sant Carles de la Ràpita

17
Researchers

19
Support staff

This programme aims to carry out strategic research in the field of aquaculture and facilitate its effective transfer to the industry, companies and the government. The Marine Environment Monitoring sub-programme performs the following tasks: monitoring the environment in marine production areas and food safety in seafood, the valuation of marine products, and the design and execution of the Monitoring programme of Water Quality, molluscs and toxic phytoplankton in shellfish production areas on the Catalan coast, based on environmental parameters, microbiological indicators (E. coli), toxic phytoplankton and marine toxins, pollutants, heavy metals, organochlorines, PAHs and dioxins. The Aquatic Cultures sub-programme seeks to develop research into both new and well-established aquatic species to improve their quality, productivity and sustainability at a commercial level and for the innovation of new biotechnological methods. The sub-programme also strives to attain an inter-disciplinary synergy between its programs and lines of research.

Projects and Contracts

37
Activities with private funding

12
National projects

5
European projects

8
Other projects

Technology transfer

5
Technical seminars

41
Scientific papers

34
Communications and posters

2
Technical and broad-based articles

2
Theses

Featured project

DIVERSIFY. Exploration of the biological and socio-economic potential of new or emerging species of fish as candidates for expanding the European aquaculture industry. The project involves the study and resolution of problems in the raising of new freshwater and marine species (croaker, grouper, amberjack, mullet, pike perch and halibut) in Europe and Israel.
The IRTA participates, together with other institutions, in research into croakers, mainly the great variability of growth among stocks during the fattening phase, the low genetic variability of existing breeding stocks and emerging pathologies (especially granulomatosis, nocardia and parasites).

Start: 2014 End: 2018

Financing body: EU KBBE-7 Framework Programme (H2020-SFS-2014-2)

Budget: €968,387.43

Partners: 20

Other notable projects

- **ITACA.** Improved management and technological innovation on tilapia fish farms
- **ECSafeSEAFOOD.** Environmental contaminants in fish: assessment of safety, impact and mitigation strategies

Featured publications

Chauvigné, F.; Boj, M.; Finn, R.N.; Cerdà, J. (2015) Mitochondrial aquaporin-8-mediated hydrogen peroxide transport is essential for teleost spermatozoon motility. *Scientific Reports* 5: 7789

Lee-Montero, I.; Navarro A.; Negrín-Báez, D.; Zamorano, M.J.; Berbel C.; Sánchez, J.A.; García-Celdrán, M.; Manchado, M.; Estévez, A.; Armero, E.; Afonso, J.M. (2015) Genetic parameters and GxE interactions for skeleton deformities and growth traits at different ages on gilthead sea bream (Sparus aurata L.) in four Spanish regions. *Animal Genetics* 46: 164-174

Gisbert, E.; Skalli, A.; Campbell, J.; Solovyev, M.; Rodriguez, C.; Dias, J.; Polo, J. (2015) Spray-dried plasma promotes growth, modulates the activity of antioxidant defences, and enhances the immune status of gilthead sea bream (Sparus aurata) fingerlings. *J. Anim. Sci.*, 93: 278-286

Carrasco, N.; Green, T.; Itoh, N.; (2015) Marteilia spp. parasites in bivalves: a review of recent studies. *Journal of Invertebrate Pathology* 131: 43-57

L. Reverté, P.de la Iglesia, V. del Río, K. Campbell, C.T.Elliott, K. Kawatsu, P. Katikou, J. Diogène and M. Campàs. Detection of tetrodotoxins in pufferfish by a self-assembled monolayer-based immunoassay and comparison with SPR, LC-MS/MS and MBA. *Analytical Chemistry,* 87 (21), 10839-10847, 2015.

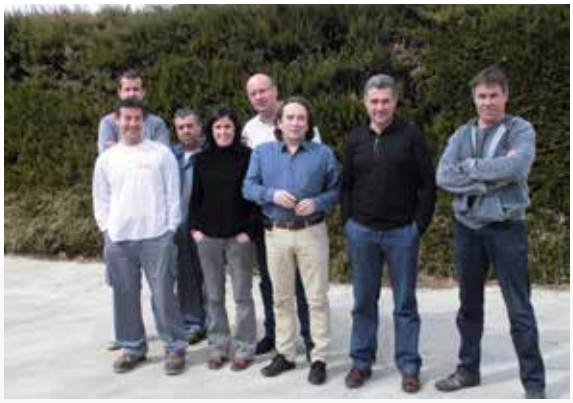
ANIMAL GENETICS AND BREEDING

Director
Raquel Quintanilla

Work centres
IRTA Lleida Agromists, Monells, Torre Marimon

17
Researchers

19
Support staff



The Animal Genetics and Breeding programme is a multi-disciplinary group devoted to research and transfer in quantitative genetics and genomics aimed at the study, conservation and breeding of animal populations.
The main lines of research form part of the social challenges of the H2020 and address the study of the genetic regulation of characters of economic and social importance (feeding efficiency, product quality, longevity and resilience), as well as the development of new strategies for the selection and conservation of swine, rabbit and poultry species. It also participates in conjunction with biomedical research groups in research using swine as a model. The programme is also responsible for the management of the Spanish Swine Database (BDPorc), which provides companies in the pig farming sector with information to help them in their decision-making. Since 2014 it has been recognised by the Government of Catalonia as a Consolidated Research Group on the Management and Improvement of Animal Genetic Resources.

