Special Edition:
Research and Innovation

Food
Programme

Technology

Portfolio

Prepared Consumer Foods




UCC / Teagasc
Food Innovation Alliance

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Agriculture and Food Development Authority

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Coláiste na hOllscoile Corcaigh, Éire
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Teagasc is delighted to present a Special Edition of its Technology Portfolio which focuses on our capability and expertise in Prepared Consumer Foods, research and innovation. It is well accepted that innovation is a key driver of economic growth and our ambition is that Teagasc will continue to support science based innovation in the Irish food processing sector. This edition also showcases our strategic alliance with University College Cork in this regard.

The UCC-Teagasc Food Innovation Alliance seeks to understand the technical needs of the Irish food sector and ensure that our combined competencies in food technology are fully accessible to the industry.

This Special Edition concisely describes our current technologies, capabilities, services and expertise relating to the prepared consumer foods sector in one discreet volume. Our combined technology transfer strategy takes into account the many different forms of technology and knowledge support "gateways" by which companies can engage with us. These include collaborations or contract research agreements, commercial service arrangements, industry training programmes, student placements and consultancy projects.

Central to these activities are mutual trust, credibility, confidentiality, clear business objectives and high quality customer relationship management. We value our extensive industry interactions and have stringent policies regarding IP management, contract agreements and confidentiality.

We look forward to assisting your enterprise in expanding its innovation potential, growing new markets and becoming more competitive.

Details of the main contact of each of these "gateways" are given at the bottom of each page but do not hesitate to contact me directly if you have any queries.

Declan J. Troy
Assistant Director of Research and
Head of Technology Transfer, Teagasc

Portfolio

Technology for the Prepared Consumer Foods Industry

Updates

Main highlights from Teagasc and UCC food research projects focusing on key prepared food technologies at various stages of development.

Expertise

Concise overviews of our high specification technical equipment and pilot plant facilities.

Services

Our main technical and specialist food services offered to the preapred consumer foods industry.

Profiles

Profiles of our staff detailing their expertise and highlighting the role they can play in providing solutions and/or opportunities for food companies.

Offers

Summaries of available technology owned or part-owned by Teagasc that are currently open to potential users.

UCC / Teagasc
Food Innovation Alliance

Updates

Technology

UPDATE

Protecting Consumer Choice: Ensuring the Provenance of Artisan Foods Produced on the island of Ireland.

Key External Stakeholders

Artisan cheese producers; food processors; retailers; regulatory agencies; public analysts.

Practical Implications for Stakeholders

Protection of Brand Ireland is of critical importance for the ingredients and processed foods industries. Artisan cheese production in Ireland has grown considerably over the last decade and has established a reputation for high quality. Linkage of production to local raw materials is a key characteristic of this developing enterprise sector. Development of appropriate analytical means to confirm the provenance of such finished cheeses would represent a key support for companies and lay some of the foundations to support a geographic designation label should any such be desired in the future. Meat products are ideal vehicles for fortification with extra protein, vitamins and minerals and reformed products will provide enhanced and targeted nutrition to promote healthy ageing and vitality in the older population.

Main Results

- A representative sample set of Irish artisanal cheeses has been collected on two occasions over a 12 month period.
- Baseline data describing the content and variability of 11 elements (Na, Mg, P, K, Ca, Mn, Fe, Cu, Zn, Se and Mo) have been established.
- Corresponding data for ratios of naturally-occurring isotopes (H, C, O and N) are being collected.
- Preliminary results indicate that it may be possible to discriminate artisan cheeses produced on the island of Ireland from those produced on mainland Europe. Separation of cheeses produced in Ireland from those originating in Great Britain may not be possible.
- Currently, data collection and full mathematical analysis are being completed.

Opportunity/Benefit

Any successful application for geographic origin status within the EU will require, among other things, the demonstration of a verified analytical capability to confirm the claim being made. This project aims to demonstrate one potential approach to achieve such a capability. This approach mirrors that used successfully for the monitoring of Grana Padano cheeses in Italy for geographic provenance infringements by an industrial consortium. This general analytical approach is capable of being applied to many food products to confirm geographic origin and other authenticity characteristics.

