IRTA

Activity Report 2017

“We share our science to feed the future”

IRTA

Activity
Report
2017

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JOSEP MARIA MONFORT

CEO

For more than 30 years, IRTA has been contributing to the population's supply of healthy, quality food, and improving the productivity and competitiveness of the Catalan agrifood sector. In 2017, it has been our desire to celebrate this journey alongside our collaborators and points of reference while keeping our eyes on the future.

We are facing a new period in which changes will take place rapidly and on a global scale. Science and technology will play a key role in taking on the challenges of the coming decade and in responding to the demands of millennial society. The creation of new products, solutions and services will also result in the creation of new markets and business models in the area of food, health and the circular bioeconomy. Under these circumstances, the food agro-industry is posed to be one of the most attractive and promising industries of the future.

"Science and technology will play a key role in taking on the challenges of the coming decade and in responding to the demands of millennial society."

We are referring to a true revolution in the agrifood sector, which will have to face the challenge of feeding a growing population that is increasingly concentrated in urban areas, in a context of climate change, which will have a strong impact on the regions around us. We will need to be capable of intensifying food production whilst doing so in an ethical, sustainable manner, in keeping with society's needs and demands. We will need more efficient and resilient food processing systems with a reduced environmental impact, which involve a more effective use of strategic resources such as sunlight and water, and that, are also more transparent and focused on consumers' needs.

"We will need to be capable of intensifying food production whilst doing so in an ethical, sustainable manner, in keeping with society's needs and demands."

Converting these challenges into opportunities will require the combination and hybridisation of abilities and talent, both our own and those of other fields of science and technology (artificial intelligen-

ce, sensorization, Big Data, etc.). Also in the area of business, new ecosystems of innovation and entrepreneurship are being generated that promote the creation of tech companies and startups. As a result, it is essential for our organisation to continue to evolve and for it to be prepared to operate in much more complicated situations that will force us to be more flexible and open.

We are faced with a scenario of profound change and uncertainties, but far from disheartening us, this drives us to continue working to become the point of reference for agrifood centres all around the Mediterranean and to consolidate our position to tie the problems affecting the sector with the opportunity to carry out influential research.

Our motto is now more appropriate than ever, and for this reason I would like to express my thanks to everyone who has helped to form the IRTA, and to encourage you to face the next 30 years with the same determination to keep on sharing our science to feed the future.

DRA. CONXITA ROYO

Chief Scientist

With the goal of increasing our operational efficiency, throughout 2017 we have worked on modifying IRTA's scientific structure, grouping the programmes into the Institute's five areas of activity: Plant Production, Animal Production, Food Industries, Agrosystems and Environment, and Agrifood Economy. The members of what was, until recently, the Environmental Horticulture programme have been relocated to different teams in order to increase our critical mass and reinforce their capabilities. Our structure has been simplified by eliminating the majority of sub-programmes, and three small emerging groups have been created in areas of potential growth within our institution. There has also been a change in the location of the Project Office, which has become part of Scientific Management.

Our level of success in the approval of projects in competitive tenders has increased notably in 2017 in comparison with the previous year. In the National Plan tenders, we have received funding for 37 proposals, with a 35% increase in our success rate. As for projects funded by the EU, 15 of the 59 proposals presented were approved, which mean a success rate of 25%. This is a significant increase in comparison with the previous year.

"Our level of success in the approval of projects in competitive tenders has increased notably in 2017 in comparison with the previous year."

In order to promote groundbreaking research and to help make creative and original ideas by IRTA scientists a reality, the Institute's management created a seed capital fund in 2017. This fund, which is managed through an internal, ongoing call for projects, aims to contribute to the creation of high-tech companies using the results of our research on the frontier of knowledge.

Within the framework of our talent-capturing programme, in 2017 6 new doctors joined the IRTA through the INIA, Beatriu de Pinós and Marie Curie-COFUND doctoral programmes, as were 18 pre-doctorate researchers. In 2017, one of the main objectives of the Institute's Management was fulfilled in the area of human resources: to reopen the promotion process as soon as the effects of the recent economic recession on IRTA's finances are overcome.

The impact of the scientific publications by the Institute's researchers, measured in the number of quotations cited per researcher, has grown by 3.1% in the last year, confirming a recent trend. Of the influential scientific publications carried out by IRTA, more than 50% were in consortia consisting of researchers from foreign organisations, and 80% of which were in publications located in the first quartile of their scientific category.

IRTA's new Scientific Advisory Board (SAB), made up of five individuals of recognised international prestige in the Institute's fields of action, celebrated their first meeting at our Corporate Services at Torre Marimon in November. As a result of this meeting, the board put together a series of recommendations that will help to define IRTA's strategic direction. The strategic lines that IRTA will focus its research on in the coming year will have to emerge from the interaction between themes already identified as having a large social demand in the area of agrifood, our internal capacity to address them, in terms of both human and material means, and the availability of external sources of funding.

"The strategic lines that IRTA will focus its research on in the coming year will have to emerge from the interaction between themes already identified as having a large social demand in the area of agrifood, our internal capacity to address them, in terms of both human and material means, and the availability of external sources of funding."

In other notable scientific work, we should make special mention of the Research Centre on Animal Health (IRTA-CReSA), as a Collaborating Centre of the World Animal Health Organisation (OIE) for research into and control of emerging and re-emerging diseases affecting swine in Europe, and of its designation by the OIE as a Referential Laboratory for classical swine flu. Some of our most important events include the organisation of the 21st edition of the European Symposium on Poultry Nutrition, which brought together more than 1,500 professionals from the sector. Within the framework of public-private collaboration, the creation of the Monells Cattle Farm (EVAM in its Catalan initials) is worth noting. Among other objectives, it seeks to contribute to the generation of scientific knowledge on milk production. In addition, the URV-IRTA campus for agrarian and food research was created. This campus will allow for greater collaboration between the Rovira i Virgili University and IRTA.

IRTA

The **Institute of Agrifood Research and Technology** (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 agro-food sector and a scientific point of reference and a driving force of innovation and technology transfer in this sector.

MISION

To contribute to the modernization, improvement and promotion of competiveness and sustainable development in the Agriculture, Food and Aquaculture sectors, providing safe, quality foods to the final consumer and generally contributing to the global improvement of human welfare.

VISION

To become the scientific reference and a force for innovation, and technology transfer. We aim to be the strategic partner of the agro-food sector.

VALUES

Commitment
Creativity
Learning
Innovation
Leadership
Respect
Service Vocation

STRATEGIC CHALLENGES

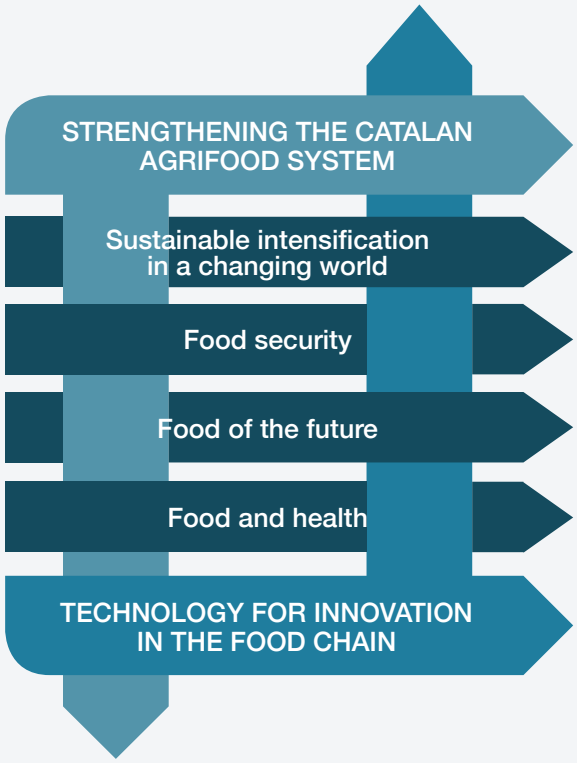
The quality of our research and IRTA's presence in all the links in the agrifood value chain, together with our connection to and close relationship with the sector, are some of the things that help to set us apart, both on a national and international level.

However, in order to continue to produce influential science that effectively contributes to value generation, it is essential that we evolve towards a research and innovation model with a greater focus on priority challenges. In order to identify what these great future challenges should be, we need to match up our capabilities with what will soon be the main factors of transformation and innovation (environmental, technological, social, etc.), also including the points of view of interested parties and other relevant agents involved in our ecosystem.

In addition to identifying the priorities we want to take on in the area of research, we will also have to decide what role IRTA will play in the organisation and transformation of the agrifood sector. Furthermore, we will have to adapt our organisational structure to meet these challenges, while also planning the future development of our capabilities.

In 2017, multiple actions have been organised with the aim of prioritising these strategic challenges, taking into account the needs of the sector and our society, and considering in which fields we can have a preeminent scientific position and a differential impact on.

In addition, we need to take into account that the challenges we tackle on a local level are related to challenges facing humanity as a whole and that they will need to be addressed in an uncertain, complex context. In summary, our knowledge of the agrifood systems of the Mediterranean should help to generate a vision that integrates constraints and tendencies on a global level, in order to make the process of innovation and transition towards more intense and sustainable models for the production and consumption of food more effective.



1 **SUSTAINABLE INTENSIFICATION IN A CHANGING WORLD**
Producing more with less input and adapting production systems to the climate change

2 **FOOD SECURITY**
Ensure the supply of food to the population in the face of global change

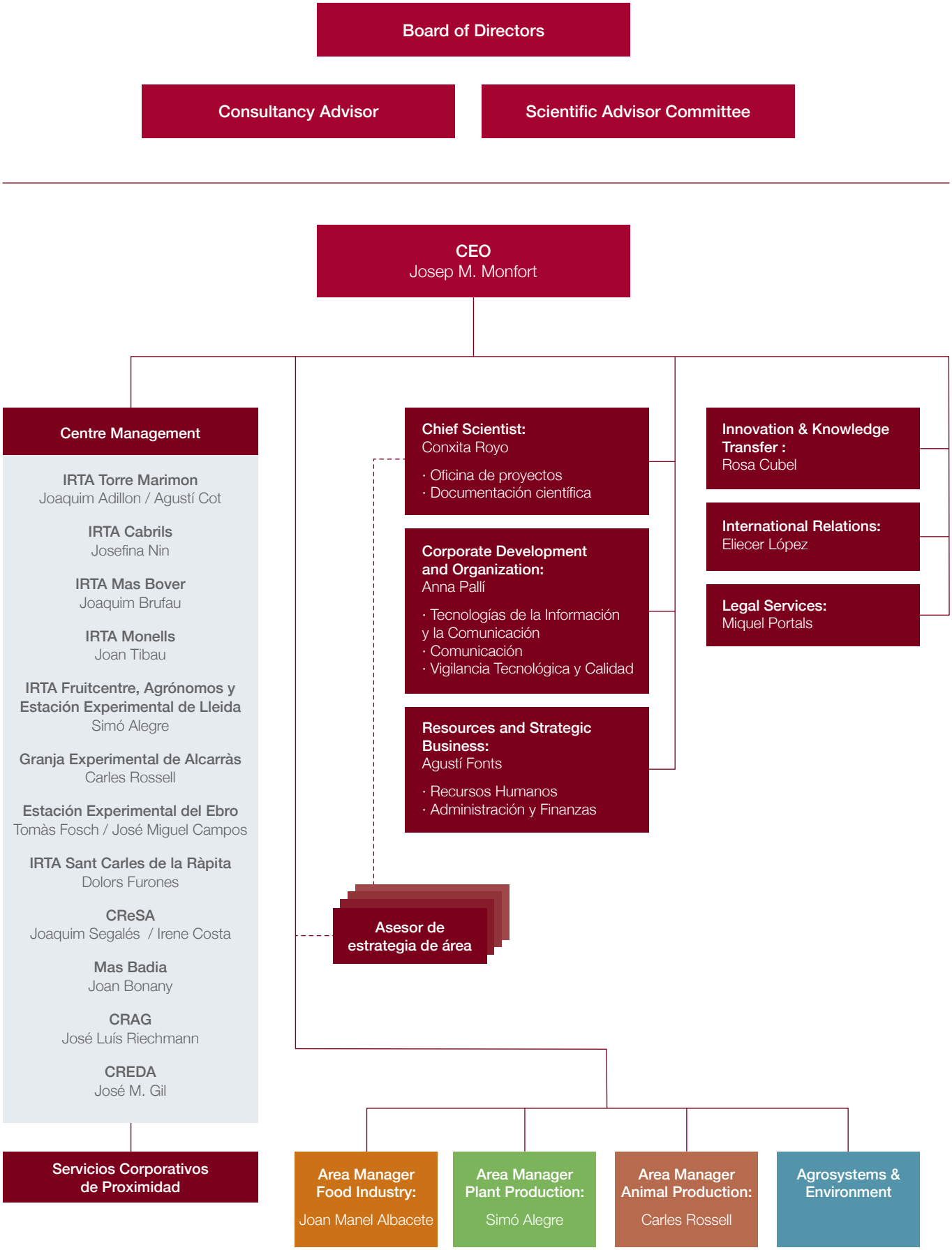
3 **FOOD OF THE FUTURE**
A new agro-industry focusing on the needs of consumers in the new Millennium

4 **FOOD AND HEALTH**
Animal Health, Plant Health and Food Safety

5 **TECHNOLOGY FOR INNOVATION IN THE FOOD CHAIN**
Integration of new facilitating technologies in the generating knowledge and innovation chain

6 **STRENGTHENING THE CATALAN AGRIFOOD SYSTEM**
Innovation and alternatives in production and processing sectors with the greatest economic, environmental and regional impact in Catalonia

Organisational Chart



Area	Program / Subprogram
Plant Production	**Postharvest**: Josep Usall **Fruit Production**: Luis Asín **Sustainable Plant Protection:** Cinta Calvet **Genomics & Biotechnology:** Amparo Monfort
Animal Production	**Animal Breeding & Genetics:** Raquel Quintanilla **Animal Nutrition:** Enric Esteve **Aquaculture:** Alícia Estévez · **Marine Monitoring:** Jorge Diogene **Animal Health:** Fernando Rodríguez · **Epidemiology & Risk Assessment:** Ernesto S. Napp · **Endemic Diseases:** Ignasi Badiola · **Exotic Diseases:** Francesc Accensi **Ruminant Production:** Maria Devant **Animal Welfare (EG)*:** Antoni Velarde **Comparative Molecular Physiology (EG)*:** Joan Cerdà
Food Industry	**Food Technology:** Pere Gou **Product Quality:** Maria Font **Food Safety:** Sara Bover
Agrosystems & Environment	**Integral Management of Organic Waste:** Francesc Xavier Prenafeta **Aquatic Ecosystems:** Nuno Caiola **Sustainable Field Crops:** Fanny Álvaro **Efficient Use Of Water In Agriculture:** Jaume Casadesús **Urban & Peri-Urban Agriculture (EG)***
Agro-food Economics	**Agro-food Economics:** José Mª Gil