Projects and Contracts

32
Activities with private funding

7
National projects

1
European projects

1
Other projects

Technology transfer

5
Technical seminars

12
Scientific papers

33
Communications and posters

7
Technical and broad-based articles

0
Theses

Featured project

Feed-a-Gene. Adaptation of feeding, animals and feeding strategies to improve the efficiency and sustainability of livestock production systems in monogastrics Feed-a-Gene aims to improve the adaptation of the different components of the livestock production systems for monogastrics (swine, poultry and rabbit) with the aim of improving the overall efficiency of these systems, reducing their environmental impact and increasing food safety while conserving the quality of the foodstuffs.

Start: 2015 End: 2020

Financing body: H2020 - Research and Innovation Framework Programme (H2020-SFS-2014-2)

Budget: €8,999,544

Partners: 23 European partners

Other notable projects

- **GENEF.** Improving the efficiency of growth and the reproductive function of prolific species: genetic determinism of their components and selection strategies.
- **GENGIM.** Genomic physiology of the deposit of intra-muscular fat in pigs.
- ·Development of a pyramidal genetic improvement programme for Iberian pigs which incorporates information on two pure parental lines and the Castúa commercial F1.
- Sustainability on rabbit farms by means of the implementation and use of a management tool based on the bdcuni platform.

Featured publications

Ballester, M.; Revilla, M.; Puig-Oliveras, A.; Marchesi, J.A.P.; Castelló, A.; Corominas, J.; Fernández, A.I.; Folch, J. (2016). Analysis of the porcine APOA2 gene expression in liver, polymorphism identification and association with fatty acid composition traits. *Animal Genetics* 47: 552-559.

Chanski, W.; González-Prendes, R.; Castelló, A.; Jordana, J.; Manunza, A.; Quintanilla, R. (2016). An association analysis between a missense polymorphism at the pig PCSK9 gene and serum lipid and meat quality traits in Duroc pigs. *Livestock Science* 190: 27-30.

Mínguez, C.; Sánchez, J.P.; Ragab, M.; El Nagar, A.G.; Baselga, M. (2016). Growth traits of four maternal lines of rabbits founded on different criteria: comparisons at foundation and at last periods after selection. *Journal of Animal Breeding and Genetics* 133:303-315.

Puig-Oliveras, A.; Revilla, M.; Castelló, A.; Fernández, A.I.; Folch, J.M.; Ballester, M. (2016). Expression-based GWAS identifies variants, gene interactions and key regulators affecting intramuscular fatty acid content and composition in porcine meat. *Scientific Reports* 6: 31803.

Ragab, M.; Sánchez, J.P.; Minguez, C.; Baselga, M. (2016). Cross-breeding effects on rabbit reproduction from four maternal lines of rabbits. *Animal* 10:1086-1092.

Plant Production

Sustainable Plant Protection

Fruit Cultivation

Extensive Crops

Genomics and Biotechnology

Post-Harvest

SUSTAINABLE PLANT PROTECTION

Director
Cinta Calvet

Work centres
Cabrils, Ebro Experimental Station, IRTA Lleida Agronomists, Mas Badia

24
Researchers

13
Support staff

Sustainable Plant Protection primarily aims to improve crop health and production with the development of innovative strategies to control pests and diseases compatible with cultural practices having a low environmental impact. The lines of research aim to conduct further study into the biology and epidemiology of the pathogen organisms involved in the diseases and the study of beneficial organisms which can contribute to their control and the quality of agricultural and forestry products.

Projects and Contracts

53
Activities with private funding

10
National projects

3
European projects

6
Other projects

Technology transfer

25
Technical seminars

19
Scientific papers

9
Communications and posters

12
Technical and broad-based articles

0
Theses

Featured project

Evaluation of the fungal diversity of soil and its influence on the supply of edible ectomycorrhizal fungi in forest systems. Fungi are one of the most diverse groups of organisms and a key piece in the sustainability of ecosystems. Fungal communities serve as decomposers, symbionts and pathogens in plants and animals. This regulatory environmental role is combined with the provision of other goods and ecosystem services, both economic (mushroom and truffle production) and socio-cultural (recreational use, mycological tourism, restaurants, etc.). The general increase in demand of these ecosystem services by the public drives a search for new agroforestry systems to maximise the value that fungi can produce. The goal of this project is to determine which factors affect fungal diversity in forest ecosystems, providing the scientific basis for the development of tools aimed at sustainable managements that value the ecosystem services associated with fungal diversity. As a result, the relationship between carpophores, mycorrhizae, mycelia and spores in different agricultural-forest ecosystems will be evaluated. Different processing protocols for soil samples in order to extract DNA will be prepared, as will different metagenomic characterisation techniques.

Start: January 2016 End: December 2018

Financing body: MINECO

Budget: €96,800.00

Partners: 0

Other notable projects

- A border of marigold to conserve the predator *Macrolophus pygmaeus* in a tomato greenhouse.
- Landscaping in biological control for conserving stone fruit trees

Featured publications

Sabaté, J. ; Laviña, A. ; Batlle, A. 2016. Incidence and distribution of "Candidatus phytoplasma prunorum" and its vector Cacopsylla pruni in Spain: an approach to the epidemiology of the disease and the role of wild Prunus. *Plant Pathology* 65:837-846.