Collaborating Institutions

Queen's University Belfast

Project Number: NFDT-0101-6557

Funding Source: *safe*food

Date: 11/05/2015

Project Dates: 01/09/2013-31/07/2015

How to Proceed

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Technology

UPDATE

Sensory Acceptance of Low Salt Ready Meals

Key External Stakeholders

Food manufacturers, food policymakers, food safety policymakers, food researchers.

Practical Implications for Stakeholders

Chilled ready meals are becoming increasingly popular but often contain appreciable amounts of salt. Food manufacturers are under increasing pressure from regulators and consumers to reduce salt in food. The present project focused on the impact of salt reduction and reformulation on sensory acceptability of low salt ready meals.

- The addition of key herbs and spices individually can help compensate for shortfalls in sensory acceptability for chilled ready-meals.
- The addition of salt substitutes into all 3 frozen ready-meals made it possible to achieve the FSAI salt reduction targets of 0.63g salt (250mg sodium) per 100g in ready-meals and 0.58g salt (230mg sodium) per 100g in soup.

- By adopting a gradual salt reduction strategy the following salt reductions could be achieved without adversely affecting sensory properties and consumer preference for the meals.

Main Results

Sensory perceptions of low salt ready meals were investigated and the impact of reformulation on sensory acceptability was probed.

- A number of herb/spice blends were formulated that resulted in satisfactory sensory acceptability in comparison to meals with normal salt contents.
- The use of herbs and spices also increased the microbial stability of the meals and enhanced their antioxidant status.
- In conjunction with an industrial manufacturer the reformulated low salt meals were manufactured and analysed for sensory acceptability using a consumer panel. In all cases the reformulated meals were of comparable sensory acceptability to their full salt counterparts.

Opportunity/Benefit

The outputs of this project have shown that research driven reformulation can off-set perceived losses in flavour as a result of salt reduction. The strategies developed could be applied to a range of prepared foods and identify effective measures for reducing salt levels in foods without comprising on sensory acceptability. Expressions of interest in this research are welcome.

Collaborating Institutions

University of Limerick, Dawn Fresh Foods Ltd., All in All Ingredients

Project Number: 5712

Funding Source: DAFF (06/R&D/AFRC/519)

Date: March, 2012

Project Dates: Oct 2006 - Sep 2011

How to Proceed

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Technology

UPDATE

Engineering of High Quality Gluten-Free Breads

Key External Stakeholders

Food manufacturers, bakeries, food ingredients companies.

Practical Implications for Stakeholders

A number of recent studies highlighted the poor nutritional quality of gluten-free cereal-based products available on the market. This project evaluated the baking and nutritive properties of the pseudocereals amaranth, quinoa and buckwheat, and their applications as functional ingredients in a gluten-free bread formulation.

The pseudocereal flours proved to be extremely viable and should play an important part in enhancing the nutritional properties of gluten-free breads. This gluten-free project has further improved the knowledge and expertise of the cereal group at Ashtown in this significant and ever-growing area. In summary:

- Pseudocereal flours are feasible ingredients in the formulation of good quality gluten-free breads.
- Pseudocereals are important energy sources, due to their starch content, and contain good quality protein, dietary fibres and lipids rich in unsaturated fats.
- Pseudocereals have adequate levels of important minerals such as calcium and iron.

Main Results

- Buckwheat and quinoa breads had increased bread volume.
- Pseudocereal containing breads had a softer texture than the control bread.
- Higher levels of protein, fat, fibre and minerals were found in the pseudocereal breads.
- Buckwheat breads had the highest total phenol content.
- Quinoa and buckwheat grains are rich sources of polyphenols.
- Amaranth, quinoa and buckwheat breads are excellent sources of vitamin E.

Opportunity/Benefit

The opportunity exists to engage with Teagasc to produce a range of nutritionally enhanced gluten-free breads using the tested pseudocereals which may provide interested companies with a competitive advantage. Companies can access the expertise gained through services provision, with the potential also to engage in research with Teagasc researchers in order to develop these products successfully.

Collaborating Institutions

University College Cork

Project Number: 5472

Funding Source: DAFF (FIRM) & EI

Date: June, 2011

Project Dates: Mar 2006 – Mar 2009

How to Proceed

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Technology

UPDATE

Retaining Health Promoting Polyacetylenes in Fully Processed Vegetables

Key External Stakeholders

Vegetable processors, government authorities/ legislators, consumers.