*(EG): Emerging Group

CENTERS

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

18 **Locations**

5 in Barcelona
7 in Lleida
5 in Tarragona
2 in Girona

13 **IRTA centres and experimental stations**

5 **Experimental consortium. Centres and stations**

IRTA Torre Marimon

- IRTA work center
- Corporate Services

Ctra. C-59, Km. 12,1.
08140 Caldes de Montbui
Barcelona

26 **Researchers**

94 **Support Staff**

Programmes

Fruit Production
Genomics & Biotechnology
Urban & Peri-urban Agriculture (GE)
Integral Managementof Organic Waste
Animal Breeding & Genetics
Ruminant Production

IRTA Cabrils

- IRTA work center

Ctra. de Cabrils, Km. 2
08348 Cabrils
Barcelona

12 **Researchers**

29 **Support Staff**

Programmes

Sustainable Plant Protection
Genomics & Biotechnology
Urban & Peri-urban Agriculture(GE)
Integral Managementof Organic Waste

Plant Production / Animal Production / Food Industry / Agrosystems & Environment / Agro-food Economics

IRTA Mas de Bover

● IRTA work center

Ctra. de Reus - El Morell, Km. 3,8
43120 Constantí
Tarragona

14 Researchers

47 Support Staff

Programmes
Fruit Production ●
Animal Breeding & Genetics ●
Animal Nutrition ●
Bienestar Animal ●

IRTA Monells

Buildings A, B, C and EVAM

● IRTA work center

Finca Camps i Armet, E
17121 Monells
Girona

35 Researchers

53 Support Staff

Programmes
Product Quality ●
Food Safety ●
Food Technology ●
Ruminant Production ●
Animal Nutrition ●
Animal Welfare ●

IRTA Fruitcentre

● IRTA work center

Parc Científic i Tecnològic
Agroalimentari de Lleida (PCiTAL)
25003 Lleida

19 Researchers

52 Support Staff

Programmes
Fruit Production ●
Postharvest ●
Animal Breeding & Genetics ●
Efficient Use of Water in Agriculture ●

IRTA Lleida Agronomists

● IRTA work center

Av. Alcalde Rovira i Roure, 191
25198 Lleida

8 Researchers

9 Support Staff

Programmes
Sustainable Field Crops ●
Animal Breeding & Genetics ●
Sustainable Plant Protection ●

● Plant Production / ● Animal Production / ● Food Industry / ● Agrosystems & Environment / ● Agro-food Economics

Lleida Experimental Field

● IRTA work center

Fields: Les Borges Blanques, Gimenells, Mollerussa

7 Researchers

15 Support Staff

Programmes
Fruit Production ●
Sustainable Field Crops ●
Efficient Use of Water in Agriculture ●

Granja Experimental de Alcarràs

● IRTA work center

Partida Montagut, s/n.
25180 Alcarràs
Lleida

- Researchers

5 Support Staff

Programmes
Animal Breeding & Genetics ●
Animal Nutrition ●
Bienestar Animal ●
Producción de Rumiantes ●
Animal Health ●

IRTA Sant Carles de la Ràpita

● IRTA work center

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

20 Researchers

40 Support Staff

Programmes
Aquaculture ●
Aquatic Ecosystems ●

Ebro Experimental Field

● IRTA work center

Ctra. Balada, Km 1.
43870 Amposta
Tarragona

4 Researchers

9 Support Staff

Programmes
Sustainable Field Crops ●
Fruit Production ●
Sustainable Plant Protection ●

● Plant Production / ● Animal Production / ● Food Industry / ● Agrosystems & Environment / ● Agro-food Economics

IRTA CReSA CReSA Animal Health Research Centre

● IRTA work center

Edifici CReSA. Campus Universitat Autònoma de Barcelona.
08193 Bellaterra
Barcelona

26 Researchers

59 Support Staff

Programmes

Animal Health ●

Mas Badia

● Centre in Partnership

Mas Badia
17134 La Tallada d'Empordà
Girona

8 Researchers

35 Support Staff

Programmes

Sustainable Field Crops ●
Fruit Production ●
Postharvest ●
Sustainable Plant Protection ●

CRAG Agricultural Genomics Research Centre

● Centre in Partnership

Campus UAB. Edifici CRAG.
Bellaterra
08193 Cerdanyola del Vallès
Barcelona

77 Researchers

152 Support Staff

Programmes

Genomics & Biotechnology ●

CREDA Economics and Agri-Food Development Research Centre

● Centre in Partnership

Parc Mediterrani de la Tecnologia.
Edifici ESAB.
C/ Esteve Terrades, 8.
08860 Castelldefels
Barcelona

10 Researchers

8 Support Staff

Programmes

Agro-food Economics ●

● Plant Production / ● Animal Production / ● Food Industry / ● Agrosystems & Environment / ● Agro-food Economics

GREENHOUSES

19.080 m²
greenhouses area

LABORATORIES

4.082 m²

28%
of lab benches

FIELDS

375 ha
of experimental fields

344 ha
owned by IRTA
(92%)

PILOT PLANTS

7.630 m²
de plantas piloto

· Pilot slaughterhouse+cutting room:

· Pilot processing plant+lecture theatre

· Pilot plant for new technologies

· Join Research Unit IRTA-Ordesa pilot plant

· Dairy and liquid pilot plant

· Oils pilot plant

· Feed factory

· Cheese factory

· Experimental wine cellar

· Pilot plant for organic waste management

· Pilot plant of new technology for fruit conservation

· Pilot plant for production and formulation of micro-organisms

· Pilot plant for classification, preparation and packaging of fruit

· Pilot plant for the development of minimally-processed fruit (4th range)

· Pilot plant for 5th range fruit

FARMS

15.500 m²
of facilities for land animals

Pork
Poultry
Cattle
Rabit
Sheep

3.800 m²
675 m³
of installations for fish and molluscs

23.700
Housing capacity for terrestrial animals (all species)

220.000
Capacity for housing fish

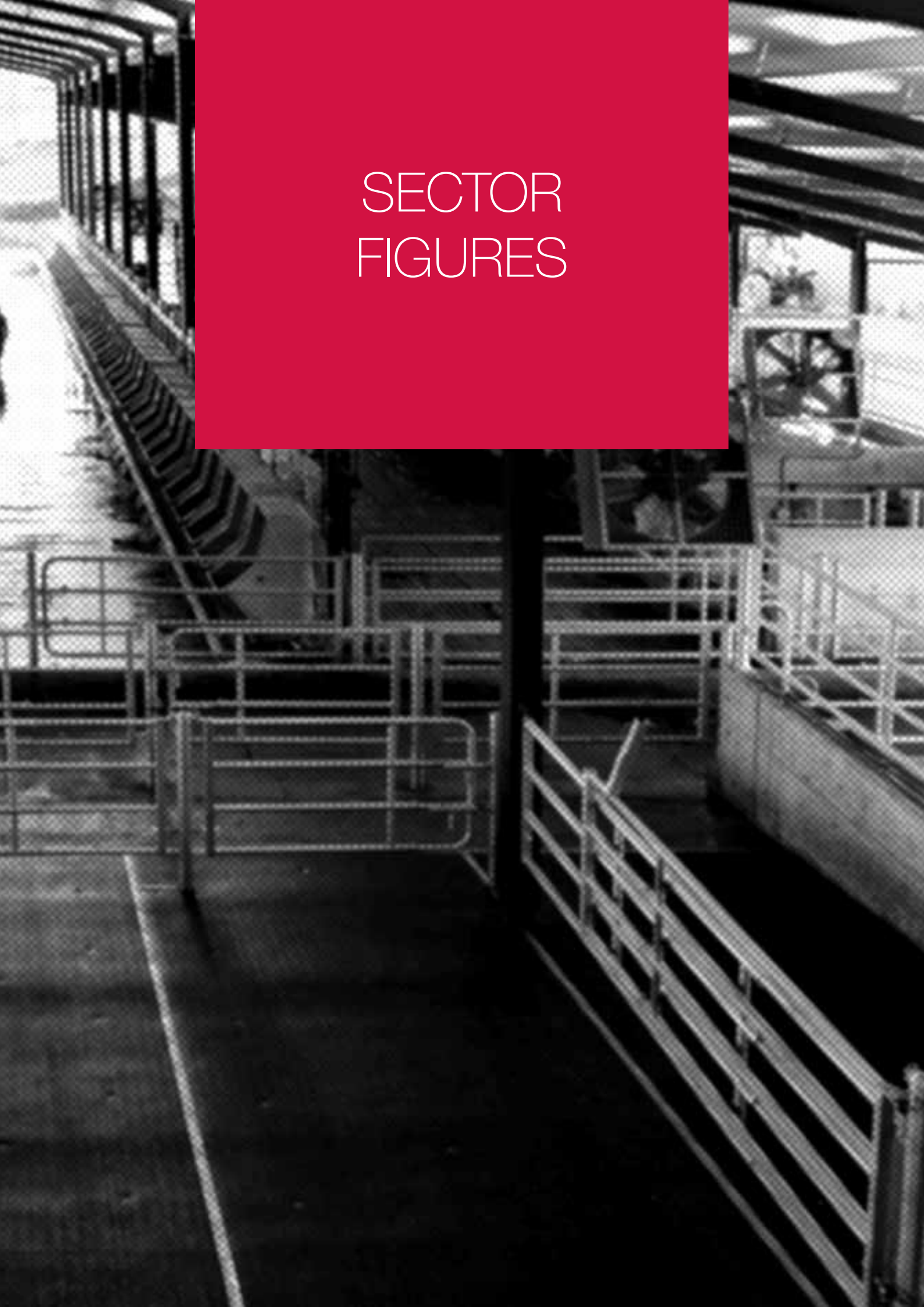
47.000
molluscs

92.000
Rotating livestock*

420.000
Rotating livestock*

*cantidad de animales que pasan por las granjas en un año

SECTOR FIGURES



Importance of the Catalan agrifood sector to the economy

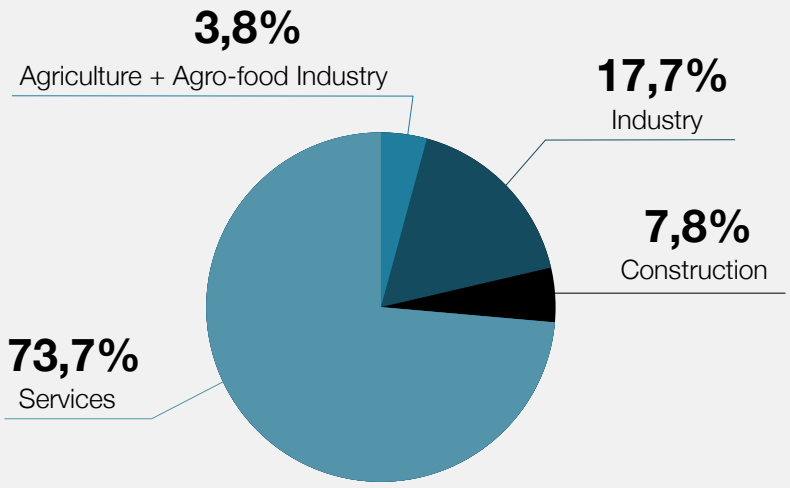
(Gross Value Added, GVA. Source: IDESCAT)

191.639 M€
GVA in agriculture, livestock and fishing

5.489 M€
GVA in food, tobacco and beverage industries

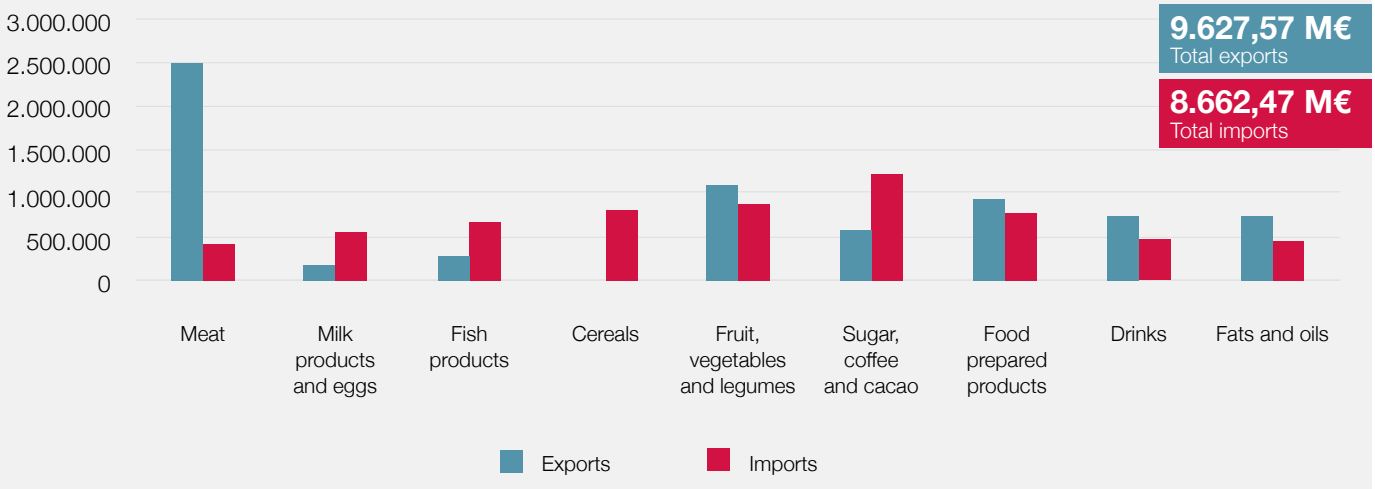
3,8 %
of the total GVA
in Catalonia (2014)

GVA per sectors



Catalan agrifood products in external commerce

(Source: Datacomex, 2017. Units, millions of euros)

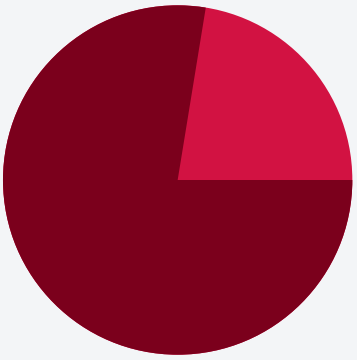


9.627,57 M€
Total exports

8.662,47 M€
Total imports

Food Waste in Catalonia

Source: Diagnosis of food waste in Catalonia. Waste Agency of Catalonia and Autonomous University of Barcelona, 2011

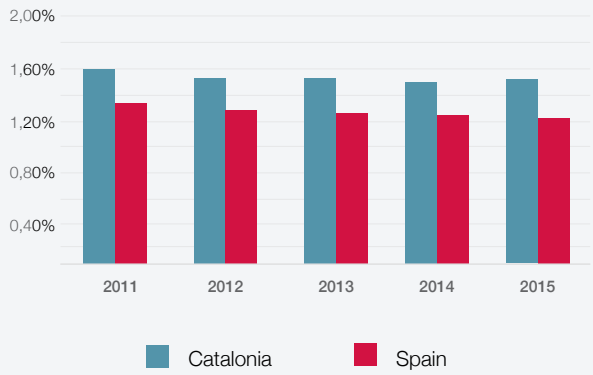


22%
Food Waste

78%
Food Residue
(inevitable)

Gross domestic expenditure in R+D as part of GDP

(Source: IDESCAT, 2015)



Impact-generating agents in Catalonia

Source: RTD classification system of the University and Investigation Department

RTD public system
in Catalonia

SiCUP

Research institutes
Faculties and schools

Research centers

ALBA Synchrotron

Barcelona Supercomputing Center

Others

Support research premises

Hospitals

Technological centers

Science and technology parks

Research groups and networks


39
32
34

IRTA IN FIGURES

IRTA closed 2017 with 810 employees. 77% are IRTA staff, which consists of 30% research staff and 70% support staff. In terms of gender, 54% are women and 46% are men. In this regard, in 2017 IRTA organised an Equality Commission to promote the management's commitment to the equal rights of its male and female employees. In addition, IRTA has been awarded the seal of excellence in Human Resources (HRS4R), which involves the application of multiple standards related to gender equality, such as non-discrimination, gender balance and working conditions that allow employees to have a balanced work and family life.