Duran, J.; Castañé, C.; Calvet, C.; Camprubí, A.; Battaglia, D.; Trotta, V.; Fanti, P. 2016. Tomato belowground-aboveground interactions: Rhizophagus irregularis affects foraging behaviour and life history traits of the predator Macrolophus pygmaeus (Hemiptera:Miridae). *Arthropod-Plant Interactions DOI* 10.1007/s11829-016-9465-5.

Elena, G.; Luque, J. 2016. Seasonal susceptibility of grapevine pruning wounds and cane colonization in Catalonia, Spain, following artificial infection with Diplodia seriata and Phaeomoniella chlamydospora. *Plant Disease* 100(8):1651-1659.

Gómez-Polo, P.; Alomar, O.; Castañé, C.; Aznar-Fernández, T.; Lundgren, J.G.; Piñol, J.; Agustí, N. 2016. Understanding trophic interaction of Orius spp. (Hemiptera: Anthocoridae) in lettuce crops by molecular methods. *Pest Management Science* 72: 272-279.

Oveja, M.F.; Riudavets, J.; Arnó, J.; Gabarra, R. 2016. Does a supplemental food improve the effectiveness of predatory bugs on cucumber? *BioControl* 61:47-56.

FRUIT CULTIVATION

Director
Simó Alegre

Work centres
IRTA Lleida Fruitcentre, Lleida Experimental Station, Mas de Bover, Torre Marimon






19
Researchers

43
Support staff

The Fruit Cultivation programme focuses on research aimed at solving problems in the fruit sector. It is divided into two sub-programmes: Fresh Fruit, Olive Production, Oil Processing and Dry Fruit. The activities are mainly conducted at the Lleida Experimental Station, the Mas Badia Experimental Station, Mas de Bover, Torre Marimon and the Ebro Experimental Station. The research focuses mainly on peaches, apples, pears, almonds, olives, hazelnuts and agroforestry production, but also on crops such as carob, walnuts, apricots, cherries and citrus fruits.

Projects and Contracts

194
Activities with private funding

12
National projects

5
European projects

11
Other projects

Technology transfer

89
Technical seminars

10
Scientific papers

33
Communications and posters

22
Technical and broad-based articles

0
Theses

Featured project

Improving fruit quantity and resistance to biotic factors in varieties of dessert apple

Selection assisted by molecular markers. The goal of this project is to create new varieties of apple with large quantities of fruit that are pest- and disease-resistant. As a result, interesting descendants from cross-breeding in the 2009-2014 period will be selected. In addition, a new generation of cross-breeding will be realised in order to obtain varieties with elevated quantities of fruit that are resistant to scabbing, powdery mildew and ashy aphids and are well-adapted to growth conditions in the Ebro Valley.

The composition of fruit will also be determined using innovative analytical methods, especially with regard to phenolic compounds that significantly influence health as a result of their high oxidising power. Knowledge of these compounds is being used in selection processes.

Finally, the transmission of highly interesting characteristics will also be analysed, in order to determine QTLs and the molecular markers connected to them. This will provide new tools to take on more efficient selection assisted by markers in the programme for improving apple

Start: 07/09/2015 End: 16/09/2018

Financing body: INIA

Budget: €140,000

Partners: 0

Other notable projects

- The obtaining, selection and physiological characterisation of new hybrid patterns tolerant to iron chlorosis and with reduced vigour, for intensive pear tree plantations
- Adaptive and productive selection of *Catanea sativa* in Montseny.
- Genetic improvement of almond trees.
- **ECO-ZEO:** Developing a pool of novel and eco-efficient applications of zeolite for the agriculture sector.

Featured publications

Chagné, D.; kirk, C.; How, N.; Whitworth, C.; Fontich, C.; Reig, G.; Sawyer, G.; Rouse, S.; Poles, L.; Gardiner, S.E.; Kumar, S.; Espley, R.; Volz, R.K.; Troggio, M.; Iglesias, I. (2016). A functional genetic marker for apple red skin colouration across different environments. *Tree Genetics & Genomes* 12 :67.

Linacero, R.; Ballesteros, I.; Sanchiz, A.; Prieto, N.; Iniesto, E.; Martinez, Y.; Pedrosa, M.M.; Muzquiz, M.; Cabanillas, B.; Rovira, M.; Burbano, C.; Cuadrado, C. (2016). Detection by real time PCR of walnut allergen coding sequences in processed foods. *Food Chemistry* 202 :334-340.

Guardia, M.; Charrier, G.; Vilanova, A.; Savé, R.; Ameglio, T.; Aletà, N. (2016). Genetics of frost hardiness in Juglans regia L. and relationship with growth and phenology [On Line]. *Tree Genetics & Genomes.* 12: 83.

Donoso, J.M.; Picañol, R.; Serra, O.; Howad, W.; Alegre, S.; Arús, P.; Eduardo, I. (2016). Exploring almond genetic variability useful for peach improvement: mapping major genes and QTLs in two interspecific almond × peach populations. *Molecular Breeding* 36 :16.

Meneses, C.; Ulloa-Zepeda, L.; Cifuentes-Esquivel, A.; Infante, R.; Cantin, C.; Batlle, I.; Arús, P.; Eduardo, I. (2016). A co-dominant diagnostic marker for the slow ripening trait in peach. *Molecular Breeding.* 36: 77.