Practical Implications for Stakeholders

Technologies for the maximum retention of biologically active polyacetylenes in carrot, parsnips and fennel products were developed in this project. These technologies have been formulated and disseminated to industry stakeholders and recommendations produced for processors.

Results from the project have been formulated into a series of blueprints and fact sheets for end-users. Knowledge gained from the project can be used to formulate processing strategies which will maximise the retention of polyacetylenes in processed foods.

Polyacetylenes are a group of bio-active compounds present in carrots and other vegetables which have

recently gained scientific attention due to their ability to inhibit cancer development in rats. Carrots contain three polyacetylenes; falcarinol (FaOH), falacrindiol (FaDOH) and falcarindiol-3-actetate (FaDOAc). The present project sought to examine effective processing strategies for retaining these compounds in vegetables and facilitated key recommendations to be made to processors and consumers.

Main Results

- During minimal processing, abrasive peeling accounts for most of the losses in polyacetylene levels, when compared to other minimal processing treatments such as cutting and washing. Therefore, to maximise polyacetylene contents in minimally processed carrot products, less severe methods of peeling are recommended.
- The inclusion of a blanching step prior to sous-vide processing resulted in a significant decrease in levels of FaOH and FaDOH in parsnip disks. Subsequent sous-vide processing had little effect on levels of polyacetylene; however, chill storage for up 20 days did result in significant decreases in these compounds. Roasting resulted in significant losses of polyacetylenes from fennel bulb.
- Ultrasound-assisted hot air drying (UAHD) resulted in higher retention of polyacetylenes in dried carrot disks than blanching followed by hot air drying. Given the minimal impact of ultrasound on polyacetylene content and the general negative impact of blanching, ultrasound could be considered as a replacement for blanching.

Opportunity/Benefit

Opportunities arising from the outputs of the project derive from the ability of vegetable processors to optimise processing protocols for the retention of polyacetylenes. A series of recommendations have been made with regard to traditional and novel processing techniques and these can be used to produce premium products with optimal health promoting properties.

Collaborating Institutions

NUI Galway, Natures Best Ltd

Project Number: 5711

Funding Source: DAFF (06/R&D/TAFRC/518)

Date: March, 2012

Project Dates: Dec 2006 - Nov 2010

How to Proceed

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Technology

UPDATE

Antioxidant Status of Fully Processed Fruits, Vegetables and Their Products: Technology Optimisation to Minimise Losses

Key External Stakeholders

Vegetable processors, government authorities/ legislators, consumers, food research scientists.

Practical Implications for Stakeholders

Thermal and non-thermal processing effects on fruits and vegetables influence their antioxidant capacity.

The outcomes of the investigation are:

- Thermal processing such as *sous-vide* and post-processing storage decrease the antioxidant activity and concentration of antioxidant compound groups in fruits and vegetables.
- However the effect is not clear cut with some thermal and non thermal strategies resulting in an increase in antioxidant activity.

- In general post-processing storage at temperatures above 0°C resulted in a decrease in antioxidant levels.

Main Results

- Sous-vide processing is a promising strategy for retaining the antioxidant capacity and colour of thermally processed carrot disks.
- High hydrostatic pressure processing at ambient temperature and pressures of 400-600 MPa is an excellent food processing technology which has the potential to retain antioxidant compounds in strawberry, blackberry, tomato and carrot puree while also ensuring the foods are effectively pasteurised.
- Blast freezing and storage at -18°C is a good technique for preserving ascorbic and antioxidant activity in broccoli and greens but not carrots, provided the samples had been blanched prior to freezing.

Opportunity/Benefit

This project developed relatively novel processing techniques, sous-vide and high hydrostatic pressure processing, which are attractive options for end-users as they allow retention of antioxidants in fruits and vegetables and also aid in increasing the shelf-life of the products. Expressions of interest in this research are welcome.

Collaborating Institutions

University of Limerick

Project Number: 5414

Funding Source: DAFF (04/R&D/UL/327)

Date: March, 2012

Project Dates: Jan 2005 - Sep 2010

How to Proceed

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Technology

UPDATE

Novel Fruit Products from Apples and Other Tree Fruit (IsaFruit)

Key External Stakeholders

Vegetable processors, government authorities/ legislators, consumers, food research scientists.