HUMAN RESOURCES

628 IRTA Staff

113 Associated Staff

69 Doctoral Students

810 TOTAL

FINANCES

43,96M€

32,8% Contributions of the Government of Catalonia

67,2% Own funds

PROJECTS AND CONTRACTS

15,9M Revenue by contracts and services

987 Current contractual activities

262 Activities with competitive funding

182 Research projects

524 Clients

23% Activity outside Catalonia

IRTA STAFF

5% of IRTA staff are foreigners with
19 different nationalities

Gender

338 Women

290 Man

Scale

443 Support Staff

185 RDT Staff

Education

69 PhD students

41 Students

20 Nacionalities

SCIENTIFIC PRODUCTION

363 Papers in *Science Citation Index* journals

24 Books and book chapters

8 Thesis

280 Communication and lectures in crongresses

8.400 Citations

77% Papers in scientific journals of Q1

57% Coauthorship International papers

101 IRTA's h index

TECHNICAL PRODUCTION

78 Articles in technical journals or broadbased publications

56 Technical articles on web pages

INTERNACIONAL ACTIVITY

International IRTA activities include 319 projects and contracts under way abroad. With a volume of €22.6 M, this represents 35% of IRTA's total economic volume.

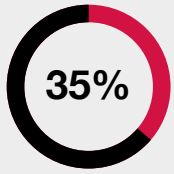
In 2017, we were able to generate €5.8 M in new business with foreign companies, including research contracts, technical assistance, services, recruitment events and agreements on the use of intellectual property in the form of patents and plant varieties. This new activity represents an increase of 6.6% in comparison with the previous year.

319 Current Activities

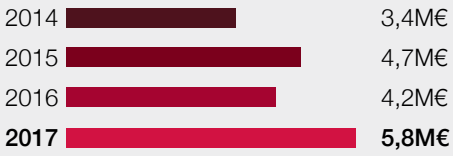
51 Countries

Total economic volume **22,6M €**

Percentage with regard to the IRTA's total economic volume

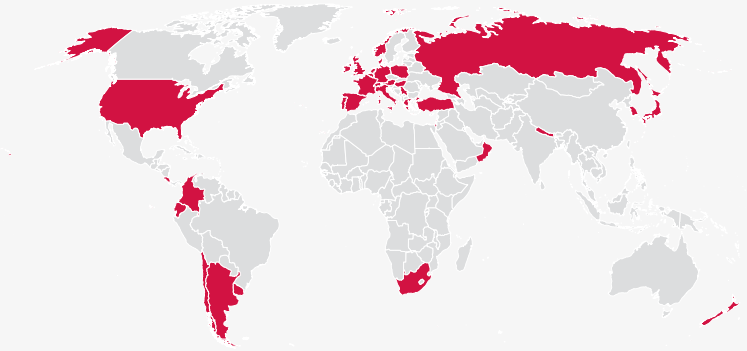


Newly-acquired economic volume

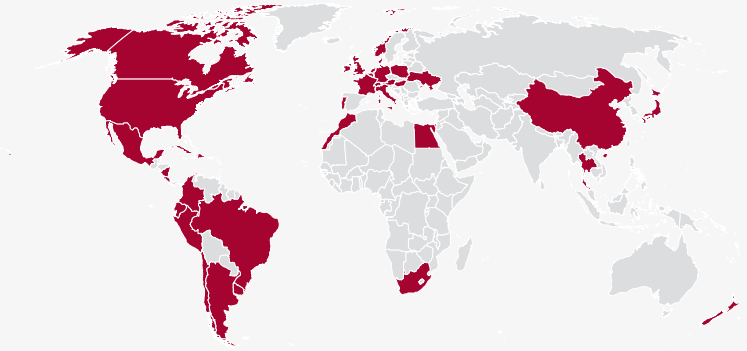


ACTIVITIES BY COUNTRY

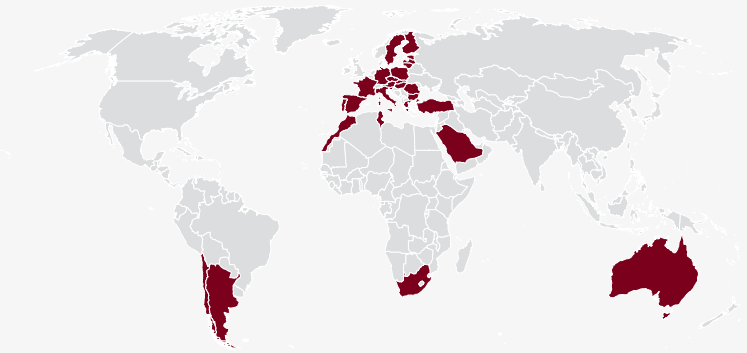
● Contracts



● Agreements



● Licenced plant material



TECHNOLOGY TRANSFER AND COMMUNICATION

817 Activities

317 Seminars

257 Transfer activities

93 Field Trials

76 Technical courses

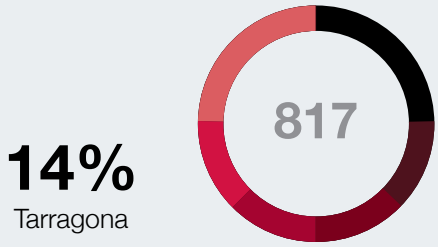
22 External staff visits

43 Sector courses

12 Technical missions

2.583 References in the press

Distribution of transfer activity by region



24% Lleida

24% Barcelona

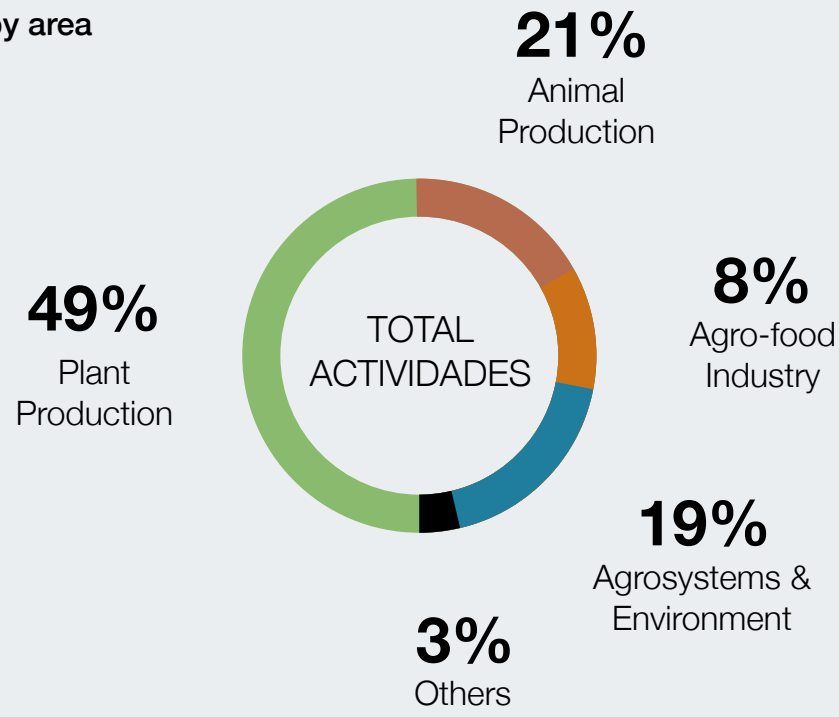
14% Tarragona

10% Abroad

15% Girona

13% Spain

Activities by area



HIGHLIGHTS

Over 30 years of research and support for the sector

IRTA celebrated over 30 years of agrifood research with an event on March 15 attended by over 400 people. The various future challenges for the agrifood sector were considered during the event which centred on a conference by Dr Louise Fresco, from the University of Wageningen. Some of the guests included IRTA staff, authorities, clients and institutions the Institute has collaborated with over the years, such as Uruguay's INIA and New Zealand's Plant & Food research.

Organisation of the seminar "Dynamics of transition to a sustainable world"

Organisation of the seminar "Dynamics of transition to a sustainable world", to reflect and debate on the Catalan agrifood system and sustainability for the future. Multiple representatives from entities linked to the Catalan agrifood system formed working groups to debate waste, water and food sovereignty to detect possible dynamics of transition. The conclusions obtained allow us to explore and accelerate new future scenarios. The sessions took place on February 1, 2 and 3 of 2017 in Palau Macaya in Barcelona, and they were directed by researchers from DRIFT (Dutch Research Institute for Transitions).

The URV-IRTA Campus for agricultural and food research is created

The purpose of the URV-IRTA Campus will be to allow URV students to complete their internships for bachelor, master and doctorate programs at IRTA's facilities in Mas Bové, Sant Carles de la Ràpita and the Estació Experimental in Amposta. It seeks to facilitate student learning on the application of theoretical concepts in research and development programmes, as well as to facilitate scientific research and development activities at both institutions. For some time, IRTA and URV have collaborated in the co-management of doctoral theses.

EVAM, a new centre for milk research, begins operating

EVAM is a new IRTA facility that aims to be a point of reference in research, experimentation and education in the production, transformation and consumption of milk, based on public-private collaboration. EVAM has three objectives: research aimed at generating new knowledge that can help to meet challenges involving technology and innovation in the sector, the transfer of results to help contribute to the improve the sector's competitiveness, seeking greater efficiency in production and the health and welfare of animals, the quality and the differential and added value of dairy products and its derivatives, and the education of the public regarding the process of producing and processing milk, allowing for the implementation of proactive initiatives for disseminating this information and its interpretation. IRTA has made its team, facilities, laboratories and the pilot plants in different facilities at the Monells Centre and the Mas Badia Experimental Station available to EVAM.

Collaboration agreement in environmental management, sustainability and food waste with the Fundació Banc dels Aliments (Food Bank Foundation)

A study by IRTA evaluates the potential environmental impact of the use of excess food or food that is eliminated from the sales chain because of market conditions. Thanks to this collaboration, an agreement has been signed in which both entities agree to work together in the evaluation and monitoring of agrifood projects.

IRTA and the Catalonian Meterologic Service join forces to research the influence of the climate on the agrifood sector

This agreement, with an initial duration of 4 years, is the result of a need to share information and knowledge that allow both institutions to expand their activity regarding one of the sectors most affected by climate change, the agrifood sector. The first results have been focused on the study of the climate in the past and future projections within the framework of DO Penedès, as a complementary management tool for winemaking.

Organisation of the ESPN symposium on poultry nutrition

A total of 1,744 experts in poultry nutrition met from May 8 to 11 in Salou and Vila-seca for the 21st European Symposium on Poultry Nutrition 2017, this sector's most important event worldwide. Over four days, the most relevant issues in this field were addressed, both those of a scientific interest and those affecting the industry.

IRTAmar, public-private innovation for the aquaculture sector

The IRTAmar water re-circulation system for aquaculture developed by IRTA will be employed commercially by the Llaberia Group hydraulic solutions company, though a public-private association with the participation of the software developer INGESOM. The association between the research centre and the private company go far beyond the transfer of knowledge, including the generation of knowledge in an industrial setting.

IRTA develops two new methods to predict bitter pit in apples

Bitter pit is one of the main defects that may appear in apples during storage and commercialisation, and which can result in annual losses of up to 5 million euros in Spain. As a result of the research by the IRTA fruit programme together with the University of Lleida; two simple methods have been developed for evaluating the risk of the appearance of symptoms before these become visible in the tree. These two methods have recently been published in the prestigious scientific publications Postharvest Biology and Technology and Scientia Horticulturae.

Kellogg's and IRTA collaborate to make rice cultivation in the Ebro Delta more sustainable and productive

01/03/2017

Rice productivity grows for the fourth consecutive year in the plots participating in the Kellogg's Origins programme. Over 20% of the Ebro Delta's rice-producing area applies the 10 Best Practices for rice cultivation identified and put into place by IRTA, thanks to this programme. A plan for training and advice aimed at technicians and farmers has also been created to promote these agronomic best practices and to optimise resources, improve crop performance and reduce environmental impact.

Catalonia's first map of carbon content in agricultural soil

27/03/2017

ICGC, CREAF, CTFC, DARP and IRTA have signed a collaboration agreement that has allowed for the establishment of a threshold in the carbon content of Catalonia's agricultural soil. This is a starting point for the generation of policies aimed at reducing climate change, which is in line with the 4 per1000 strategy of COP 21 and 22, which the IRTA subscribed to. It was introduced for the first time at the international "Agriculture and Climate Change" congress in Sitges (Barcelona) on March 27 and 28, 2017.

Intelligent Agriculture in the Sustainability of the Primary Sector

17/02/2017

Thanks to collaboration with the UAB within the framework of the P-Sphere project, funded by the European Union's COFUND project, the IRTA has incorporated three researchers from different countries who are specialists in latest-generation ICTs. These researchers are working on the cross-cutting application of digital technologies (management of big data, internet of things, artificial intelligence, etc.) for the production of healthy, quality foods, intelligent agriculture and a circular economy. As part of this seminar organised by IRTA and the Department of Agriculture, Livestock, Fisheries and Food, some of the results of this initiative were presented. This initiative also benefited from the collaboration of multiple national and international experts. With this action, the position of IRTA is hoped to be improved in the digital era.

