


Food Quality and Sensory Science department


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Agriculture and Food Development Authority

OUR VISION

To be to be recognised nationally and internationally for innovative, world-leading research of fresh and processed foods.

OUR OBJECTIVE

To maximise our research capability in **innovative processing, ingredient interactions** and **product matrices**, underpinning the development of **healthier**, **targeted** foods with improved product **quality** and optimised **sensory** attributes.




OUR STAFF

Staff	Number
Permanent researchers	7
Permanent technologist	1
Permanent craft butcher	1
Contract research officers	8
Post-doctoral researchers	5
Contract technicians/technologists	4
Hosted researchers	3
Walsh Fellows	19
TOTAL	**48**

- **38 projects**
- **43 publications (2017)**



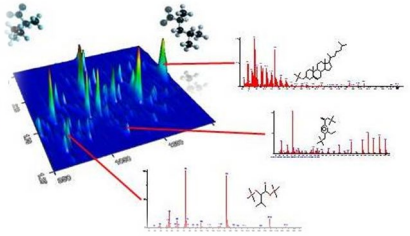

OUR RESEARCH PROGRAMME

- **Meat research**
  - Enhancing, controlling, predicting meat quality
  - Innovative, convenient, healthier meat products
  - Recovery of value from meat processing streams

- **Sensory science**
  - Flavour perception
  - Flavour chemistry and sensometrics
  - Consumer profiling
  - Texture perception / food oral processing

- **Cereal and bakery science**
  - Flour chemistry and rheology
  - Gluten-free science
  - ‘Healthy’ breads and snacks

- **Food structure**
  - Virtual reality / internal food structure
  - Immersive augmented reality

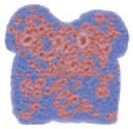


OUR FACILITIES

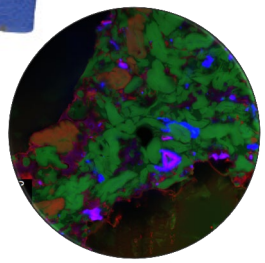
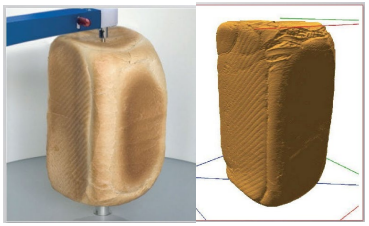
- Meat industrial development unit
- On-site slaughter plant
- Pilot-scale processing equipment
- Meat science and quality labs



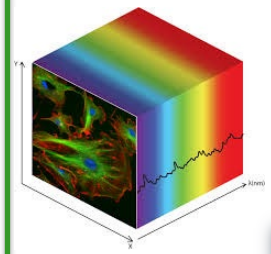
- Sensory science suite
- Flavour chemistry suite

- Grain milling lab
- Test bakery
- Cereal rheology lab


- Spectroscopy, imaging and immersive imaging capability




OUR COLLABORATIONS

Within Teagasc:

- Crops, Environment and Land Use Programme
- Animal and Grassland Programme
- Rural Economy and Development Programme

Nationally:

Internationally:

Key research challenges and drivers for our research programme - the current global vision

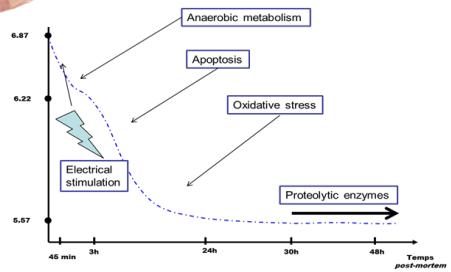
- Innovative product/processing technologies; specialised expertise, product quality, indigenous interactions, sensory and consumer acceptance

- Co-ordination between industry, state agencies and research institutions; supporting delivery of research; commercial outputs and products

- World-leading talent, facilities, collaborations

Key areas of our meat research programme

- Predictive technologies and carcass grading techniques
- Muscle biochemistry, molecular biology, proteomics, metabolomics
- Meat tenderness management



Optimising, predicting and enhancing meat quality

- Products for targeted cohorts: elderly, athletes
- Cleaner label & healthier products: reduced salt, phosphate, fat
- Food matrix, structure, physico-chemistry