Practical Implications for Stakeholders

The project developed a number of fresh cut fruit salads and ready-to-eat dessert products enriched with functional ingredients to capitalise on the growing functional food market. These products incorporated a range of functional ingredients including pre- and pro-biotics. An Irish based SME was involved in the development of these products and is interested in launching them when economic conditions improve.

Main Results

- Fruit cultivars with optimal properties for the development of fruit based desserts and fresh cut salads were selected based on their sensory, physicochemical and quality attributes.
- Novel protocols were developed for incorporation of functional ingredients using technologies such as edible films and vacuum impregnation.
- Functional ingredients were added at levels required to deliver the health benefit based on manufacturers' recommendations.
- At all points the sensory and quality attributes of the products were assessed to ensure that a real marketable product was being produced.

Opportunity/Benefit

Fruits and fruit products are seen as healthy by consumers. However, if their market share is to grow they need to take advantage of the growing functional food market which fulfils consumer demands for products which deliver a health benefit beyond basic nutrition. This project demonstrated that fruit based functional foods with optimal functional, quality and sensory properties could be developed.

Collaborating Institutions

University College Dublin, Nature's Best Ltd, IRTA

Project Number: 5548

Funding Source: EU FP6 (016279)

Date: July, 2011

Project Dates: Jan 2006 – Sep 2010

How to Proceed

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Technology

UPDATE

Technology for Healthier Pork Products

Key Stakeholders

Meat processors, ingredient companies, consumers

Practical Implications for Stakeholders

Traditional meat products such as sausages and cooked ham are often high in fat, salt and contain additives to prolong shelf life, improve colour and prevent oxidation. The information generated in this project will assist meat processing companies to develop healthier products, such as sausages and luncheon role, containing less salt and/or fat and containing natural ingredients that will appeal to consumers.

Main Results

- High pressure processing (HPP) can be used to reduce the salt content of pork sausages from 2.5% to 1.4% without a noticeable change in sensory and functional properties
- A phytosterol ester *(Vegapure*) was used successfully to improve the organoleptic properties of a reduced salt pork breakfast sausage.
- Grape seed extract (GS) and rosemary-pomegranate (RP) extract were added to sausages without any negative effect on the sensory quality of the products, demonstrating the potential of natural flavonoid containing extracts in the development of novel healthy functional meat products.
- Half the nitrite in a pork luncheon roll was replaced with tomato powder without negatively affecting sensory attributes.

Opportunity/Benefit

Meat products are commonly perceived by consumers as unhealthy due to their high fat, salt and artificial ingredient content. This research has shown that healthier versions of traditional meat products, such as sausages and pork luncheon roll, can be produced that are just as acceptable to consumers as standard versions of the same products. There are opportunities for the meat industry to:

- Reduce the salt, fat and nitrite levels in certain processed pork products,
- Replace artificial antioxidants with natural ones,
- Incorporate phytosterol esters with positive health associations

Teagasc can offer assistance in the development of these products.

Collaborating Institutions

IRTA Spain, University of Copenhagen, University of Helsinki

Project Number: 5718

Funding Source: EUFP6

Date: November, 2012

Project Dates: Jan 2010 – Dec 2011

How to Proceed

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Technology

UPDATE

Cheese 2030 – New Technology Platform

Key External Stakeholders

Manufacturers of cheese and milk protein ingredients.

Practical Implications for Stakeholders

A novel SMART cheese technology platform has been developed for the manufacture of specialised protein powders and recipes for converting these into cheeses with different functional properties. Key features of the technology include:

- Cheesemaking process without whey release in cast cheeses or limited whey release in structured cheese (e.g. ~ 25-30% of normal).
- Complete retention of any added materials (e.g. pre-biotics, minerals, vitamins) in cast cheese types.
- Enables cheesemaking operations in regions where fresh milk is not readily available.

- Ingredient manufacturing step resulting in production of clean 'whey' ideal for the manufacture of specialised whey products e.g. functional whey protein fractions, powders for inclusion in infant milk formula.

This platform technology provides more opportunity to design/control cheese characteristics such as texture, cooking properties and greater potential for the development of new generation health cheeses.

Main Results

A technology was developed for the manufacture of milk protein ingredients (MPI) with characteristics suited to the manufacture of cheeses with different physical properties.

The dispersion, hydration and gelation properties of the MPI were affected by mineral composition, protein concentration, time, solvent quality factors (including ionic strength, pH, temperature).