Experts in environmental research from different countries come together for the 5th edition of the REMEDIA workshop at Torre Marimon

01/03/2017

This edition, organised by IRTA, includes a round table discussion dedicated to urban and periurban agriculture and the circular economy. According to experts in the reduction of greenhouse gasses, the fight against climate change includes, among other things, the integration of agriculture in metropolitan spaces and other areas of knowledge in order to generate products with a small carbon and water footprint, in collaboration with research on a global scale.

Designation of IRTA-CReSA as a Collaborating Centre and Reference Laboratory for the World Organisation for Animal Health

09/06/2017

At the General Assembly of the World Organisation for Animal Health (OIE) the Animal Health Research Centre (IRTA-CReSA) has been named as an OIE Collaborating Centre for "Research and control of emerging and re-emerging swine diseases in Europe." This is the first time a research centre in Spain has been named an OIE Collaborating Centre. IRTA-CRESA has also been named with the objective of exploring problems related to classical swine fever.

Coordination of the BioPro project, based on the circular economy

04/12/2017

The Department of Food Industries is responsible for the scientific coordination of strategic program CIEN 2017, funded by CDTI, in which 8 companies and 4 national research bodies participated.

The goal of this project is to develop a technological platform to evaluate agrifood subproducts of plant and animal origin. For the first time, the BioPro project will combine treatment stages of organic waste using bioconversion and biorefinery processes in order to obtain ingredients and products with a high added value, with both nutritional and technological applications, that will be added to new products for providing food for both humans and animals.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PROGRAMME ACTIVITIES

Postharvest

Director: Josep Usall

Plant production

15 Researchers

25 Support Staff

9 Students

Keywords
Fruit
Conservation
Microorganisms
Decomposition
Physiopathology
Sensory analysis
Advisory
Food processing
Vegetables
Quality

The Postharvest programme sets out to improve the quality of fresh and processed fruit and vegetables throughout the value chain, from the harvest to the end consumer. This integrated approach to the whole chain is possible thanks to its expertise in the fields of physiology, biochemistry, technology, engineering, pathology and microbiology, as well as the combination of basic research, applied research, training, transfer and consultancy in close collaboration with the production sector.

Related strategic challenges

Food security

Technology for innovation in the food chain

Projects and contracts

80	10	3	14
Activities with private funding	National projects	European projects	Other projects

Technology transfer

9	32	18	2	2
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

BIOREC. New integrated strategies for the improvement of post-harvest quality of apples and persimmons, based on the application of edible coatings made with bioactive ingredients

The overall aim of the project is the development of coatings (RCs) to be applied within an integrated strategy to improve their physicochemical, sensory and aromatic qualities, as well as to reduce the presence of physiological alterations and rot in persimmons and apples.

Starts	Ends	Funding body	Budget	Partners
2017	2019	INIA. Ref. RTA2015-00037-C02-01	270.000 €	IRTA, IVIA de Valencia, Universidad Politécnica de Valencia

Featured Activities

· **Evaluation of the postharvest potential of stone fruit varieties and the optimisation of export protocols.** The study, carried out in conjunction with DARP and PRODECA, evaluates the conservation potential of different peach and nectarine varieties, both round and flat, in order to determine which markets they could be exported to. At the same time, it sets out to develop techniques that allow for longer conservation and thus give the consumer fruit with excellent organoleptic qualities.

· **II International Course 'Technology and Management of the Post-harvesting of Fruit'.** The main objective of the course is to offer knowledge and tools that can be used both by professionals involved in postharvest fruit handling facilities as well as by companies involved in the handling of harvested fruit. The course combines theoretical classes with workshops and the resolution of practical cases.

· **Consultancy on the postharvesting of citrus fruit in Uruguay (UPEFRUY).** This is a 4-year agreement in which IRTA advises Uruguayan companies on the post-harvest handling of citrus fruits intended for export and, in conjunction with the INIA of Uruguay, it aims to launch a Postharvest Technical Service similar to that of IRTA.

Featured publications

· Gine, J.; Echeverría, G.; Ubach, D.; Aguilo, I.; López, M.L.; Larrigaudière, C. (2017). Biochemical and physiological changes during fruit development and ripening of two sweet cherry varieties with different levels of craking tolerance. Plant Physiology and Biochemistry 111 :216-225

· Colas, P.; Abadias, M.; Oliveira, M.; Usall, J.; Viñas, I. (2017). Influence of fruit matrix and storage temperature on the survival of Listeria monocytogenes in a gastrointestinal simulation. Food Control 73 (Part B):1045-1052

· Gotor-Vila, A.; Usall, J.; Torres, R.; Solsona, C.; Teixidó, N. (2017). Biocontrol products based on Bacillus amyloliquefaciens CPA-8 using fluid-bed spray-drying process to control postharvest brown rot in stone fruit. LWT - Food Science and Technology 82 :274-282

· Bernat, M.; Segarra, J.; Xu, X-M; Casals, C.; Usall, J. (2017). Influence of temperature on decay, mycelium development and sporodochia production caused by Monilinia fructicola and M. laxa on stone fruits. Food Microbiology 64 :112-118

· Zudaire, L.; Viñas, I.; Abadias, M.; Simó, J.; Echeverría, G.; Plaza, L.; Aguilo, I. (2017). Quality and bioaccessibility of total phenols and antioxidant activity of calçots (Allium cepa L.) stored under controlled atmosphere conditions. Postharvest Biology and Technology 129 :118-128

Fruticulture

Director: Luís Asín

Plant production

18 Researchers

40 Support Staff

4 Students

Keywords
Fruit
Nuts
Oil
Agroforestry
Vineyard
Plant breeding
Climate change
Crop technology
Ecosystems
Olive oil production
Plant physiology
Agronomy
Fruit quality

The research done in the fruticulture programme is aimed at solving the problems of the fruit sector. It focuses mainly on peaches, apples, pears, almonds, olives, hazelnuts, wine and agri-forestry production, and also on crops such as carob, walnuts, apricots, cherries and citrus fruits.

Related strategic challenges

Strengthening the catalan agrifood system

Projects and contracts

177	10	4	19
Activities with private funding	National projects	European projects	Other projects

Technology transfer

81	11	14	6	0
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

Genetic improvement of the almond tree (coordinated project “Retos [Challenges]”, AGL2013-48577-C2-2-R)

The almond tree variety improvement project is the resumption of the programme started in 1975 with new objectives and on a larger scale of cross-hybridisation (5,000 almonds per year). The project has been aimed at obtaining new commercial varieties (self-compatible, late flowering, fungal tolerant, almond and production quality). The activity was based on field-based crossings and phenotypic and genotypic selection. The basic management of the new descendants and advanced selections was maintained, but selection-assisted markers (SAM) with respect to two characters (self-compatibility Sf and late flowering Lb) were incorporated. The technological characterisation of almonds and their industrial aptness were crucial. The experimentation with advanced varieties and selections in different agri-ecological conditions were added factors in the decision regarding their transfer to the sector.

Starts	Ends	Funding body	Budget	Partners
11/12/2014	31/12/2017 (3 anys + 1 pròrroga)	AEI, Ministerio de Economía y Competividad	145.200 €	CSIC-CEBAS

Featured Activities

· Improving fruit quantity and resistance to biotic factors in dessert apple varieties. Selection assisted with molecular markers.

· **MEDACC.** The LIFE project sets out to test innovative solutions designed to adapt our agriforestry and urban systems to the impacts of climate change in the Mediterranean area. In Catalonia it will be a valuable tool for the deployment of the Catalan Strategy for Adaptation to Climate Change (ESCACC 2013-2020). The project will be implemented in the Muga, Ter and Segre river basins.

· **BIOFOS.** The aim is to build a portable analyser of contaminants in olive oil (phosmet and copper), milk (aflatoxin M1, penicillin and lactose), nuts (aflatoxin B1) and dehydrated fruit (ochratoxin A). The system, based on biosensors, photonics and microfluidics, seeks to simplify the analysis process with a simple, low-cost tool.

Featured publications

· Torres, E.; Recasens, I.; Avila, G.; Lordan, J.; Alegre, S. (2017). Early stage fruit analysis to detect a high risk of bitter pit in `Golden Smoothee¿. Scientia Horticulturae 219 :98-106

· Rovira, M.; Hermoso, J.F.; Romero, A. (2017). Performance of hazelnut cultivars from Oregon, Italy, and Spain, in Northeastern Spain. HortTechnology 27 (5):631-638

· Breto, M.; Cantin, C.; Iglesias, I.; Arús, P.; Eduardo, I. (2017). Mapping a major gene for red skin color suppression (highlighter) in peach. Euphytica 213 :14

· Reig, G.; Alegre, S.; Cantin, C.; Gatius, F.; Puy, J.; Iglesias, I. (2017). Tree ripening and postharvest firmness loss of eleven commercial nectarine cultivars under Mediterranean conditions. Scientia Horticulturae 219 :335-343

· Alins, G.; Alegre, S.; Avilla, J. (2017). Alternative to azadirachtin to control Dysaphis plantaginea Passerini (Hemiptera: Aphidae) in organic apple production. Biological Agriculture & Horticulture 33 (4):235-246

Protección Vegetal Sostenible

Director: Cinta Calvet



Plant production

16 Researchers

11 Support Staff

6 Students

Keywords
Pests
Insect-borne diseases
Mycorrhiza
Integrated pest management
Edible mushrooms
Pathogenic fungus
Biodiversity
Biological control

The search for new control strategies compatible with low impact management practices to improve plant health and crop production is the priority objective of the Sustainable Plant Protection program. Research is focused both in the biology and epidemiology of pathogenic organisms and in the study of beneficial organisms involved in the control of pests and diseases and contributing to high quality standards of agricultural and forestry products.

Related strategic challenges

Sustainable intensification in a changing world

Food security

Technology for innovation in the food chain

Projects and contracts

38	10	3	7
Activities with private funding	National projects	European projects	Other projects

Technology transfer

27	15	10	8	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

Control and confinement strategies for Trioza erytreae, vector of citrus huanglongbing

Trioza erytreae, vector of the devastating Huanglongbing citrus disease, has recently been detected in the Iberian Peninsula. We will provide a solid scientific basis for developing innovative and sustainable protection practices to face up to challenge.

Starts
26/06/2017

Ends
25/06/2020

Partners
Institut Valencià d'Investigacions Agraries (IVIA), Instituto Canario de Investigaciones Agrarias (ICIA), Instituto de Investigación y Formación Agraria y Pesquera de Anadalucía (IFAPA), Universidad Politécnica de Cartagena (UPCT), Instituto Murciano de Investigación Agraria y Alimentaria (IMIDA).

Funding body
INIA RTA-2015-0005-C06-03

Budget
105.000,00€

Featured Activities

· **Annual Interactive Sustainable Plant Protection Technical Seminar,** including talks, demonstration workshops and posters informing attendees of the most recent results of the lines of research conducted by the Programme. This year, the Seminar was held at the Mas Bahia Foundation Experimental Station and jointly involved Programme researchers and Foundation personnel. The Seminar was organized and designed for professionals and technicians from companies and sectoral groups.

· **MICOFOOD Project (V400-V4146).** This activity was conceived as a new line in the industrial use of fungi, envisaging the use of crops of ectomycorrhizal fungi (symbionts of plants, usually arboreal plants) for food, nutraceutical and cosmetic uses. It should be mentioned that it involves cross-cutting cooperation between the programme for Sustainable Plant Protection, Food Safety, Food Technology and Product Quality.

· **Market Garden Task Force (V400-V4153).** The project includes the search for technology-based improvements to increase the sustainability of Catalonia's market garden crops, initiatives for the employment of natural resources such as useful indigenous fauna and soil micro-organisms and rationalization of the use of phytosanitary products and fertilizers in market garden crops. It seeks a market differentiation to meet the current requirements of consumers who wish to consume food without waste and demand fresh products of high organoleptic quality.

Featured publications

· Martínez-Ferrer, M.T.; Campos-Rivela, J.M. 2017. Diversity, spatial Distribution, and sampling for ant manegement decision-making in integrated pest management programs in citrus groves. Entomologia Experimentalis et Applicata 162(2):251-260.

· Queralt, M.; Parladé, J.; Pera, J.; De Miguel, A,M,. 2017. Seasonal dynamics of extraradical mycelium and mycorrhizas in a black truffle (Tuber melanosporum) plantation. Mycorrhiza 27:565-576. DOI:10.1007/s00572-017-0780-1.

· Rufo, R.; Batlle, A.; Camprubí, A.; Montesinos, E.; Calvet, C. 2017. Control of rubus stunt and stolbur diseases in Madagascar periwinkle with mycorrhizae and a synthetic antibacterial peptide. Plant Pathology 66(4):551-558.

· Sola, M.; Lundgren, J.G.; Agustí, N.; Riudavets, J. 2017. Detection and quantification of the insect pest Rhyzopertha dominica (F.) (Coleoptera: Botrischidae) in rice by qPCR. Journal of Stored Products Research 71 :106-111

· Jauset A.M., Edo-Tena, E.; Pares-Casanovas, P.M.; Castañé, C.; Agustí, N-; Alomar, O. 2017. Elliptic Fourier analysis in the study of the male genitalia to discriminate three Macrolophus species (Hemiptera: Miridae). Insects. 8(4), 120; doi:10.3390/insects8040120

Genomics and Biotechnology

Director: Amparo Montfort

Plant production

14 Researchers

10 Support Staff

12 Students

The main objective of the Genomics and Biotechnology Programmes is the study of the inheritance of characters related to the resistance to disease and fruit quality (maturation and aroma) in species of the cucurbit (melon) and rosaceae (peach and strawberry) families. We apply the knowledge generated to develop new markers (SNPs and SSRs) that can be applied to our own improvement programmes or those of companies through the Genetic Analysis Service.

Keywords
Genetic variability
Virus resistance
Fruit organoleptic properties
Pelon
Peach
Strawberry
Marker Assisted Selection (MAS)

Related strategic challenges

Sustainable intensification in a changing world

Food of the future

Food and health

Projects and contracts

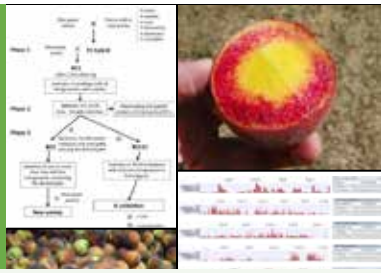
17	5	1	-
Activities with private funding	National projects	European projects	Other projects

Technology transfer

3	12	2	1	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

New technologies for peach improvement based on molecular markers: assisted introgression for markers and resynthesis



Develop new strategies to obtain new peach varieties based on the selection of the entire genome with molecular markers: Marker Assistance Introgression (MAI), and Resynthesis. Funding body: National RDI programme aimed at challenges of society. RTA2015-00050-00-00.