EXTENSIVE CROPS

Director
Fanny Álvaro

Work centres
IRTA Lleida Agronomists, Ebro Experimental Station, Mas Badia

7
Researchers

12
Support staff

The Extensive Farming programme aims to contribute to scientific and technological knowledge of large crop species and to promote sector innovation. Principal lines of research are aimed at adapting crops to the abiotic stresses that are typical of Mediterranean environments. By means of genetic improvement programmes we can obtain high-productivity, high-quality cereal varieties and transfer them to new companies. The aims of the programmes include the evaluation of the performance of these new crop varieties, the study of new, more efficient and sustainable agricultural practices, agreements with industry and technology transfers.

Projects and Contracts

40
Activities with private funding

7
National projects

1
European projects

14
Other projects

Technology transfer

51
Technical seminars

12
Scientific papers

11
Communications and posters

11
Technical and broad-based articles

0
Theses

Featured project

NEURICE. New commercial European rice carrying alleles for tolerance to salinity in order to protect rice production from climate change and the apple snail invasion. The main objective of the NEURICE project (New commercial European Rice) is to develop strategies for protecting the productivity, stability and quality of rice by obtaining new commercial rice varieties *(Oryza sativa)*, with the incorporation of alleles for tolerance to salinity, in order to protect the sector from the effects of climate change and the apple snail *(Pomacea insularum)*. The project also aims to search for new alleles for tolerance to salinity through the phenotypic characterisation of genoplasma collections and associative studies, the development of new wireless sensors to monitor the salinity of fields treated with seawater, and the transfer or knowledge generated in the sector.

Start: March 2016 End: February 2020

Financing body: EU H2020

Budget: €4,608,975

Partners: 14

Other notable projects

- **MAS2WHEAT.** Tools for marker-assisted selection in wheat improvement programs on a national and international scale: adapting to climate change and industrial quality.
- Genetic bases for the adaptation of wheat to changing conditions and sustainable management.
- Yielding new varieties of bread wheat adapted to the current demands of the agri-industrial sector within the framework of sustainable agriculture.

Featured publications

Soriano JM, Villegas D, Aranzana MJ, Garcia del Moral LF, Royo C. 2016. Genetic structure of modern durum wheat cultivars and Mediterranean landraces matches with their agronomic performance. *PLoS ONE* 11(8), e0160983.

Subira J, Ammar K, Álvaro F, Garcia del Moral LF, Dreisigacker S, Royo C. 2016. Changes in durum wheat root and aerial biomass caused by the introduction of the Rht-B1b dwarfing allele and their effects on yield formation. *Plant and Soil* 403: 291-304.

Villegas D, Alfaro C, Ammar K, Cátedra MM, Crossa J, García del Moral LF, Royo C. 2016. Daylength, temperature and solar radiation effects on the phenology and yield formation of spring durum wheat. *Journal of Agronomy and Crop Science* 202(3): 203-216.

Royo C, Dreisigacker S, Alfaro C, Ammar K, Villegas D. 2016. Effect of Ppd-1 genes on durum wheat flowering time and grain filling duration in a wide range of latitudes. *Journal of Agricultural Science, Cambridge* 154: 612-631.

Domingo C, Lalanne E, Català MM, Pla E, Reig-Valiente JL, Talón M. 2016. Physiological Basis and Transcriptional Profiling of Three Salt-Tolerant Mutant Lines of Rice. *Frontiers in Plant Science* 28(7): 1462.

GENOMICS AND BIOTECHNOLOGY

Director
Amparo Monfort

Work centres
CRAG, Torre Marimon

15
Researchers

10
Support staff

The main goal of the Genomics and Biotechnology programme is to study the inheritance of important traits related to fruit quality, ripening, aroma and plant resistance to illness in species from the Cucurbitaceae family (especially melon) and Rosaceae family (peach, prune, almond, strawberry and other berries). It is working on a molecular approximation in order to characterise the wild and commercial variability of germoplasm collections; genetic markers, maps and complete genome sequences are developed to obtain the final mapping and clone the key genes and QTLs responsible for characteristics; and finally, new methods based on genomics are developed to make improvement programs more efficient.

Projects and Contracts

17
Activities with private funding

4
National projects

1
European projects

0
Other projects

Technology transfer

13
Technical seminars

9
Scientific papers

6
Communications and posters

0
Technical and broad-based articles

0
Theses

Featured project

ALMELO. Identification and characterisation of genes involved in the shape and succulence of peaches. In this project, three important peach tree genes are analysed in detail: the gene that determines the shape of flat fruit (saturn peach) and two genes that determine the essential differences between almond and peach tree fruits (*Alf/alf* and *Jui/jui*, respectively). On the one hand, it aims to characterise the three genes, and on the other it would like to introduce the peach alleles alf (which will produce fleshy fruits) and jui (which will produce juicy fruits) into the gene pool of the almond tree. This project will provide greater knowledge of the genes involved in commercial and agronomically interesting characteristics, while offering new tools (markers and plant material) with social impact.

Start: January 2016 End: December 2018

Financing body: MINECO (AGL2015-68329-R)

Budget: €163,350

Partners: 0

Other notable projects

- **RESMELORIP.** Genetic dissection of two characteristics of agronomic interest in melons: Resistance to Cucumber mosaic.
- **FRESAROMA.** Genetic analysis of the aroma of wild and cultivated strawberries: Development of molecular markers for selecting cultivated strawberries.