A process for the conversion of MPI into:

- 'Cast' cheese variants with dry matter levels ≤ 50% without whey expression.
- 'Structured' cheese variants (with ≥ 50% dry matter) by subjecting the cast cheese to further curd handling and whey expression steps.

The composition, physical and sensory properties of the cheeses were altered by the following process variables: formulation (type and level of MPI, salt level, pH), ingredient dispersion/blending conditions (shear, temperature, duration), sequence of ingredient addition, gelation conditions (coagulant type, pH, temperature, time), curd handling processes, and addition of polysaccharides.

Opportunity/Benefit

This technology allows the development of prototype functional MPIs with unique technological characteristics for conversion into cheeses. Irish dairy companies have an opportunity to supply export markets with cheese ingredient solutions (MPIs and cheese conversion processes) which can be converted by *in-situ* re-hydration into local products.

Collaborating Institutions

N/A

Project Number: 5857

Funding Source: EI (TD/2007/0128)

Date: March, 2012

Project Dates: Apr 2008 – Oct 2011

How to Proceed

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Technology

UPDATE

Technological Advances in Spray Drying of Functional Ingredients for Automated Beverage Vending

Key External Stakeholders

Manufacturers of milk powders and dairy ingredients

Practical Implications for Stakeholders

Technologies were developed to produce functional powders suitable for reconstitution/dispensing as either hot or cold beverages

- Installing an in-line high pressure gas/liquid injection system on the concentrate feed to the spray atomiser of a milk-drier facilitated the production of dried ingredients with extensive foaming properties suitable for use in cappuccino-based beverage formulations.
- *Development of foaming powder for hot beverage formulation and vending* – a knowledge-base was established on the performance of different injection gases used and their interactions with concentrate formulation and process variables on powder characteristics

- *Development of cold mixed smoothie-style beverages from textured dairy-fruit dry blends* – 'smoothie' style powders containing fruit/dairy ingredient blends with desired physical characteristics e.g. texture, viscosity and phase stability were successfully developed for dispensing in prototype vending machines.

Main Results

The immediate effect of using either nitrogen gas or liquid CO_2 injection during atomisation, was improved powder agglomeration and an associated decline in bulk densities (from 0.56g/cc to 0.12g/cc) as well as reduced moisture contents. This was also reflected in changes to the particle size distribution and particle density – the latter reduced from 1.2334g/cc to 0.599g/cc.

Interrelationships were established between drying parameters and powder properties (bulk density, particle size distribution, occluded air, interstitial air, particle density, wettability, foam height using a coffee dispenser at t=0 min, foam height after 5 min, and moisture content) specific to cappuccino beverages. Significant relationships, in particular, were established between powder bulk density and cappuccino foam stability using CO_2 (foam stability = 5.556-(5.532*Bulk Density)) and N_2 (foam stability = 5.017-(4.573*Bulk Density)) dosing.

Opportunity/Benefit

This research provides the opportunity to add functionality and value to spray dried ingredients. This technology may be incorporated, with some adaptation by ingredient drying manufacturers, to prepare fat-filled base or fully-formulated powders for supply to branded food companies with channel dominance in food service markets. Relevant pilot scale technologies at Moorepark may be availed off to support technology transfer initiatives.

Collaborating Institutions

N/A

Project Number: 5435

Funding Source: FIRM 04/R&D/TD/320

Date: Nov, 2012

Project Dates: Jan 2005-Sept 2008

How to Proceed

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Technology

UPDATE

Functional Beverages Containing Health-Promoting Prebiotic Milk Oligosaccharides

Key External Stakeholders

IMF manufacturers, dairy/cheese industry, dairy farmers

Practical Implications for Stakeholders

Oligosaccharides, known to have health promoting properties, are significantly higher in human milk when compared with Bovine milk. In this study, Moorepark researchers in collaboration with UC Davis, sought to extract and enrich oligosaccharides from cows' milk to provide health promoting ingredients for inclusion in infant and adult beverages.

The main findings from this research demonstrate that

- The detection of 18 new high-molecular weight oligosaccharides was observed in the enriched powders.

- Kilogram quantities of enriched powders can be produced using the developed membrane filtration process.
- The oligosaccharide powders produced have been shown *in vitro* to possess prebiotic activity and can prevent invasion of human cells by *Campylobacter jejuni*.
- The oligosaccharide powders also decreased the number of potential pathogens *in vivo* in a mouse model.