Starts	Ends	Funding body	Budget	Partners
26/06/2017	25/06/2020	Programa Estatal de I+D+I Orientado a los retos de la Sociedad. RTA2015-00050-00-00	110.000€	IRTA, IVIA de Valencia, Universidad Politécnica de Valencia

Featured Activities

· **RESMELORIP.** Genetic dissection of two agronomic characters in melon: resistance to the Cucumber mosaic virus. In-depth study of important agronomic characters in melons, such as resistance to the Cucumber mosaic virus (CMV) and climacteric fruit ripening. We study the action mechanisms of the genes cmv1 and eth6.3, and search for new QTLs.

· **ALMELO.** Identification and characterisation of genes involved in the shape and succulence of peaches. In depth analysis of three important peach tree genes: the gene that determines the shape of flat fruit (Saturn peach) and two genes that determine the essential differences between the fruit of the almond and peach trees (Alf/alf and Jui/jui).

· **Semillas Fitó-IRTA Private-Public Unit.** Obtaining new varieties in horticultural species. The project aims to introduce the use of assisted improvement using SNPs in the Semillas Fitó company's improvement programmes for various important characters in seven solanaceous and cucurbit species.

Featured publications

· López-Girona E, Zhang Y, Eduardo I, Hernández Mora JR, Alexiou KG, Arús P, Aranzana MJ (2017) A deletion affecting an LRR-RLK gene co-segregates with the fruit flat shape trait in peach. Scientific Reports 7:6714

· Ríos P, Argyris J, Vegas J, Leida C, Kenigswald M, Tzuri G, Troadec C, Bendahmane A, Katzir N, Picó B, Monforte AJ, Garcia-Mas J (2017) ETHQV6.3 is involved in melon climacteric fruit ripening and is encoded by a NAC domain transcription factor. The Plant Journal 91 671-683
Urrutia M, Rambla JL, Alexious KG, Granell A, Monfort A (2017) Genetic analysis of the wild strawberry (Fragaria vesca) volatile composition. Plant Physiology and Biotechnology: 121, Pages 99-117

· Giner A, Pascual L, Bourgeois M, Gyetvai G, Rios P, Picó B, Troadec C, Bendahmane A, Garcia-Mas J, Martín-Hernández AM (2017) A mutation in the melon Vacuolar Protein Sorting 41 prevents systemic infection of Cucumber mosaic virus. Scientific Reports 7-10471.

· Serra O, Giné-Bordonaba J, Eduardo I, Bonany, Joan, Echeverría G, Larrigaudière C, Arús P (2017). Genetic analysis of the slow-melting flesh character in peach. Tree Genetics & Genomes. 13. 77.

Animal Breeding & Genetics

Director: Raquel Quintanilla

Animal Production

8 Researchers

12 Support Staff

2 Students

Recognised as a Consolidated Research Group in the “Management of Animal Breeding and Genetic Resources”, the Animal Breeding and Genetics Programme conducts research and transfer in quantitative genetics, genomics and integrative biology aimed at the study of genetic determinism and the development of selection strategies in relation to the efficiency and robustness in pig and rabbit populations.

Keywords
Genomic selection
Breeding
Modelling
Feed efficiency
Immunocompetence
Strength
Information systems
Integrative biology
Microbiota

Related strategic challenges

Sustainable intensification in a changing world

Food and health

Projects and contracts

30	8	2	1
Activities with private funding	National projects	European projects	Other projects

Technology transfer

6	23	32	8	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

IMMUPIGEN - Genetic determination of immunity in pigs: identification of functional genetic variants for the implementation of genomic selection

Study of the genetic determinism of the immune capacity in pigs, as well as its relation to the productive yield and animal welfare. The ultimate goal is to improve the resilience and robustness of animals along with the improvement of productive efficiency, contributing to the increased sustainability of production systems and the reduction of resistance to antibiotics.

Starts	Ends	Funding body	Budget	Partners
2017	2020	MINECO	130.000 €	-

Featured Activities

· *Feed-a-Gene*. Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems. H2020 Project with the participation of 23 European partners.

· Collaboration agreement with the Ministry of Agriculture and Fisheries, Food and the Environment (MAPAMA in its Spanish initials) to offer scientific advice on animal welfare and the promotion and use of the Spanish porcine database (BDporc).

· Technical seminar on rationing and de-medication in rabbit breeding, with speakers from the Spanish Drug Agency, the UPV, UCM, INRA and IRTA. Torre Marimon, 15 June, 2017.

Featured publications

· Piles M., David I., Ramon J., Canario L., Rafel O., Pascual M., Ragab M., Sánchez J.P. 2017. Interaction of direct and social genetic efects with feeding regime in growing rabbits. Genetics Selection Evolution 49: 58. doi: 10.1186/s12711-017-0333-2.

· Sánchez J.P., Ragab M., Quintanilla R., Rothschild M.F., Piles M. 2017. Genetic parameters and expected responses to selection for components of feed efficiency in a Duroc pig line. Genetics Selection Evolution 49: 86. doi: 10.1186/s12711-017-0362-x.

· Figueiredo-Cardoso T., Canovas A., Canela-Xandri O., González-Prendes R., Amills M. and Quintanilla R. 2017. RNA-seq based detection of differentially expressed genes in the skeletal muscle of Duroc pigs with distinct lipid profiles. Scientific Reports 7, Article number: 40005. doi: 10.1038/srep40005.

· Ballester M., Ramayo-Caldas Y., Revilla M., Corominas J., Castelló A., Estellé J., Fernández A.I., Folch J.M. 2017. Integration of liver gene co-expression networks and eGWAs analyses highlighted candidate regulators implicated in lipid metabolism in pigs. Scientific Reports 7, Article number: 46539. doi: 10.1038/srep46539.

· Ramayo-Caldas Y., Ballester M., Sánchez J.P., González-Rodríguez O., Revilla M., Reyer H., Wimmers K., Torrallardona D., Quintanilla R. 2018. Integrative approach using liver and duodenum RNASeq data identifies candidate genes and pathways associated with feed efficiency in pigs. Scientific Reports 8, Article number: 558. doi: 10.1038/s41598-017-19072-5.

Animal Nutrition

Director: Enric Esteve

Animal Production

8 Researchers

29 Support Staff

1 Students

Keywords
Efficiency
Gut Health
Reduction of antibiotic use
Enzyme
Probiosi
Product quality
Food safety
New ingredients
Fetal programming
Epigenetics
Modelling

The aim of the programme is to improve the value of livestock production. Innovation in this field should maintain animal production in our country at the forefront of the sector.

The programme is aimed at monogastric nutrition and studies on how to augment nutritional efficiency in order to improve livestock productivity, health and welfare and reduce the environmental impact of intensive production. The programme also focuses on reducing the use of antibiotics for prophylactic purposes.

Related strategic challenges

Fortaleciendo el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Suficiencia alimentaria

La alimentación del futuro

Alimentación y salud

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

167	7	5	5
Activities with private funding	National projects	European projects	Other projects

Technology transfer

27	52	20	8	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

* Información compartida con el grupo emergente de Bienestar Animal durante 2017

Featured project

Foetal programming in pigs, impact on survival and immunity in commercial Iberian breeds

Improve the reproductive efficiency of sows, the health of piglets through nutrition in the pre- and post-natal stages thanks to the improvement of immune system response, and study whether this strategy modifies the epigenome.

Starts	Ends	Funding body	Budget	Partners
2018	2021	INIA	126.946 €	Universidad de Extremadura

Featured Activities

· European Symposium on Poultry Nutrition, held in Salou and Vila-seca from 8-11 May 2017, with 1,700 participants, organised by IRTA.

· 44 contracts signed with companies in the sector.

· 2 European projects and 2 INIA projects during 2017, 1 INIA doctoral fellowship, and a reading of the doctoral thesis of Joseane Willamill.

Featured publications

· Prenafeta-Boldú, F.X.; Fernandez, M.; Viñas, M.; Lizardo, R.; Brufau, J.; Owusu-Asiedu, A.; Walsh, M.C.; Awati, A. (2017). Effect of Bacillus spp. direct-fed microbial on slurry characteristics and gaseous emissions in growing pigs fed with high fibre-based diets. Animal 11 (2):209-218

· Rodehutscord, M.; Adeola, O.; Angel, R.; Bikker, P.; Delezie, E.; Dozier, W.A.; Umar Faruk, M.; Francesch, M.; Kwakernaak, C.; Narcy, A.; Nyachoti, C.M.; Olukosi, O.A.; Preynat, A.; Renouf, B.; Saiz Del Barrio, A.; Schedle, E.; Siegert, W.; Steenfeldt, S.; van Krimpen, M.M.; Waititu, S.M.; Witzig, M. (2017). Results of an international phosphorus digestibility ring test with broiler chickens. Poultry Science 96 (6):1679-1687

· Serrano, J.; Casanova-Martí, A.; Gual, A.; Pérez-Vendrell, A.M.; Blay, M.T.; Terra, X.; Ardévol, A.; Pinent, M. (2017). A specific dose of grape seed-derived proanthocyanidins to inhibit body weight gain limits food intake and increases energy expenditure in rats. European Journal of Nutrition 56 (4):1629-1636

· Montanhini Neto, R.; N'Guetta, E.; Gady, C.; Francesch, M.; Preynat, A. (2017). Combined effect of using near-infrared spectroscopy for nutritional evaluation of feed ingredients and non-starch polysaccharide carbohydrase complex on performance of broiler chickens. Animal Science Journal 88 :1979-1986

· Torres-Pitarch, A; Hermans, D.; Manzanilla, E. G.; Bindelle, J., Everaert, N., Beckers, Y., Torrallardorna, D., Bruggeman, G., Gardiner, G.E. and Lawlor,, P.G. (2017) . Animal Feed Science and Technology 233: 145-159.

Aquaculture

Director: Alicia Estévez

Animal Production

11 Researchers

20 Support Staff

6 Students

Keywords
Aquiculture
New species
Nutrition
Health
Marine habitats
Marine toxins
Biosensors

The aquaculture programme aims to carry out strategic research in the field of aquaculture and transfer the results to industry, companies and the government. It works to improve the quality, productivity, and sustainability of both new and established species. It carries out several lines of research that include reproduction, larval cultures, nutrition, and the health of fish and molluscs. The programme includes the Marine Monitoring Sub-programme that carries out the monitoring of the marine environment of production and food safety of seafood; valuation of marine products; design and implementation of the programme to control the quality of the water, molluscs and toxic phytoplankton in the seafood production areas along the Catalan coast, from environmental and microbiological parameters to indicators (E. coli), toxic algae, marine toxins, polluting substances, heavy metals, organochlorines, PAHs and dioxins.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

La alimentación del futuro

Alimentación y salud

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

35	14	8	9
Activities with private funding	National projects	European projects	Other projects

Technology transfer

10	42	57	1	2
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

* Información compartida con el grupo emergente de Fisiología Molecular Comparada durante 2017

Featured project

MedAID - Mediterranean Aquaculture Integrated Development

MedAID aims to increase the global competitiveness and sustainability of the entire value chain of the Mediterranean marine aquaculture industry by improving technical and business features and shifting towards a sustainable market-oriented approach with an improved social reputation among consumers. The project is coordinated by IAMZ-CIHEAM and IRTA

Starts	Ends	Funding body	Budget	Partners
01/05/2017	30/04/2021	UE - H2020-SFS-2016-2 Project ID: 727315	6.999.996,25 €	34 socis de 12 països

Featured Activities

· SEASENSING, Microsystems for the rapid, reliable and cost-effective detection of toxic microalgae in situ and in real time.

· Recirculation model in the Bay of Fangar for the management of Aquaculture and Shellfish activities.

· Life-BREWERY. New strategies for improving the sustainability of the brewing industry: comprehensive recovery of by-products for feed in aquaculture.

Featured publications

· Campoverde, C., Milne, D.J., Estévez, A., Duncan, N., Secombes, C.J., Andree, K.B. (2017) Ontogeny and modulation after PAMPs stimulation of β-defensin, hepcidin, and piscidin antimicrobial peptides in meagre (*Argyrosomus regius*). Fish and Shellfish Immunology, 69: 200-210

· Carrasco, N., Gairin, J.I., Pérez, J., Andree, K., Roque, A., Fernández-Tejedor, M., Rodgers, C., Aguilera, C., Furones, M.D. (2017). A production calendar based on water temperature, spat size, and husbandry practices reduce OsHV-1 uvar impact on cultured pacific oyster *Crassostrea gigas* in the Ebro Delta (Catalonia), Mediterranean Coast of Spain. Frontiers in Fhysiology 8 (125): 1-10 doi: 10.3389/fphys.2017.00125

· Diogène, J., Reverté, L., Rambla-Alegre, M., del Río, V., de la Iglesia, P., Campàs, M., Palacios, O., Flores, C., Caixach, J., Ralijaona, C., Razanajatovo, I., Pirog, A., Magalon, H., Arnich, N., Turquet, J. (2017) Identification of ciguatoxins in a shark involved in a fatal food poisoning in the Indian Ocean. Scientific reports 7, Article number: 8240. doi: 10.1038/s41598-017-08682-8.

· Leonardo, S., Rambla-Alegre, M., Samdal, I.A., Miles, C.O., Kilcoyne, J., Diogène, J., O'Sulllivan, C.K., Campàs, M. (2017) Immunorecognition magnetic supports for the development of an electrochemical immunoassay for azaspiracid detection in mussels Biosensors and Bioelectronics, 92: 200-206

· Vinatea, L., Malpartida, J., Carbó, R., Andree, K.B., Gisbert, E., Estévez, A. (2017). A comparison of recirculation aquaculture systems versus biofloc for on-growing of juveniles of *Tinca tinca* (Cyprinidae) and grey *Mugil cephalus* (Mugilidae). Aquaculture, 482: 155-161

Animal Health

Director: Fernando Rodríguez

Animal Production

26 Researchers

49 Support Staff

19 Students

Keywords
OIE
ICTS
BSL3
One health
Translational Access
Monitoring and control
Multispecies

The Animal Health programme is devoted to research, technological development, transfer and education in this field, in order to improve animal health and the quality and safety of animal products intended for human consumption. The research is divided into three sub-programmes which include endemic diseases, exotic diseases, epidemiology and risk analysis.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Alimentación y salud

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

114	20	7	15
Activities with private funding	National projects	European projects	Other projects

Technology transfer

23	54	45	11	2
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

Avian flu: Detection, pathogenesis and epidemiology in the interaction between wild and domestic species.

