Areas of expertise

Food industry area

Carcass and meat quality

Objectives

1. Non-invasive modelling of animal growth to produce meat cuts oriented to market requirements.

   Evaluation and classification of carcasses and their cuts.

2. Improving the quality and shelf-life of fresh meat and meat products from different species through production, handling and post mortem treatment strategies.

   Understand consumer perceptions and societal demands to drive meat production.

Infraestructures and tools

- Slaughterhouse
- Cutting room
- Cooling chambers
- Ageing chambers
- Mobile computed tomography

Specific Points

1. Determining the composition of carcasses according to diet, sex or genetics directly in the animal or slaughter line.
2. Characterizing and improving meat obtained from animals from different production systems in terms of technological, nutritional and sensory quality.
3. Knowing and optimizing the ageing process of meat to enhance its value.
4. Extending the shelf life of meat and meat products to adapt it to market needs.
5. Calibration of carcass and cuts on line classification devices.
6. Modeling animal growth in a non-invasive way to achieve meat cuts oriented to market requirements.

Microbiology

Objectives

1. Identification of niches and sources of contamination by characterizing the microbiota of ingredients, foods, equipment and facilities.
2. Study of the impact of processing technologies and biopreservation strategies to improve food safety and extend the shelf-life of perishable foods.

Infraestructures and tools

- Laboratories (BSL2)
- Pathogen pilot plant (BSL2)
- Classical techniques and challenge tests
- Molecular techniques (PCR, omics, sequencing)
- Predictive microbiology and decision support tools

Specific Points

1. Validation of technologies and processes as control measures for the elimination of pathogenic and spoilage microorganisms.
2. Determination of shelf-life and hygiene, formulation, processing and preservation strategies for its extension.
3. Metagenomic study of microbial communities and their implication in spoilage, fermentation and bioconversion processes.
4. Pathogen typing for the identification, prevention and elimination of sources of contamination.
5. Selection and implementation of starter, bioprotective (anti-Listeria) and probiotic cultures.
6. Support for the design and implementation of food safety management systems (hygiene, disinfection, HACCP, microbiological risk assessment).

Process technology

Objectives

1. Development of Innovative Foods.
2. Valorisation of subproducts and coproducts.
3. Optimisation of technological processes including sustainability.

Infraestructures and tools

- Preservation technologies: packaging, thermal technologies (RF, MW, UHT, autoclave), drying technologies (PSD) and HPP.
- Other technologies: high and low moisture extrusion, membrane separation and concentration, decanter...
- Multi-product processing pilot plants.
- Quality control laboratories.

Specific Points

1. To address the legislative requirements in terms of food formulation, labelling, etc.
2. To develop strategies to improve the nutritional and sensory profile of food ensuring food safety.
3. To characterise, to model and to evaluate the sustainability of new processing technologies (HPP, RF, PSD) in different types of food.
4. Developing plant-based beverages and food analogues of animal origin.
5. Partnering food companies to improve their competitiveness.
6. **Specialised training:**
   International course in meat products technology, International course in dry cured meat products and Course in Dairy products technology, among others.

IRTA Institute of Agrifood Research and Technology

Generalitat de Catalunya
Government of Catalonia

Areas of expertise

Food industry area

Sensors and modelling

Objectives

1. Development and application of new solutions based on the use of sensors and mathematical modelling to optimise production processes considering quality and food safety criteria.
2. Increase and catalyse the digital transformation of the food industry in order to increase their efficiency and sustainability.

Infraestructures and tools

Laboratory of non-destructive sensors:

- Mobile unit of Computed Tomography
- Infrared and microwave spectrometry
- Hyperspectral imaging
- Low-cost sensors

Programs for the analysis and development of control algorithms and predictive models.

Food production pilot plant for the in-line implementation of sensors and algorithms.

Specific Points

1. Prediction of food behaviour during processing and conservation.
2. Identification of the most convenient sensors for the in-line control and process digitalisation.
3. Production process parameterisation and development of optimization algorithms considering quality, food safety and/or sustainability criteria.
4. Use of Artificial Intelligence to find management and product solutions.

Biorefinery and bioactive compounds

Objectives

1. Agrifood co-/byproducts valorisation by means of green chemistry and bioconversion, biorefinery and zero residue strategies.

   Development of extraction, purification, characterization and functionalization processes to obtain ingredients for human and animal nutrition.
2. Investigation of new sustainable protein sources.

   Implementation of strategies to improve circularity and sustainability of the food systems.

Infraestructures and tools

Microwave oven, Ultrasounds

Analytical Chromatography Lab

Rheometer, NIR, Circular Dichroism

"Pulse Spray Drying"

Pilot plant for ingredient processing

Membrane filtration equipment

Specific Points

1. Agrifood co-/byproducts valorisation by means of biopreservation and/or, biorefinery strategies.
2. Obtention of protein-rich fractions with high nutritional and technological value from alternative biomasses (algae, insects, microorganisms)
3. Production of protein concentrates and isolates with technological functionality from vegetal raw materials for the development of meat and dairy analogues and new food concepts.
4. Obtention and characterization of extracts, bioactive compounds (e.g., antimicrobials, antioxidants, etc.) and compounds with technological functionality (natural pigments) to develop innovative foods (clean label, nutritionally improved, etc.)

Sensory and consumer science

Objectives

1. Study and understand consumer demands, needs, and behavior.

   Develop new products and optimize existing ones.

   Design effective communication strategies.
2. Evaluate and optimize the sensory characteristics of food products by adapting them to consumer preferences.

Infraestructures and tools

Consumer Neuroscience Laboratory:

- Eye tracking
- Electroencephalography (EEG)
- Heart rate monitoring
- Skin conductance response
- Facial expression analysis

Specific Rooms for Creative Sessions and Consumer Studies.

Equipment for Virtual and Reconstructed Reality.

Trained and Experts Sensory Panels.

Sensory Testing Room (UNE-EN ISO 8589-2010).

Specific Points

1. Design and application of co-creation methodologies, concept testing, sensory optimization processes, and product testing.
2. Measurement of the rational and emotional consumer response (explicit and implicit measures).
3. Analysis of the impact of context. on consumer behavior (virtual reality and immersive reality).
4. Benchmarking.

IRTA Institute of Agrifood Research and Technology

Generalitat de Catalunya
Government of Catalonia