Main Results

In this study, pilot-scale enrichment of oligosaccharides from whey streams using 1kDa membranes was successful yielding as high as 17.52% enrichment of oligosaccharides as a percentage of lactose. In collaboration with UC Davis, this study revealed, for the first time, the presence of several new free oligosaccharides containing up to 10 monomers that correspond in size to the most abundant oligosaccharides present in human milk including some fucosylated structures. A variety of bioactivities were shown to be associated with the bovine oligosaccharides *in vitro* such as increased colonisation of human intestinal cells by Bifidobacteria, prebiotic effects and anti-invasive activity against *Campylobacter*. Of most importance, bovine milk oligosaccharides were found to reduce non-beneficial or pathogenic bacterial populations *in vivo* in the mouse GIT and have no adverse effects on the other health parameters measured.

Opportunity/Benefit

Whey permeate is either used for fermentation of portable alcohol, lactose crystallisation or disposed off at a cost to the industry. Extraction, enrichment or isolation of oligosaccharides with prebiotic and anti-infective activity from whey permeate or from by-products of lactose production could result in the production of value-added ingredients from waste streams, while also reducing disposal costs for companies involved.

Collaborating Institutions

UC Davis, University of California

Project Number: 5450

Funding Source: DAFM 05/R&D/TD/368/Dairy levy

Date: August, 2012

Project Dates: March 2006 - May 2012

How to Proceed

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Technology

UPDATE

Biocide Tolerance in Foodborne Pathogens

Key External Stakeholders

Food industry, biocide producers, regulatory authorities

Practical Implications for Stakeholders

The outcome of this project is a greater understanding of how foodborne pathogens including *E. coli* O157 and *Salmonella* spp. respond to the presence of biocidal agents, with a particular emphasis on triclosan.

- A panel of verocytotoxigenic *E.coli* (VTEC) and *Salmonella* isolates were found to have minimum inhibitory concentrations (MIC) less than the recommended working concentrations of a number of commercial biocide formulations, although some possessed an MIC of greater than 50% of the working concentration of some agents. This highlights the importance of strict adherence to manufacturer guidelines and appropriate training of personnel.
- Mutants with an enhanced tolerance to triclosan were readily obtained for both *Salmonella* and VTEC. In the case of *Salmonella* corresponding alterations to the strains' antibiotic profiles were observed, illustrating an additional public health risk.
- A spectroscopic method was developed for the detection of quaternary ammonium compounds on stainless steel surfaces, allowing for the detection of residue build up which may constitute a risk for pathogen exposure to sub lethal concentrations of such agents. This would increase the likelihood of resistance developing.

Main Results

A bank of foodborne pathogen isolates were tested against commercial biocide formulations. Although all isolates thad an MIC below the recommended working concentration for all the biocide formulations tested a concern is that for some isolate-biocide combinations the MIC was 50% of the working concentration. Such a concentration may easily occur in real world situations, either due to over dilution, handler error or high organic load. Through this study the transcriptomic and proteomic response of triclosan tolerant *E. coli* O157 and *Salmonella* mutants in comparison with their reference strains were characterised in detail, identifying key responses for each pathogen. Subsequent phenotypic studies showed key changes which may contribute to enhanced pathogen persistence. A spectroscopic method was developed for measuring the potential buildup of biocidal agents on industrial surfaces.

Opportunity/Benefit

The findings of this project provide a detailed analysis of the response of two key foodborne pathogens to sub lethal exposure to biocides commonly used in the farm to fork chain and how these responses may contribute to pathogen persistence in the food chain. The project findings underline the key importance of utilising biocidal agents as directed. Furthermore, the spectroscopic method developed and validated as part of this project is readily transferable to industry for the measurement of the buildup of biocide residues on industrial surfaces.