This project aims to conduct an in-depth study of the epidemiology, pathogenesis and persistence of avian flu viruses: study the dynamics and risks of avian influenza in Spain, the implications for peridomestic fauna and the susceptibility of native breeds.

Starts	Ends	Funding body	Budget	Partners
06/2017	05/2020	INIA - MEC	627.725,34 €	Neiker-Instituto Vasco De Investigacion Y Desarrollo Agrario I Universidad De Castilla-La Mancha

Featured Activities

· **Technical mission** of Dr. Llilianne Ganges at the Chinese Institute of Veterinary and Drug Control in Beijing, as a collaborative centre and reference laboratory of the OIE for the virus of classic swine fever (CSF)

· **Collaboration agreement** with the company WorldPathol for the development of a recombinant vaccine for Glässer's disease. 2015-18. IP: Virginia Aragón. Total price of the contract: €160,133.28

· **CReSA & the city: IRTA-CReSA scientific dissemination blog**, where current topics of Animal Health, biosecurity and biosafety, and other topics are presented, as well as the results of the research activities carried out at CReSA. Coordination: Enric Vidal

Featured publications

· M Brustolin; S Talavera; A Nuñez; C Santamaría; R Rivas; N Pujol; M Valle; M Verdún; A Brun; N Pagès; N Busquets. Rift Valley fever virus and European mosquitoes: vector competence of Culex pipiens and Stegomyia albopicta (= Aedes albopictus). Medical and veterinary entomology. 31 - 4, pp. 365 - 372. 12/2017. ISSN 1365-2915

· Monteagudo, P L.; Lacasta, A; Lopez, E; Bosch, L; Collado, J; Pina-Pedrero, S; Correa-Fiz, F; Accensi, F; Vidal, E; Navas, MJ; Rodriguez, JM; Gallei, A; Nikolin, V; Salas, ML.; Rodriguez, F. BA71 Delta CD2: a New Recombinant Live Attenuated African Swine Fever Virus with Cross-Protective Capabilities. Journal of Virology

· Garcia-Morante, Beatriz; Segales, Joaquim; Fraile, Lorenzo; Llarden, Gemma; Coll, Teresa; Sibila, Marina. Potential use of local and systemic humoral immune response parameters to forecast Mycoplasma hyopneumoniae associated lung lesions. Plos One

· Balseiro, Ana; Altuzarra, Raul; Vidal, Enric; Moll, Xavier; Espada, Yvonne; Sevilla, Iker A.; Domingo, Mariano; Garrido, Joseba M.; Juste, Ramon A.; Prieto, Miguel; Perez de Val, Bernat. Assessment of BCG and inactivated Mycobacterium bovis vaccines in an experimental tuberculosis infection model in sheep. Plos One

· J. Vergara-Alert, J.M.A. van den Brand, W. Widagdo, M. Muñoz, V. Stalin Raj, D. Schipper, D. Solanes, I. Cordón, A. Bensaid, B.L. Haagmans, J. Segalés. Susceptibility of different livestock animal species for Middle East respiratory syndrome coronavirus infection. Emerging Infectious Diseases, 23(2):232-240 (2017)

Rumiant Production

Director: Maria Devant

Animal Production

- **6** Researchers
- **8** Support Staff
- **3** Students

The Ruminant Production programme carries out research on bovine milk and meat in order to improve productivity, farm sustainability and product quality.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Suficencia alimentaria

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

41	5	-	5
Activities with private funding	National projects	European projects	Other projects

Technology transfer

10	18	8	3	1
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

Establishment of work protocols to reduce the use of antibiotics in dairy cattle farms.

The main objective of the project is to establish work protocols in dairy cow farms that reduce the use of antibiotics in livestock operations. To achieve this goal, we will focus on two critical areas of dairy farms where the use of antibiotics is widespread, and in which a new work protocol can be established to reduce their use. Therefore, we consider two specific objectives in the creation of new protocols for the rinsing of cows and the treatment of intrauterine infections during afterbirth. As a secondary objective, we propose to assess the impact of the new work protocols on the reduction of antibiotic resistance in farming ventures.

Starts	Ends	Funding body	Budget	Partners
20/04/2017	2020	Generalitat DARP y FEADER	248.500 €	Vether, Sant Mer, IRTA

Featured Activities

· **Biotech Seminar.** The main objective of this seminar is to show the beef sector (livestock breeders, veterinary advisers, the agri-food industry, the pharmaceutical industry in the livestock sector) how biotechnology enables us to face new challenges. The development of new molecules, new biochemical markers and the understanding of ruminant physiology provide us with support to establish the most appropriate livestock management practices, which analyses we must prioritise , and which molecules can add value to the production system to make it environmentally sustainable and economically viable.

· **EVAM seminar.** The IRTA has opted for the creation of an experimental dairy farm that allows studies to be carried out on nutrition and the improvement of productive efficiency, among others. This seminar aimed to present the facilities and their research potential to livestock farmers in the dairy sector in Catalonia.

· **Round table work meeting on calf fattening.** Annually, 12 stakeholders in calf fattening gather to prioritise 3 lines of research: this year they have prioritised the rational use of antibiotics, Water Treatment Optimisation Guide (GOTA in its Catalan initials), and pre-slaughter factors that affect meat quality

Featured publications

· Bach, A., A. Aris, and I. Guasch. 2017. Consequences of supplying methyl donors during pregnancy on the methylome of the offspring from lactating and non-lactating dairy cattle. PLoS One. 12(12): e0189581.

· Gifre L, Arís A, Bach À, Garcia-Fruitós, E. 2017. Trends in recombinant protein use in animal production. Microbial Cell Factories 16(1): 40.

· Genís S, Bach À, Arís A. 2017. Título: Effects of intravaginal lactic acid bacteria on bovine endometrium: Implications in uterine health. Veterinary Microbiology. 204: 174-179.

· G. Maynou, A. Bach, and M. Terré. 2017. Feeding of waste milk to Holstein calves affects antimicrobial resistance of Escherichia coli and Pasteurella multocida isolated from fecal and nasal swabs. J. Dairy Sci. 100:2682-2694.

· M. Verdú, A. Bach, and M. Devant. 2017. Effect of feeder design and concentrate presentation form on performance, carcass characteristics, and behavior of fattening Holstein bulls fed high-concentrate diets. Anim. Feed Sci. Technol. 232.148-159.

Bienestar Animal

Director: Antoni Velarde

Producción Animal

3 Researchers

4 Support Staff

2 Students

Keywords
Animal welfare
Efficiency
Slaughterhouse
Transport
Farm
Porcine
Rabbit
Ruminants
Poultry
Behaviour
Sustainability

Our mission is to use research to contribute to animal welfare in the modernisation, competitiveness and sustainable development of livestock production. Current activities focus on four broad lines of research:

1. Welfare in the slaughtering process.

2. Evaluation of welfare in transport from the farm to the slaughterhouse.

3. Strategies for improving the welfare of farm animals during transport to the slaughterhouse.

4. Sustainability in livestock production.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

167	7	5	5
Activities with private funding	National projects	European projects	Other projects

Technology transfer

27	52	20	8	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

* Información compartida con el programa de Nutrición Animal durante 2017

Featured project

Animal welfare and economic viability in intensive pig and bovine production facilities.

The general objective of this project is to generate knowledge that will help Spanish pig and bovine producers to overcome challenges related to animal welfare. In the case of pigs, in which the IRTA participates, the law currently states that all pigs in intensive farming operations must have manipulable material available to express their exploratory conduct and thus reduce the risk of caudophagia and the need to remove their tails. In spite of this, it is difficult to find manipulable materials that meet these objectives and are feasible in practice, especially in warm climates such as the Mediterranean. Specifically, at the IRTA, four different enrichment materials were compared (straw, wood, newspaper and chains). The preliminary results of the project were presented at the first call for the INNOVAC awards, resulting in Roger Vidal's work securing first place.

Starts	Ends	Funding body	Budget	Partners
1/1/2016	31/12/2018	MINECO	60.500€ (IRTA)	IRTA i UAB

Featured Activities

· Evaluation of the welfare of calves after long-distance transport from Scotland to Spain. Identification and characterisation of the main risk factors for the health and welfare of suckling calves in transit from Scotland to Catalonia. This will allow for the development of strategies to optimise this type of transport.

· Training and technical consulting in the AENOR Conform certification audits on animal welfare (based on Welfare Quality®). Implementation of animal welfare certification schemes that cover the animal's entire life cycle from birth to slaughter. In 2017, the implementation of this animal welfare scheme definitively passed from the pilot phase to a fully realised practice in the industry.

· Thematic network in pig breeding for the identification of good practices in health, welfare, specification and quality. The objective of the project is to create a network for the exchange of information on good practices in animal welfare, quality, specification and health, which are currently being carried out in pig farms in the 13 countries participating in the project.

Featured publications

· Carreras, Ricard; Arroyo, Laura; Mainau, Eva; Valent, Daniel; Bassols, Anna; Dalmau, Antoni; Faucitano, Luigi; Manteca, Xavier; Velarde, Antonio. Can the way pigs are handled alter behavioural and physiological measures of affective state?. BEHAVIOURAL PROCESSES. 142, pp. 91 - 98. ELSEVIER SCIENCE BV, 01/09/2017. ISSN 0376-6357, ISSN 1872-8308

· Dalmau, Antoni; Mainau, Eva; Velarde, Antonio. Reliability of Fear Assessment in Growing Pigs Exposed to a Novel Object Test in Commercial Conditions. JOURNAL OF APPLIED ANIMAL WELFARE SCIENCE. 20 - 3, pp. 280 - 288. ROUTLEDGE JOURNALS, TAYLOR & FRANCIS LTD, 01/01/2017. ISSN 1088-8705, ISSN 1532-7604

· Casal, N., Manteca, X., Escribano, D., Cerón, J.J., Fàbrega, E. (2017). Effect of environmental enrichment and herbal compound supplementation on physiological stress indicators (chromogranin A, cortisol and tumor necrosis factor-α) in growing pigs. Animal, 11 (7), 1228-1236, doi: 10.1017/S1751731116002561

· Arikan F, Martinez T, Sanchez A, Campos M, Esteves M, Gandara D, Rodríguez A, Castro C, Dalmau A, Tibau J, Sahuquillo J. 2017. Development of a new experimental model of Malignant ischaemic stroke in porcine model. A proof of concept study. Plos one, 12. e0172637

· Valent, Daniel; Arroyo, Laura; Pena, Raquel; Yu, Kuai; Carreras, Ricard; Mainau, Eva; Velarde, Antonio; Bassols, Anna. Effects on pig immunophysiology, PBMC proteome and brain neurotransmitters caused by group mixing stress and human-animal relationship. PLOS ONE. 12 - 5, PUBLIC LIBRARY SCIENCE, 05/05/2017. ISSN 1932-6203

Comparative molecular physiology

Director: Joan Cerdà

Producción Animal

2 Researchers

1 Support Staff

1 Students

Keywords
Gametogenesis
Spermatozoa
Oocyte
Water and ion channels
Cellular preservation
Cryopreservation
Reproduction control
Biotechnology

The main task of this emerging group is to study the molecular basis of the formation and function of gametes (germinal cells) in order to develop biotechnological inventions for animal production and conservation biology. The current lines of research: (i) Comparative studies on the evolution, structure and function of aquaporins and ion channels in female and male gametes; (ii) Development of new biotechnological methods based on aquaporins for cell preservation; and (iii) Molecular endocrinology of spermogenesis and hormonal control of reproduction in farmed fish.

Related strategic challenges

Intensificación sostenible en un mundo cambiante

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

35	14	8	9
Activities with private funding	National projects	European projects	Other projects

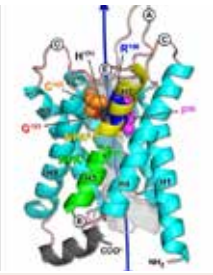
Technology transfer

10	42	57	1	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

* Información compartida con el programa d'Acuicultura durante 2017

Featured project

Water and ion channels as new antioxidant and kinetic markers of sperm quality in marine teleosts (SPERMIOPORIN).



To establish intracellular pathways that regulate the mitochondrial transition of aquaporin-8bb in sea bream spermatozoa, and to identify the type of ion channels present in the spermatozoa and its possible interactions with aquaporins. It also sets out to develop mRNA silencing methods to define the physiological functions of the water and ion channels in motile sperm cells.

Starts	Ends	Funding body	Budget	Partners
29/12/2016	28/12/19	Ministerio de Economía, Industria y Competitividad	229.900 €	Radboud University Medical Center, Universidad de Bergen

Featured Activities

· Research on the role of molecular interactions between aquaporins and ion channels in regulating the motility of fish sperm.

· Development of vaccines against aquaporin-based salmon copepod ectoparasites.

· Development of protocols to increase sperm production in Senegalese sole through recombinant hormones.

Featured publications

· Chauvigné F., Parhi J., Ollé J., Cerdà J. (2017) Dual estrogenic regulation of the nuclear progestin receptor and spermatogonial renewal during gilthead seabream (Sparus aurata) spermatogenesis. Comparative Biochemistry and Physiology Part A 206:36-46.

· Chauvigné F., Ollé J., González W., Duncan N., Giménez I., Cerdà J. (2017) Toward developing recombinant gonadotropin-based hormone therapies for increasing fertility in the flatfish Senegalese sole. PLoS One 12(3):e0174387.

· Cerdà J., Chauvigné F., Finn R.N. (2017) The physiological role and regulation of aquaporins in teleost germ cells. Advances in Experimental Medicine and Biology 969:149-171.

· Fatsini E., Carazo I., Chauvigné F., Manchado M., Cerdà J., Hubbard P.C., Duncan N. (2017) Olfactory sensitivity of the marine flatfish Solea senegalensis to conspecific body fluids. Journal of Experimental Biology 220:2057-2065.

· Eskova A., Chauvigné F., Maischein H.-M., Ammelburg M., Cerdà J., Nüsslein-Volhard C., Irion U. (2017) Gain-of-function mutations in Aqp3a influence zebrafish pigment pattern formation through the tissue environment. Development 144:2059-2069.

Food Technology

Director: Pere Gou

Industrias Alimentarias

13 Researchers

14 Support Staff

3 Students

Group focused on the research and knowledge transfer to the food industries, mainly in meat, dairy, fish, fruit and cereals. The programme carries out research aimed at resolving problems in the sector.