Featured publications

Garcia-Mas J, Rodríguez-Concepción M (2016) The carrot genome sequence brings colours out of the dark. *Nature Genetics* vol. 48 n. 6.

Guiu-Aragonés C, Sánchez-Pina MA, Díaz-Pendón JA, Peña EJ, Heinlein M, Martín-Hernández AM (2016) cmv1 is a gate for Cucumber mosaic virus transport from bundle sheath cells to phloem in melon. *Molecular Plant Pathology.* DOI: 10.1111/mpp.12351.

Lambert P, Campoy JA, Pacheco I, Mauroux J-B, Da Silva Linge C, Micheletti D, Bassi D, Rossini L, Dirlewanger E, Pascal T, Troggio M, Aranzana MJ, Patocchi A, Arús P (2016) Identifying SNP markers closely associated with six major genes in peach [Prunus persica (L.) Batsch] using a high-density SNP array with an objective of marker-assisted selection (MAS). *Tree Genetics & Genomes* 12 :121.

Serra O, Donoso JM, Picañol R, Batlle I, Howad W, Eduardo I, Arús P (2016) Marker-assisted introgession (MAI) of almond genes into the peach background: a fast method to mine and integrate novel variation from exotic sources in long intergeneration species. *Tree Genetics and Genomes* 12:96.

Urrutia M, Schwab W, Hoffmann T, Monfort A (2016) Genetic dissection of the (poly) phenol profile of diploid strawberry (Fragaria vesca) fruits using a NIL collection. *Plant Science* 242:151-168.

POST-HARVEST

Director
Josep Usall

Work centres
IRTA Lleida
Fruitcentre

17
Researchers

29
Support staff

The Post-Harvest programme bases its activity on improving the quality of fresh and processed fruit and vegetables throughout the value chain (from the harvest to the consumer). The programme conducts research focused on the needs of the sector, improving knowledge and providing tools for producers, fruit processing plants, the vegetable processing industry, as well as the auxiliary industry (cooling, plant protection products, disinfection products, etc.). The programme is divided into different sub-programmes and/or areas of knowledge: physiology and technology, pathology, engineering and processed fruits and vegetables. It also includes the Post-Harvest Technical Service, a team with broad experience in the fruit and vegetable sector, whose main purpose is to provide consultancy for improving quality, as well as the handling and preservation of fruit and vegetables during the post-harvest period.

Projects and Contracts

82
Activities with private funding

13
National projects

3
European projects

11
Other projects

Technology transfer

9
Technical seminars

17
Scientific papers

14
Communications and posters

2
Technical and broad-based articles

0
Theses

Featured project

AGRIMAX. The Agrimax project combines accessible and flexible processing technologies to recuperate a significant part of the valuable compounds contained in agricultural waste, as well as waste resulting from food processing generated in the value chain of tomato, cereals, potato and olives. The technologies used include ultrasound, extraction with solvents, filtering and thermal and enzyme treatments. These technologies are applied in two pilot plants in Italy and Spain, with collaborative use with different local agent. The sub-product generated during the production cycle is tested in new applications, such as the production of micro-organisms for the agri-food industry, re-use in the form of food additives, packaging and agricultural material, active ingredients, or even fibres, biogas and fertilisers that can be obtained from the resulting biomass. Social, environmental, ethical , safety, technological feasibility and regulatory aspects are evaluated. This programme is expected to result in the creation of a business model and a platform for communication among the potential providers of raw materials, in order to maximise the use of cooperative treatment plants year round.

Start: October 2016End: September 2020

Financing body: EU H2020

Budget: €307,488.75

Partners: 29

Other notable projects

- Fruit trees in the Andean region
- Validation of strategies for the control of *Monilinia spp*. in organic peaches and nectarines
- An alternative to traditional fungicide treatments applied to apples and pears in the post-harvest.

Featured publications

Colas, P.; Abadias, M.; Altisent, R.; Alegre, I.; Plaza, L.; Gilabert, V.; Lacomba, R.; Viñas, I. (2016). Development of a fresh-cut product based on pears and the subsequent evaluation of its shelf life under commercial conditions and after a cold chain break. *Journal of Food and Nutrition Research* 4 (9):582-591.

Gine, J.; Cantin, C.; Echeverría, G.; Ubach, D.; Larrigaudière, C. (2016). The effect of chilling injury-inducing storage conditions on quality and consumer acceptance of different Prunus persica cultivars. *Postharvest Biology and Technology* 115 :38-47.

Vilanova, L.; Teixidó, N.; Torres, R.; Usall, J.; Viñas, I.; Sánchez-Torres, P. (2016). Relevance of the transcription factor PdSte12 in Penicillium digitatum conidiation and virulence during citrus fruit infection. *International Journal of Food Microbiology* 235 :93-102.

Usall, J.; Torres, R.; Teixidó, N. (2016). Biological control of postharvest diseases on fruit: a suitable alternative? *Current Opinion in Food Science* 11 :51-55.

Larrigaudière, C.; Candan, A.; Gine, J.; Civello, M.; Calvo, G. (2016). Unravelling the physiological basis of superficial scald in pears based on cultivar differences. *Scientia Horticulturae* (213):340-345.