Healthier, innovative, meat and meat products

clean label

Novel process technologies

Recovery of value from meat co-products

- Accelerated processing and enhanced extraction
- Improved product quality
- Minimal processing and clean label

- Higher value opportunities for functional proteins
- Promoting more efficient use of co-products and side streams
- Food and non-food (biomedical, materials) applications

Key areas of our sensory science and flavour chemistry research programme

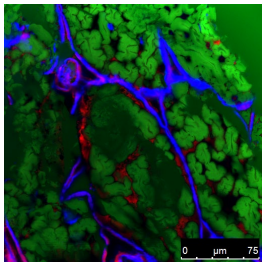
- Applying traditional and rapid sensory techniques to investigate sensory quality of foods.
- Combining sensory, flavour chemistry, rheology and composition data to better understand consumer food and beverage choices.
- Cross cultural programme to understand international sensory perception of meat and dairy products.
- Identifying biomarkers in dairy products, meat and beverages for use in authentication, traceability and marketing.
- Developing methods in lipid oxidation and fatty acid quantification.
- Using novel augmented and virtual reality technologies to better understand dynamics of human sensory perception.

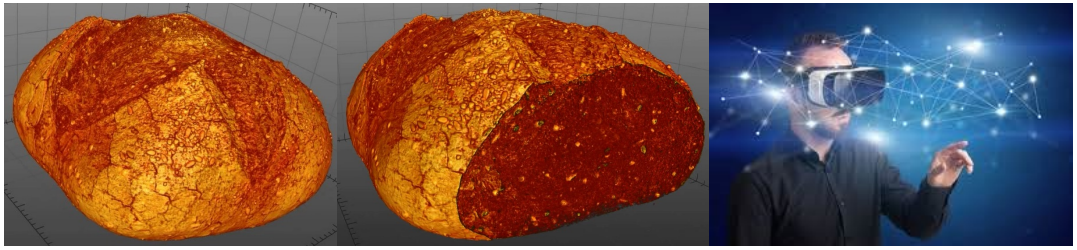


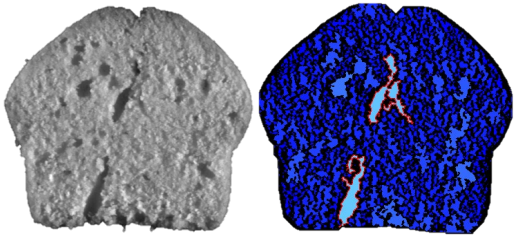

Sensory Food Network Ireland
good food, good sense, good science

Key areas of our cereal and bakery research programme

- Fundamental and applied research on the links between ingredient structures and interactions and baked product functionality.
- Studying the kinetics of crumb staling and mechanical properties of baked and extruded products.
- Extrusion processing of novel ingredient blends for new snack formulations.
- Rheology and structure of targeted products e.g. gluten-free, low FODMAP products.



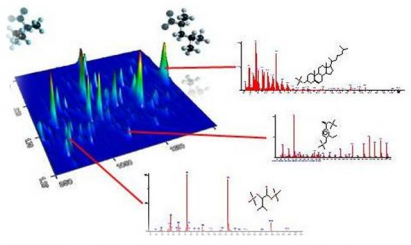







Scientific highlights/impacts and contribution to food programme objectives



1. Underpinning innovation, diversification, quality and competitiveness in food products

SENSORY SCIENCE / FLAVOUR CHEMISTRY

Inter-department and inter-programme

- Co-ordinate first national network of excellence in sensory science, on the board of E3S, hosted international conference.
- New sensory science suite.

- 3 trained expert sensory evaluation panels in place; profiled 2,300 animals for sensory quality in 1 year, possibly largest known genetic sensory study in the world. (A national index being launched).
- Consumer sensory trial at Teagasc has contributed to the global MSA eating quality database.
- Cross-cultural programme.
- 35 companies undertaken sensory training
- Flavour chemistry unit provided services to 20 national/international companies, generated an income of €183,110.
- Editor choice awards in flavour chemistry.