Keywords
New technologies
Process design
Product design
Process control
Efficient energy use
Co-products and byproducts valorization
Pilot test
Industrial upscaling
Quality
Consumers perception

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

La alimentación del futuro

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

84	7	5	6
Activities with private funding	National projects	European projects	Other projects

Technology transfer

14	6	20	1	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

Development of new products from fish farming

The project is aimed at the development of new products, with the collaboration of producers, consumers and experts in innovation, which increase the added value of fish and, therefore, improve the competitiveness of the Spanish aquaculture industry.

Starts	Ends	Funding body	Budget	Partners
Septiembre 2014	Septiembre 2018	INIA	137.760 €	Universidad de las Palmas de Gran Canaria, UNIZAR e IRTA

Featured Activities

· **International Course "Meat Products Technology"**. An exhaustive view of all aspects related to technology, quality and safety of meat and meat products.

· **RF-Cooking of Ham**. Radio frequency technology (RF) is applied to the preparation of cooked ham to reduce processing time, improve quality and reduce energy consumption.

· **SOLTEXJAM**. Characterisation and objective detection of texture defects in cured ham using non-destructive technologies. Development and evaluation of corrective measures.

Featured publications

· Fulladosa, E., Rubio-Celorio, M., Skytte, J.L., Muñoz, I., Picouet, P. (2017). Laser-light backscattering response to water content and proteolysis in dry-cured ham. Food Control, 77:235-242

· Hurtado, A., Guàrdia, M.D., Picouet, P., Jofré, A., Ros, J.M., Bañón, S. (2017) Stabilization of red fruit-based smoothies by high-pressure processing. Part A. Effects on microbial growth, enzyme activity, antioxidant capacity and physical stability. Journal of Science of Food and Agriculture, 97(3): 770-776

· Laguna, L., Picouet, P., Guàrdia, M.D., Renard, C., Sarkar, A. (2017) In vitro gastrointestinal digestion of pea protein isolate as a function of pH, food matrices, autoclaving, high-pressure and re-heat treatments. LWT-Food Science and Technology, 84: 511-519

· Gómez, J., Sanjuán, N., Arnau, J. Bon, J., Clemente, G. (2017) Diffusion of nitrate and water in pork meat: Effect of the direction of the meat fiber. J. Food Engineering, 214: 69-78

· Lazo, O., Guerrero, L., Alexi, N. Grigorakis, K., Claret, A., Pérez, J., Bou, R. (2017) Sensory characterization, physico-chemical properties and somatic yields of five emergint fish species. Food Research International, 100: 396-406.

Product Quality

Director: Maria Font

Industrias Alimentarias

5 Researchers

10 Support Staff

2 Students

Keywords
Carcass
Meat
Qualty
Bioactive Compost
Feeding
Bioconversion
Sustainability

Multidisciplinary group 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, optimising veal curing, evaluating the quality of meat from alternative production systems, and determining functional bioactive compounds in different food matrices and/or in by-products so that they can be used for innovation and improving the quality of other foods.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Suficiencia alimentaria

La alimentación del futuro

Alimentación y salud

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

47	4	4	3
Activities with private funding	National projects	European projects	Other projects

Technology transfer

4	4	22	2	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

Development of new meat products enriched with bioactive algae extracts (ALGAE)

The ALGAE project aims to develop the first fusion food that brings together the benefits of Mediterranean and Japanese diets, developing an innovative meat product with algae to attain healthy and nutritional improvements to compete with existing products on the market.

Starts	Ends	Funding body	Budget	Partners
Septiembre 2016	Agosto 2019	CDTI	1.024.560 €	ARGAL (líder), CEAMSA (consorciada), CTIC-CITA e IRTA (opis)

Featured Activities

· **Nutritional composition, oxidative stability and sensory quality in mountain foal meat.** The objective is to describe the foal meat of the Catalan Pyrenean horse, differentiating a system which provides exclusive access to pasture and suckling, from one that includes a pasture phase and a final fattening diet, both organic and conventional.

· **Oxidative stability in chicken meat.** Lipid oxidation has been studied in the meat of chickens fed with various antioxidant supplements. Chicken thighs were exposed in commercial conditions for 7 days and at the end of this period the level of lipid oxidation was evaluated by quantifying the malondialdehyde formed by the analysis of TBARS.

· **Calibration of porcine carcass classification equipment.** At IRTA there are national experts in the classification of pig carcasses and it is the benchmark centre for establishing the official calibration of the sorting machines to determine lean meat content. In order to carry out the calibration we use computer tomography as a reference. This work is done via contracts with companies or with the MAPAMA.

Featured publications

· Carabús, A., Sainz, R.D., Oltjen, J.W., Gispert, M., Font-i-Furnols, M. (2017). Growth of total fat and lean and of primal cuts is affected by the sex type. Animal 11, 1321-1329.

· Lucas, D., Brun, A., Gispert, M., Carabús, A., Soler, J., Tibau, J., Font-i-Furnols, M. (2017) Relationship between pig carcass characteristics measured in live pigs or carcasses with Piglog, Fat-o-Meat'er and computed tomography. Livestock Science 197, 88-95.

· Borrisser-Pairó, F.,Panella-Riera, N., Gil, M., Kallas, Z., Linares, M.B., Egea, M., Garrido, M.D., Oliver, M.A., (2017). Consumers' sensitivity to androstenone and the evaluation of different cooking methods to mask boar taint. Meat Science 123, 198-204.

· Garrido, M.D., Egea, M., Linares, M.B., Borrisser-Pairó, F., Rubio, B., Viera, C., Martínez, B. (2017). Sensory characteristics of meat and meat products from entire male pigs. Meat Science 129, 50-53.

· Xiberta, P., Boada, I., Bardera, A., Font-i-Furnols, M. (2017). A semi-automatic and an automati segmentation algorithm to remove the internal organs from live pig CT images. Computers and electronics in agriculture, 140, 290-302.

Food Safety

Director: Sara Bover

Industrias Alimentarias

6 Researchers

3 Support Staff

- Students

Keywords
Chemical contaminants
Pathogens
Bioprotective cultures
Shelf life
Emerging Technologies for Food Preservation
Biorefinery
Bioactive Compost
Analytical Methods
Molecular biology
Predictive Microbiology

The Food Safety Programme develops and optimises protocols for the detection, characterisation, extraction and quantification of chemical compounds, both pollutants and of functional importance, whether these are from conventional arrays or alternative sources. It develops and validates analytical methodologies for the detection, quantification, characterisation and molecular typing of micro-organisms. There is a collection of strains of technological (starter cultures), bio-protective (anti-listeria) and functional (probiotics) importance. Conducts research and transfers knowledge to the agri-food sector on the impact of a range of preservation technologies on the quality, safety and shelf life of food through durability studies, challenge tests and predictive microbiology.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Suficiencia alimentaria

La alimentación del futuro

Alimentación y salud

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

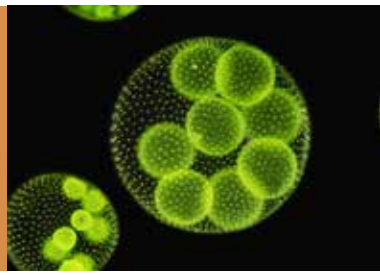
16	2	1	2
Activities with private funding	National projects	European projects	Other projects

Technology transfer

7	4	6	1	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

MICROAL3. Evaluation of the antimicrobial potential (antibacterial and anti-fungal) of extracts and protein hydrolysates from marine biota to be applied to the agri-food sector



Font: University of California Research http://ucre-search.tumblr.com/post/115400071641/training-al-gae-to-do-pretty-much-whatever-we-want

Identification and characterisation of new protein extracts and hydrolysates from marine biota (marine bacteria, microalgae and macroalgae) with antimicrobial activity, for their application to the agri-food sector.

Starts
26/06/2017

Ends
26/06/2020

Funding body
INIA

Budget
110.000€

Partners
Instituto de Productos Naturales y Agrobiología (IPNA-CSIC); Toxicología y Seguridad de Agentes Químicos y Biológicos (TOXIAQBI-UCM)

Featured Activities

· **Reduction of the content of mycotoxins in maize in Catalonia** (Operational Group with ESPORC-Mas Badia). Early detection of fungi and/or mycotoxins derived from Fusarium in the field, using innovative techniques, for rapid and non-invasive determination. Study of predictive models for crop management.

· **Closing gaps for performing a risk assessment on Listeria monocytogenes in ready-to-eat (RTE) foods: activity 2, a quantitative risk characterisation on L. monocytogenes in RTE foods; starting from the retail stage. (Tender EFSA-UCO).** Bibliographical compilation of data and conducting of a quantitative assessment of the risk associated with the presence and growth of Listeria monocytogenes in ready-to-eat foods for the European population, including risk groups. The activity was carried out in conjunction with the University of Cordoba (UCO) and is part of the EFSA-Q-2015-00597 mandate.

· **Rapid methods in food hygiene, safety and quality.** PATT technical workshop, aimed at food company professionals as well as control, quality management and food safety organisations with the aim of updating the knowledge about these methods and their application.

Featured publications

· Bover-Cid, S; Belletti, N; Aymerich, T.; Garriga, M. (2017) Modeling the the impact of water activity and fat content of dry-cured ham on the reduction of Salmonella enterica by high pressure processing. Meat Science 123:120-125

· Stollewerk, K., Cruz, C., Fletcher, G, Garriga, M., Jofré, A. (2017) The effect of mild preservation treatments on the invasiveness of different Listeria monocytogenes strains on Greenshell™ mussels. Food Control 71:322-328

· Ribas-Agustí, A., Seda, M., Sarraga, C., Montero, J.I., Castellari, M. Municipal solid waste composting: Application as a tomato fertilizer and its effect on crop yield, fruit quality and phenolic content. Renewable Agriculture and Food Systems 32(4):358-365

· Bianchi, T., Weesepoel, Y., Koot, A., Iglesias, I., Eduardo, I., Gratacós-Cubarsí, M., Guerrero, L., Hortós, M., van Ruth, S. (2017). Investigation of the aroma of commercial peach (Prunus persica L. Batsch) types by Proton Transfer Reaction–Mass Spectrometry (PTR-MS) and sensory analysis. Food Research International: 99 133–146

· Pérez-Rodríguez F., Carrasco E., Bover-Cid S., Jofré A., Valero A. (2017) Closing gaps for performing a risk assessment on Listeria monocytogenes in ready-to-eat (RTE) foods: Activity 2, a quantitative risk characterization on L. monocytogenes in RTE foods; starting from the retail stage. EFSA Supporting Publications 14(7) EN-1252E.

Integrated Management of Organic Waste

Director: Xavier Prenafeta

Agrosistemas y Medio Ambiente

9 Researchers

10 Support Staff

2 Students

Keywords
Life cycle assessment
Bioenergy
Environmental biotechnology
Environmental pollution
Circular economy
Environmental microbiology
Organic waste management
Agronomic valorization

The Integrated Management of Organic Waste programme is responsible for developing new knowledge and technologies in the field of sustainable management of organic waste in agriculture, livestock breeding and by municipal authorities. It provides a comprehensive view of the problem and provides a cross-disciplinary approach to technological and management solutions.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

41	3	3	5
Activities with private funding	National projects	European projects	Other projects

Technology transfer

16	23	24	-	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

PIONER. Integration of processes for the synthetic oxidation of acetate and autotrophy of ammonium in the anaerobic treatment of nitrogen-rich organic waste for energy monetization

Development of a system for the integrated treatment of meat waste / animal droppings and energy recovery based on (co) anaerobic digestion (biogas). The basis of the process stems from a digester enriched in acetate syntrophic oxidizing bacteria of acetate (SOB). Once the biodegradable organic matter has been eliminated, the liquid fraction of the digestate will be treated in a second partial nitrite reactor / ANAMMOX for the outotrophic elimination of surplus nitrogen. One of the main objectives is that this system can be implemented with compact and autonomous equipment remotely connected to an operator if necessary. Therefore, the equipment must be fitted with sensors and biosensors respectively monitoring chemical parameters and key micro-organisms in the process, and these must be integrated into an efficient control system. According to the available literature, this project represents one of the first implementations of the smart bioreactor concept in environmental biotechnology.

Starts	Ends	Funding body	Budget	Partners
26/06/2017	25/05/2020	INIA	221.000€	IRTA

Featured Activities

· Seminar on “Intelligent agriculture in the sustainability of the primary sector” 02/17/2017, Barcelona.

· Workshop “Empowering Women Farmers with Agricultural Business Management (EMWOFA)”. Training through collaboration with EMWOFA. 09/05/2017, Caldes de Montbui.

· Workshop “Food, Agriculture and Water: the analysis of life cycles as a means towards sustainability”. 17/05/2017, Barcelona.

Featured publications

· A review on the practice of big data analysis in agriculture. By: Kamilaris, Andreas; Kartakoullis, Andreas; Prenafeta-Boldu, Francesc X. COMPUTERS AND ELECTRONICS IN AGRICULTURE Volume: 143 Pages: 23-37 Published: DEC 2017

· Effectiveness of a full-scale horizontal slow sand filter for controlling phytopathogens in recirculating hydroponics: From microbial isolation to full microbiome assessment. By: Prenafeta-Boldu, Francesc X.; Trillas, Isabel; Vinas, Marc; et al. SCIENCE OF THE TOTAL ENVIRONMENT Volume: 599 Pages: 780-788 Published: DEC 1 2017

· Startup of Electromethanogenic Microbial Electrolysis Cells with Two Different Biomass Inocula for Biogas Upgrading. By: Cerrillo, Miriam; Vinas, Marc; Bonmati, August. ACS SUSTAINABLE CHEMISTRY & ENGINEERING Volume: 5 Issue: 10 Pages: 8852-8859 Published: OCT 2017

· A Metal-Free and Biotically Degradable Battery for Portable Single-Use Applications. By: Esquivel, Juan Pablo; Alday, Perla; Ibrahim, Omar A.; et al. ADVANCED ENERGY MATERIALS Volume: 7 Issue: 18 Article Number: UNSP 1700275 Published: SEP 20 2017

· Biochar to reduce ammonia emissions in gaseous and liquid phase during composting of poultry manure with wheat straw. By: Janczak, Damian; Malinska, Krystyna; Czekala, Wojciech; et al. WASTE MANAGEMENT Volume: 66 Pages: 36-45 Published: AUG 2017

Aquatic Ecosystems

Director: Nuno Caiola

Agrosistemas y Medio Ambiente

- **6** Researchers
- **6** Support Staff
- **4** Students

Keywords
Agrosystems and coastal ecosystems
Invasive species
Integrated river basin management
Mitigation and adaptation to climate change
Nature-based solutions and ecosystems management

The Aquatic Ecosystems programme is devoted to the study of the impact of climate change on Mediterranean coastal and continental aquatic ecosystems in order to develop effective adaptation and mitigation strategies. It carries out research into the sustainable management of water resources, fishery resources and the interactions between agriculture, climate change and biodiversity. It also researches the conservation of ecosystems and preservation of their services and environmental values.