Environment andGlobal Change

Aquatic Ecosystems

Integrated Management of Organic Waste

Environmental Horticulture

Efficient Water Use

AQUATIC ECOSYSTEMS

Director
Carles Ibáñez

Work centres
Sant Carles de la Ràpita

8
Researchers

6
Support staff

The Aquatic Ecosystem programme is devoted to the study of the impact of climate change on Mediterranean coastal and continental aquatic ecosystems and, in particular, the effects of climate change and how we can adapt to it. It also studies the effects of pollution, the intensive use of water, and invasive species in rivers, wetlands and estuary areas. In addition, this programme conducts research on the sustainable management of water resources, fishing resources and the interactions between agriculture and biodiversity, as well as the conservation of protected species and the restoration of natural areas.

Projects and Contracts

4
Activities with private funding

3
National projects

3
European projects

2
Other projects

Technology transfer

10
Technical seminars

10
Scientific papers

1
Communications and posters

2
Technical and broad-based articles

2
Theses

Featured project

LIFE+ EBRO-ADMICLIM. Pilot project for mitigation measures and adaptation to climate change in the Ebro Delta. The project proposes the integrated management of the water, sediments and habitats (wetlands and rice fields) of the Ebro Delta, an area highly vulnerable to natural land sinks (subsidence) and the rise in sea level. The project aims to optimise the elevation of the soil, reduce coastal erosion, increase the fixation of carbon in the soil, reduce the emissions of greenhouse gases and improve water quality. The study will conclude with the preparation of the Climate Action Plan of the Ebro Delta, with concrete and effective measures for adaptation to and the mitigation of climate change.

Start: June 2014 End: June 2018

Financing body: EU, Life+ Programme

Budget: €977,193

Partners: 6

Other notable projects

- Monitoring the ecological status and development of environmental indicators in the lower stretch of the Ebro River and its delta.
- Mitigation and adaptation to climate change in coastal rice fields: defining best practice to reduce emissions and evaluate varieties tolerant to salinity.
- **RISES-AM.** Responses to coastal climate change: innovative strategies for principal scenarios (adaptation and mitigation).

Featured publications

Genua-Olmedo, A., Alcaraz, C., Caiola, N., & Ibáñez, C. (2016). Sea level rise impacts on rice production: The Ebro Delta as an example. *Science of The Total Environment,* 571, 1200-1210.

Prado, P., Roque, A., Pérez, J., Ibáñez, C., Alcaraz, C., Casals, F., & Caiola, N. (2016). Warming and acidification-mediated resilience to bacterial infection determine mortality of early Ostrea edulis life stages. *Marine Ecology Progress Series,* 545, 189-202.

Cearreta, A., Benito, X., Ibáñez, C., Trobajo, R., & Giosan, L. (2016). Holocene palaeoenvironmental evolution of the Ebro Delta (Western Mediterranean Sea): Evidence for an early construction based on the benthic foraminiferal record. *The Holocene,* 26(9), 1438-1456.

Rovira, A., Alcaraz, C., & Trobajo, R. (2016). Effects of plant architecture and water velocity on sediment retention by submerged macrophytes. *Freshwater Biology.*

Benito, X., Trobajo, R., Cearreta, A., & Ibáñez, C. (2016). Benthic foraminifera as indicators of habitat in a Mediterranean delta: implications for ecological and palaeoenvironmental studies. *Estuarine, Coastal and Shelf Science,* 180, 97-113.

INTEGRATED MANAGEMENT OF ORGANIC WASTE

Director
Francesc Prenafeta

Work centres
Torre Marimon

8
Researchers

10
Support staff

The Integrated Management of Organic Waste programme is responsible for developing new knowledge and technologies in the field of sustainable management of organic waste produced by different sectors (agricultural, livestock, industrial and municipal waste). It provides a comprehensive view of the problem and provides a transversal approach to technological and management solutions.

Projects and Contracts

42
Activities with private funding

4
National projects

4
European projects

3
Other projects

Technology transfer

14
Technical seminars

17
Scientific papers

16
Communications and posters

8
Technical and broad-based articles

1
Theses

Featured project

Farms for the future: Innovation for managing farm manure in the soil. The principal objective of this programme is to develop a new process for treating complex residual water (for example, leachates from landfills), with the goal of optimising energy efficiency and recuperating products (biomass), as well as for energy production. The aim of the programme is to minimise the cost of treatment as compared to existing systems. The programme seeks to obtain regenerated water (for use in irrigation, cleaning, etc.) and biomass that can be used as a fertiliser or co-substrate for the production of biogas or biofuel.

Start: September 2013 End: September 2017

Financing body: European Union

Budget: €292,107.00

Partners: 4

Other notable projects

- **PROGRAMO.** Optimisation of anaerobic digestion and biogas production of waste rich in protein and fat, with the recovery of ammonium
- **INBENT.** Integration of bio-electrochemical reactors and anaerobic digesters to optimise energy and nitrogen recovery (INBENT)
- **GENESIS.** Integrated management of nutritional strategies and strategies for managing excretions to improve ecological and environmental sustainability in intensive pork production.

Featured publications

Loyon, L.; Burton, C.H.; Misselbrook, T.; Webb, J.; Philippe, F.X.; Aguilar, M.; Doreau, M.; Hassouna, M.; Veldkamp, T.; Dourmad, J.Y.; Bonmatí, A. ; Grimm, E.; Sommer, S.G. (2016). Best available technology for European livestock farms: Availability, effectiveness and uptake. *Journal of Environmental Management* 166 :1-11.