J. Dairy Sci. 101:1034–1047
https://doi.org/10.3168/jds.2017-13141

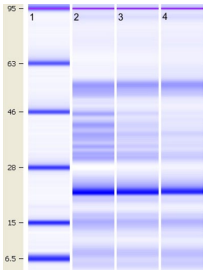
Effect of different forage types on the volatile and sensory properties of bovine milk

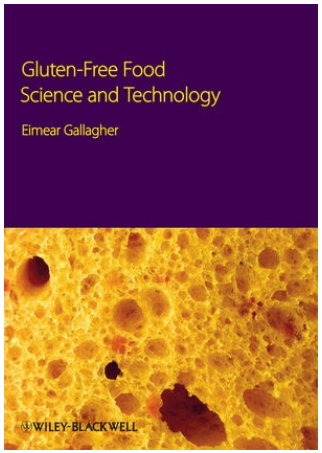
Hope Faulkner,*† Tom F. O'Callaghan,* Stephen McAuliffe,‡§ Deirdre Hennessy,§ Catherine Stanton,' Maurice G. O'Sullivan,† Joseph P. Kerry,† and Kieran N. Kilcawley*[1]

Sensory Food Network Ireland
good food, good sense, good science

2. Underpinning innovation, diversification, quality and competitiveness in food products

Structure and function relationships applied to targeted foods





- **Gluten-free:**

New aerated structures formed, protein crosslinking.

Re-formulated using bioprocessing.

Published first dedicated GF book, >1000 copies, sit on GF panel

Commercialisation of research for export market.

Radio/TV segments.

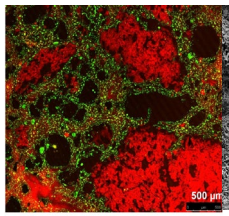
- **New meat structures:**

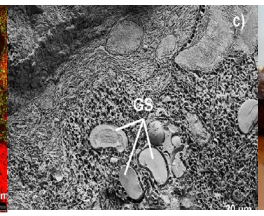
Food matrix and DOE approach: developing improved quality, healthier and targeted meat products.

Developed fortified comminuted products (~30g protein in 75g portion) and improved textured steak products with sensory characteristics accepted by older consumers.

Power ultrasound and pulsed electric fields for accelerated processing and improved meat product quality.

Publications: 45





3. Promoting valorisation and profitable utilisation of waste streams

- ❑ **Extracting value from low/neutral or negative value bovine and porcine co-products**
- ❑ **Extracting value from by-products of brewing, fruit processing and cider production**

Revalue PROTEIN


Small food producers urged to think big

Teagasc are very good at what they do. People need to use them more, and Teagasc need to get out there more and work with the industry.

- >€3.1 million funding.
- 1 patent filed, 1 prepared.
- Nominated for 2 Invention of the Year awards.
- 50 peer-reviewed publications.
- 3 IDFs generated.
- 4 keynote lectures.
- Scale up of selected product lines successfully completed, methods transferred.
- Further industry and EU funding pending.

4. Increasing efficiencies in primary processing
Animal breeding, meat quality and carcass classification

- Leading role in designing and supporting the ICBF meat quality analysis programme.
- Working towards accurate Irish beef meat quality breeding indices.
- Funding (€1.1m) established meat quality database (1,000 records), spectroscopy and chemometric models and genomics datasets using progeny of key Irish industry sires, paved way to MTI Pillar 1.
- MTI sensory data is being generated through sensory science programme.
- 2017 World's Most Highly Cited List for contribution in imaging, spectroscopy and chemometrics applied to meat quality and food authenticity and quality.
- EU Expert Groups on 'classification of beef and pigmeat' and 'the monitoring of water content in poultry'.
- Obtained 2017 EU Commission approval of 4 devices for Irish pig carcass classification.

FUTURE STRATEGIC PRIORITIES

- **Key transformative technologies**
  - International first in food immersive technologies and biometric techniques.
  - New technologies in food processing.
- **Implicit/explicit emotional sensory research**
- **Zero waste**
  - Continued leadership on co-products research.
- **Food for nutrition and health**
  - Specific structures for targeted cohorts.