Related strategic challenges

Intensificación sostenible en un mundo cambiante

Projects and contracts

11	3	2	-
Activities with private funding	National projects	European projects	Other projects

Technology transfer

5	1	-	-	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

LIFE EBRO ADMICLIM - Pilot project for mitigation measures and adaptation to climate change in the Ebro Delta

New strategies for the adaptation to the loss of elevation with respect to sea level and the regression of coastal wetlands and rice fields in the Ebro Delta, a region highly vulnerable to rising sea levels.

Starts
juny 2014

Ends
juny 2018

Funding body
Unió Europea (Programa LIFE +)

Budget
2.260.960 €

Partners
Institut de Recerca i Tecnologia Agroalimentàries (IRTA) (coordinador); Agència Catalana de l'Aigua (ACA); Consorci Concessionari d'Aigües per als Ajuntaments i Indústries de Tarragona (CAT); Comunitat de Regants del marge esquerra (CRSAE); Institut Cartogràfic i Geològic de Catalunya (ICGC); Oficina Catalana del Canvi Climàtic (OCCC); Universidad de Córdoba (UCO).

Featured Activities

· **RISES-AM- Responses to coastal climate change: Innovative Strategies for High End Scenarios -Adaptation and Mitigation.** Effects of climate change on the planet's coastal regions. The Ebro Delta as a case study. EU-funded project.

· **Monitoring and adjustment of environmental indicators and ecological state of the lower stretch of the Ebro river and its delta.** Project financed by the Catalan Water Agency [Agència Catalana de l'Aigua].

· **Control of the apple snail in the Ebro Delta.** The apple snail is an invasive species that causes serious environmental impacts and impairs the cultivation of rice. Project funded by DARP and FEADER.

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.

· Martínez-Eixarch, M., Curcó, A., & Ibáñez, C. (2017). Effects of agri-environmental and organic rice farming on yield and macrophyte community in Mediterranean paddy fields. Paddy and Water Environment, 15(3), 457-468.

· Prado, P., Alcaraz, C., Jornet, L., Caiola, N., & Ibáñez, C. (2017). Effects of enhanced hydrological connectivity on Mediterranean salt marsh fish assemblages with emphasis on the endangered Spanish toothcarp (Aphanius iberus). PeerJ, 5, e3009.

· Pont, D., Day, J. W., & Ibáñez, C. (2017). The impact of two large floods (1993–1994) on sediment deposition in the Rhône delta: Implications for sustainable management. Science of The Total Environment, 609, 251-262.

· Trobajo, R., Mann, D. G., Li, C., Sato, S., Rimet, F., Rovira, L., & Witkowski, A. (2017). A four-gene approach to the bacillariaceae: establishing a framework for classifying a highly diverse and taxonomically difficult diatom group. Phycologia, 56(4), 187.

Urban and Peri-urban Agriculture

Director: Juan Ignacio Montero
(hasta el 30 de Octubre de 2017)

Agrosistemas y Medio Ambiente

- **3** **Researchers**
- **3** **Support Staff**
- **1** **Students**
  Estudiante máster
- **1** **Formación compartida**
  con ICTA

Keywords
Water management
Fertilizer management
Environmental impact assessment
Ecosystem services

The group aims to contribute to the development of urban and periurban agricultural systems integrated into the metabolism of the city as drivers of innovation. The research is focused on the sustainable production of healthy foods at different levels: outdoor production in soil and substrates, on the roofs of buildings in the open air and in greenhouses. Upholding at all times the premise that resources are used in the best possible way to be more efficient and have the smallest possible environmental impact.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Suficiencia alimentaria

Alimentación y salud

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

15	3	4	3
Activities with private funding	National projects	European projects	Other projects

Technology transfer

1	11	-	-	-
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

FertileCity II. Greenhouses on roofs: symbiosis of energy, water and CO2 emissions with the building. Towards urban food safety in a circular economy

The project aims to demonstrate the feasibility of producing food in greenhouses erected on buildings as a means of attaining food security and quality and its role in more sustainable cities, within the framework of a green and circular economy.

Starts	Ends	Funding body	Budget	Partners
30/6/2016	29/12/2019	MINECO	78.650€ IRTA	ICTA, UPC, IRTA

Featured Activities

· Life Enrich: Improvement of the recovery of nitrogen and phosphorus from waste water and their integration in the value chain. (LIFE16 ENV/ES/000375). The aim is to improve the recovery of nutrients in urban waste water treatment plants and to exploit these nutrients in agriculture.

· Farmitank (CDTI, we have been outsourced). Description: Development of a prototype for the production of lettuce in hydroponic cultivation

· Urban Gardens on roofs of the buildings of the Institute of Disabled Persons (IMPD in its Catalan initials) and at the Sants District Hall. Application of horticultural production technology in orchards situated on the roofs of public buildings. The maintenance of orchards is carried out jointly with staff from the occupational workshops of the IMPD of Barcelona City Council.

Featured publications

· Ercilla-Montserrat M, Izquierdo E, Belmonte J, Montero JI, Muñoz P, De Linares C, Rieradevall, 2017. Buildins-integrated agriculture: a first assessment of aerobiological air quality in rooftop grennhouses (i-RTGs). Science of the Total Environment, 598: 109-120.

· Sanyé-Mengual E, Iliver-Solà J, Montero JI, Rieradevall J, 2017. The role of interdisciplinarity in evaluating the sustainability of urban rooftop agriculture. Future of Food:Journal on Food, Agricultura and Society 5(1):46-58.

· Montero JI, Baeza E, Muñoz P, Sanyé-Mengual E, Stanghellini C. 2017. Techology for Rooftop Greenhouses. In: F. Orsini et al. Eds. Rooftop Urban Agriculture. Springer International Publishing.

· Vicente-Serrano SM, Zabalza-Martínez J, Borràs G, López-Moreno JI, Pla E, Pascual D, Savé R, Biel C, Funes I, Martín-Hernández N, Peña-Gallardo M, Beguería S, Tomás-Burguera M. 2017. Effect of reservoirs on streamflow and river regimes in a heavily regulated river basin of Northeast Spain. Catena 149: 727-74. DOI: 10.1016/j.catena.2016.03.042.

· Vicente-Serrano SM, Zabalza-Martínez J, Borràs G, López-Moreno JI, Pla E, Pascual D, Savé R, Biel C, Funes I, Azorín-Molina C, Sánchez-Lorenzo A, Martín-Hernández N, Peña-Gallardo M, Alonso-González E, Tomás-Burguera M, El Kenawy A.. 2017. Extreme hydrological events and the influence of reservoirs in a highly regulated river basin of northeastern Spain. Journal of Hydrology: Regional Studies, 12: 13-32.

Sustainable Field Crops

Director: Fanny Álvaro

Agrosistemas y Medio Ambiente

6 Researchers

13 Support Staff

3 Students

Keywords
Cereals
Rice
Plant breeding
Plant ecophysiology
Adaptation
Sustainable management

The Sustainable Field Crops programme aims to contribute to the scientific knowledge and economic and environmental sustainability of agri-ecosystems based on herbaceous species of large crops through research and innovation in the fields of genetic plant improvement and agronomy.
The main lines of research are aimed at understanding the adaptation mechanisms of cereals to the main abiotic stressors typical of Mediterranean environments in order to be able to incorporate them into the new plant material; develop new genetic tools (genomics and phenomics) that make it possible to increase efficiency in the improvement that yields new varieties which are more productive, of better quality and more resilient; increase efficiency in the use of resources and study more efficient and environmentally friendly crop-raising practices which also improve productivity.
An important part of the activity is carried out in conjunction with the sector at large through improvement programmes to obtain new varieties of cereals, evaluate the behaviour of new crop varieties, and technology transfer.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Suficiencia alimentaria

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

40	10	1	15
Activities with private funding	National projects	European projects	Other projects

Technology transfer

46	1	5	19	1
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

Featured project

W3B-PR-18-Turkey. Addressing the challenges of climate change for sustainable food security in Turkey, Iran and Morocco through the creation and dissemination of a database to promote the use of genetic resources of wheat and increase genetic yields.

Through a multidisciplinary approach, the aim is to transfer and implement genetic technologies that facilitate the development and adoption of wheat germplasm adapted to climate change in order to guarantee sustainability and improve food security in Turkey, Iran and Morocco.

Starts	Ends	Funding body	Budget	Partners
10/03/2016	09/03/2019	UE, 3rd call of Proposals to the Benefit-Sharing Fund FAO	500.000 €	9

Featured Activities

· **NEURICE.** New commercial European rice (Oryza sativa) carrying alleles for tolerance to salinity in order to protect rice production from climate change and the invasion of the apple snail (Pomacea insularum)

· **PHENOFITTING.** The allelic constitution for genes responsible for phenological adaptation as a strategy to minimise the environmental limitations of wheat yield. Case studies in target environments in both hemispheres.

· **MAS2WHEAT.** Tools for marker-assisted selection in wheat improvement programmes on a national and international scale: adapting to climate change and industrial quality.

Featured publications

· Royo C, Ammar K, Alfaro C, Dreisigacker S, García del Moral LF, Villegas D. (2017). Effect of Ppd-1 photoperiod sensitivity genes on dry matter production and allocation in durum wheat. Field Crops Research (Available on-line). doi: 10.1016/j.fcr.2017.06.005

· Soriano JM, Malosetti M, Roselló M, Sorrells ME, Royo C (2017) Dissecting the old Mediterranean durum wheat genetic architecture for phenology, biomass and yield formation by association mapping and QTL meta-analysis. PLoS ONE, 12(5): e0178290. doi: 10.1371/journal.pone.0178290

· Soriano JM, Villegas D, Sorrells ME, Royo C (2018) Durum wheat landraces from east and west regions of the Mediterranean Basin are genetically distinct for yield components and phenology. Frontiers in Plant Science (Available on-line). doi: 10.3389/fpls.2018.00080

· Lopes MS, Royo C, Alvaro F, Sanchez-Garcia M, Ozer E, Ozdemir F, Karaman M, Roustaii M, Jalal-Kamali MR, Pequeno D. (2018). Optimizing winter wheat resilience to a changing environment in rain fed crop systems of Turkey and Iran. Frontiers in Plant Science (In press).

· Royo C, Soriano JM, Alvaro F. (2017). Wheat: a crop at the bottom of the Mediterranean diet pyramid. In: Fuerst-Bjelis B (Ed.) Mediterranean Identities. Environment, Society, Sulture. InTech. DOI: 10.5772/66587.

Agri-Food Economics

Director: José Maria Gil

Economía Agroalimentaria

10 Researchers

8 Support Staff

4 Students

Keywords
Information systems
Food waste
Consumer behaviour
Value chain
Sustainability
Impact assessment
Agri-food economics
Development
Natural resources

The main objectives of the Agricultural Economics programme are to promote research work and provide technical assistance 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 among the food industry, the region and the 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.

Related strategic challenges

Fortalecer el sistema agroalimentario catalán

Intensificación sostenible en un mundo cambiante

Tecnologías para la innovación en la cadena agroalimentaria

Projects and contracts

12	2	6	3
Activities with private funding	National projects	European projects	Other projects

Technology transfer

2	21	40	12	3
Technical seminars	Scientific papers	Communications and posters	Technical and broadbased articles	Thesis

* información completada con actividad CREDA

Featured project

Analysis of the impact of the IRTA's activity on society

The objective of the project is to determine the impact on society of the agri-food research and innovation carried out by IRTA. The project has been planned in two phases. In the first phase, there will be an analysis of the trend of productivity in the Catalan agricultural system and the specific contribution of the IRTA's research thereto. Methodologically, similar techniques are applied to those carried out by other research institutions, for comparative purposes. The results of this first phase have shown a profitable social return on R&D investments ranging from 15 to 28% per year, depending on the delay structure and the real interest rate. In the second stage, through the methodology of case studies, the multidimensional (economic, social, political and environmental) impact of IRTA in Catalonia will be determined.

Starts	Ends	Funding body	Budget	Partners
01/07/2016	31/07/2019	IRTA	-	CREDA

Featured Activities

· **VINOVERT:** EU-financed project (Interreg SUDOE) which aims to strengthen the competitiveness of companies in the wine industry in the south-western region of Europe. There will be an evaluation of the market's receptiveness regarding environmental and health guarantees and the options of reducing inputs in operations and the cellar.

· **Strength2Food (Strengthening European Food Chain Sustainability by Quality):** EU-financed project (H2020) whose objective is to evaluate the impacts, the exchange of knowledge and the possibility of reporting the formulation of policies on sustainable food chains

· **REFRESH:** EU-financed project (H2020) in order to prevent food waste throughout the food product value chain, from production to the final consumer.

Featured publications

· Escobar C., Kallas Z., and Gil J.M. (2017). "Consumers' Wine Preferences in a Changing Scenario". British Food Journal. Accepted article. Available online.

· Varela, E., Jacobsen, J.B., Mavsar, R. (2017). Social demand for multiple benefits provided by Aleppo pine forest management in Catalonia, Spain. Regional Environmental Change 17(2): 539-550

· Ait Sidhoum, A., Serra, T., (2017). Corporate social responsibility and dimensions of performance: An application to U.S. electric utilities. Util. Policy 48, 1–11. doi:10.1016/j.jup.2017.06.011

· Romo-Muñoz, R., Cabas-Monje, J., Garrido-Henrríquez, H., GIL. J.M., (2017). Heterogeneity and nonlinearity in consumers' preferences: An application to the olive oil shopping behavior in Chile. PLOS ONE, 12(9) Doi: 10.1371/journal.pone.0184585

· Hassouneh, I., Serra, T., Bojnec, S., GIL, J.M., (2017). Modelling price transmission and volatility spillover in the Slovenian wheat market. Applied Economics, 49 (41), 4116-4126. Doi: 10.1080/00036846.2016.1276273 co-expression networks and eGWAs analyses highlighted candidate regulators implicated in lipid metabolism in pigs. Scientific Reports 7, Article number: 46539. doi: 10.1038/srep46539.

· Article 5: Ramayo-Caldas Y., Ballester M., Sánchez J.P., González-Rodríguez O., Revilla M., Reyer H., Wimmers K., Torrallardona D., Quintanilla R. 2018. Integrative approach using liver and duodenum RNASeq data identifies candidate genes and pathways associated with feed efficiency in pigs. Scientific Reports 8, Article number: 558. doi: 10.1038/s41598-017-19072-5.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