Sotres, A.; Cerrillo, M. ; Viñas, M. ; Bonmatí, A. (2016). Nitrogen removal in a two-chambered microbial fuel cell: establishment of a nitrifying, denitrifying microbial community on an intermittent aerated cathode. *Chemical Engineering Journal* 284 :905-916.

Blasi, B.; Poyntner, C.; Rudavsky, T.; Prenafeta-Boldú, F.X. ; De Hoog, S.; Tafer, H.; Sterflinger, K. (2016). Pathogenic yet environmentally friendly? Black fungal candidates for bioremediation of pollutants. *Geomicrobiology Journal* 33 (3-4):308-317.

Sotres, A.; Tey, L.; Bonmatí, A. ; Viñas, M. (2016). Microbial community dynamics in continuous microbial fuel cells fed with synthetic wastewater and pig slurry. *Bioelectrochemistry* 111:70-82.

Cáceres, R. ; Coromina, N.; Malinska, K.; Martínez-Farré, F.X.; López, M.; Soliva, M.; Marfà, O. (2016). Nitrification during extended co-composting of extreme mixtures of green waste and solid fraction of cattle slurry to obtain growing media. *Waste Management* 58:118-125.

ENVIRONMENTAL HORTICULTURE

Director
Carme Biel

Work centres
Torre Marimon

9
Researchers

6
Support staff

The research of this programme is based on achieving four main objectives: adapting crops to climate and global change; selecting the most suitable plant material for every need; developing agronomic and technological solutions for farmers and related industries, and analysing the sustainability of horticulture on the basis of environmental impact indicators (life cycle analysis, carbon and water footprints). The programme studies the attainment of these goals by means of three main lines of action: sustainable and efficient horticulture, the eco-physiological characterisation of plant material and the change of integrative scale and environmental analysis.

Projects and Contracts

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Activities with private funding

3
National projects

4
European projects

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Other projects

Technology transfer

21
Technical seminars

12
Scientific papers

25
Communications and posters

2
Technical and broad-based articles

0
Theses

Featured project

Life Medacc. Demonstration and validation of an innovative method for adapting to regional climate change in the Mediterranean region. MEDACC aims to develop innovative solutions designed to adapt our agriforestry and urban systems to the impacts of climate change in the Mediterranean area. Thus, MEDACC contributes to the design and development of strategies and adaptation policies developed in the Mediterranean at regional and national levels. In Catalonia, the project will be a valuable tool for the development of the Catalan Strategy for the Adaptation to Climate Change.

Start: July 2013 Fi: June 2018

Financing body: EU (LIFE ENV/ES/000536)

Budget: €178,758

Partners: 3

Other notable projects

- **VINOVERT.** Guaranteeing the competitiveness of companies in the wine-growing sector of south-western Europe by adapting them to a new type of demand for wines viewed as "cleaner" from a health-based and environmental point of view.
- **Demoware.** Demonstration of competitive innovation in the reuse of European water
- **Passive greenhouses.** Improvement of productivity and the sustainability of passive Mediterranean greenhouses by means of controlling the micro-climate in cold periods
- **Hi-LED.** Smart LED devices for the promotion of SSL (solid state lighting) in Europe.

Featured publications

Funes, I.; Aranda, X.; Biel, C.; Carbó, J.; Camps, F.; Molina, A.; de Herralde, F.; Grau, B.; Savé, R. (2016). Future climate change impacts on apple flowering date in a Mediterranean sub-basin. *Agricultural Water Management* 164:19-27.

Garcia-Forner, N.; Sala, A.; Biel, C.; Savé, R.; Martínez-Vilalta, J. (2016). Individual traits as determinants of time to death under extreme drought in Pinus sylvestris L. *Tree Physiology* 36 (10): 1196-1209.

Llorach, P.; Peña, J.; Rieradevall, J.; Montero, J.I. (2016). LCA & LCCA of a PCM application to control root zone temperatures of hydroponic crops in comparison with conventional root zone heating systems. *Renewable Energy* 85:1079-1089.

Molina, A.; Aranda, X.; Carta, G.; Llorens, P.; Romero, R.; Savé, R.; Biel, C. (2016). Effect of irrigation on sap flux density variability and water use estimate in cherry (Prunus avium) for timber production: Azimuthal profile, radial profile and sapwood estimation. *Agricultural Water Management* 164:118-126

Molina, A.; Josa, R.; Mas, M.; Verdu, A.; Llorens, P.; Aranda, X.; Savé, R.; Biel, C. (2016). The role of soil characteristics, soil tillage and drip irrigation in the timber production of a wild cherry orchard under Mediterranean conditions. *European Journal of Agronomy* 72:20-27.

Sanyé, E.; Anguelovski, I.; Oliver-Solà, J.; Montero, J.I.; Rieradevall, J. (2016). Resolving differing stakeholder perceptions of urban rooftop farming in Mediterranean cities: promoting food production as a driver for innovative forms of urban agriculture. *Agriculture and Human Values* 33 (1):101-120.

EFFICIENT WATER USE

Director
Jaume Casadesús

Work centres
IRTA Lleida
Fruitcentre

6
Researchers

5
Support staff

The Efficient Water Use programme is aimed at producing knowledge and technology to improve efficiency in the use and productivity of irrigation water. As a result of these activities, several irrigation management strategies have been designed, both in woody (almond, apple, cherry, grape, peach, pear, hazelnut, olive, walnut...) and herbaceous crops (maize, alfalfa, barley...). Special emphasis is placed on spatial and temporal variability in irrigation needs, in the form of precision irrigation. To promote the practical application of this knowledge, the programme develops decision-making tools for irrigation management and fertigation, using networks of sensors, remote sensing and crop simulation. The main topics of study include modelling irrigation and crop water ratios; automated monitoring and control of irrigation; remote detection applications for the control of irrigation and the spatial heterogeneity of plots; strategic management of irrigation; and interactions of irrigation and other cultural practices, paying particular attention to mineral fertilisation.

Projects and Contracts

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Activities with private funding

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Technical and broad-based articles

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Theses

Featured project

VINECO. Yield from the application of new technologies for achieving maximum water efficiency in irrigation on a 100-ha pilot farm of conventional organic grapes. The VINECO operational group is made up of Codorniu-Raimat, IRTA and the Raïmat Irrigation association. VINECO aims to demonstrate how irrigation can be managed in a manner that is effective and practical for producers in a commercial vineyard (Tempranillo, Cabernet Sauvignon and Syrah), in order to achieve maximum productive efficiency (kg/m^3 of applied water) and grape quality. In order to reach this objective, differential and individualised irrigation management has been used for each irrigation sector with the integration of new technologies (remote sensing), simulation models and physiological knowledge of grapes. The water needs of crops have been calculated on a weekly basis using a mathematical crop model developed in the programme, which uses data acquired from remote sensing.

Start: January 2016 End: December 2017

Financing body: Government of Catalonia

Partners: 3

Other notable projects

- Super-intensive olive trees.
- Demonstrative and experimental platform for almond watering.
- Studies the incorporation of artificial intelligence into local irrigation reprogramming algorithms.
- International course on irrigation.

Featured publications

Belguerri,H.; Villar,J.M.; Pascual,M.; Fatmi,A.; Arbonés,A.; Rufat,J. (2016) A proposal of nitrogen balance in a very high-density olive orchard. *Journal of Fundamental and Applied Sciences* 8(2):639-654.

Bellvert, J.; Marsal, J.; Girona, J.; Gonzalez-Dugo, V.; Fereres, E.; Ustin, S.L.; Zarco-Tejada, P.J. (2016) Airborne Thermal Imagery to Detect the Seasonal Evolution of Crop Water Status in Peach, Nectarine and Saturn Peach Orchards. *Remote Sensing* 8(1)39.

Bellvert, J.; Zarco-Tejada, P.J.; Marsal, J.; Girona, J.; González-Dugo, V.; Fereres, E. (2016) Vineyard irrigation scheduling based on airborne thermal imagery and water potential thresholds. *Australian Journal of Grape and Wine Research* 22:307-315.

López, G.; Echeverria, G.; Bellvert, J.; Mata, M.; Behboudian, M.H.; Girona, J.; Marsal, J. (2016) Water stress for a short period before harvest in nectarine: Yield, fruit composition, sensory quality, and consumer acceptance of fruit. *Scientia Horticulturae* 211:1-7.

Marsal, J.; Casadesús, J.; López, G.; Mata, M.; Bellvert, J.; Girona, J. (2016) Sustainability of regulated deficit irrigation in a mid-maturing peach cultivar. *Irrigation Science* 34:201-208.

Agri-Food Economy

AGRI-FOOD ECONOMY

Director
José M. Gil

Work centres
CREDA

12
Researchers

5
Support staff

The main objective of the Agricultural Economics programme is to promote research work and provide technical assistance services in the fields of economics and social sciences applied to the agricultural and food sectors. It also seeks to contribute to the rural development of our society and to gain a better understanding of the complex relationships which unite the food industry and the territory and environment in which its activity is conducted. Activities include a socio-economic study of the entire chain from the producer to the final consumer, an analysis of prices, the impact of policies and, in particular, an analysis of consumer behaviour.

Projects and Contracts

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Activities with private funding

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National projects

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European projects

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Scientific papers

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Technical and broad-based articles

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Theses

Featured project

Strength2Food. The goal of the project is to evaluate impact, exchange knowledge and provide information on policies regarding sustainable food chains.
Recently, in the European Union, both policies on quality and the acquisition of food in the public sector have been the object of reforms. These changes are centred on improving and promoting plans to protect quality seals/logos, and they take into account environmental, social and innovative criteria when it comes time to assigning public contracts to purchasers and suppliers.
This project will provide recommendations based on scientific trials. These recommendations are implemented and verified through innovative pilot actions.

Start: March 2016 End: February 2021

Financing body: Government of Catalonia

Budget: €139,375

Other notable projects

- **VINOVERT.** Guaranteeing the competitiveness of companies in the wine-growing sector of south-western Europe by adapting them to a new type of demand for wines viewed as "cleaner" from a health-based and environmental point of view.
- **REFRESH.** Resource Efficient Food and Drink for the Entire Supply Chain.
A European project with the aim of working together to help reduce food waste throughout the EU by 30% by 2025.
- **TREASURE.** Diversity of local breeds of pigs and production systems for traditional high-quality products and sustainable pork chains.

Featured publications

Kallas, Z.; Martínez, B.; Panella, N.; GIL J.M. (2016) The effect of sensory experience on expected preferences toward a masking strategy for boar-tainted frankfurter sausages. *Food Quality and Preference.* 54, 1-12.

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