Collaborating Institutions

University College Dublin

Project Number: 5954

Funding Source: DAFM 08/RD/TAFRC616

Date: November 2012

Project Dates: Dec 2008-May 2012

How to Proceed

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Technology

UPDATE

Updating Cheesemaking Efficiency

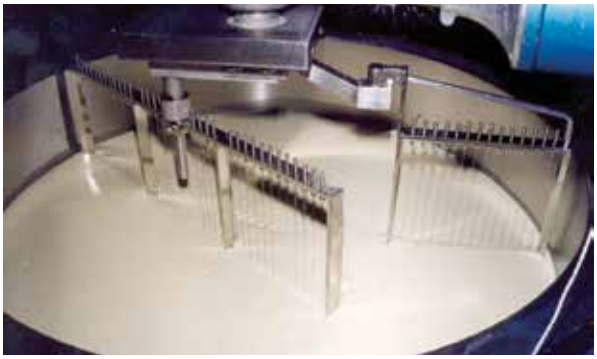
Key External Stakeholders

Irish Cheese and Dairy Industry

Practical Implications for Stakeholders

Manufacturing efficiency is a key aspect of cheese manufacture which influences cheese composition, milk component recoveries and plant profitability.

A major outcome of this project is the provision of new information on the comparative effects of bovine chymosin and camel chymosin on Cheddar cheese making efficiency, and the effects of the high heat treatment of milk at different pHs on its rennet gelation and curd forming characteristics. It also provides an extensive compendium on the effects of milk quality and



cheese manufacturing conditions on cheese making efficiency and quality in the form of 2 monographs (Moorepark Monographs 1 and 2) published in 2010.

Main Results

1. The use of chymosin of camel origin (*Camelus dromedarius*) or *Rhizormucor miehei* rennet in place of bovine chymosin (*Bos taurus*) as coagulant in the experimental manufacture of Cheddar cheese had significant effects on the recovery of fat from milk to cheese, cheese yield, and age-related changes in primary proteolysis and texture. These effects depended on the level of coagulant (number of milk clotting activity units added) and firmness of the milk gel at cutting.
2. The effects of increasing pH from 6.6 to 7.5 during high heat treatment of milk (80 °C for 5 min) resulted in depletion in the content of k-casein on the casein micelle and an increase in the level in the milk serum to an extent depending on pH. Desk-top cheesemaking studies indicated that increasing the milk pH during heating accentuated the adverse effects of high heat treatment on the rennet coagulability of the milk at pH 6.55 and its cheesemaking characteristics.
3. Two monographs (Moorepark Monograph 1. Cheese manufacture: Quality Characteristics of the milk; Moorepark Monograph 2. Cheese Manufacture: Control and prediction of quality characteristics), on the effects of milk quality and cheese, manufacturing conditions on cheese making efficiency and quality were prepared and distributed to Irish Dairy industry in 2010.

Opportunity/Benefit

The research makes available to the dairy industry a database of information on the effects of key cheesemaking parameters on manufacturing efficiency and cheese quality. The comparative study on different coagulants provides statistically validated, practically-applicable information on the impacts of the bovine chymosin, camel chymosin and *Rhizormucor miehei* coagulants on cheesemaking efficiency and changes in the proteolysis and texture of Cheddar cheese during maturation. The cheese manufacture monographs provide a user-friendly reference source of practical information directly applicable to optimisation of cheese manufacturing efficiency and quality.

Collaborating Institutions

N/A

Project Number: 5979

Funding Source: Dairy Levy

Date: November, 2012

Project Dates: Jan 2010 - Dec 2011

How to Proceed

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Technology

UPDATE

Health Promoting Bioactives from Cider Yeast

Key External Stakeholders

Food manufacturers, dairy industry, pharmaceutical companies, research communities; public health agencies and health professionals; policymakers.

Practical Implications for Stakeholders

Beta glucan is a bioactive polysaccharide which has FDA approval for the reduction of cardiovascular risk, the leading cause of death and morbidity in the EU. A cardioprotective diet enriched in dietary fiber, and in particular beta glucan is recommended to protect against the development of cardiovascular disease. Furthermore, food-derived ACE (Angiotensin-I-converting enzyme)-inhibitory peptides have been shown to reduce peripheral blood pressure and exert an antihypertensive effect *in vivo* following ingestion. In this project, bioactive components (ACE inhibitory/ antihypertensive peptides and beta glucan) were isolated and characterised from Natural Yeast, which was a by-product of the cider production process.

Main Results

- Laboratory scale trials, involving autolysis and hydrolysis of spent cider yeast, were optimised for production of yeast extracts, enriched in free amino acids, flavour-enhancing components and bioactive ACE-inhibitory peptides.
- Pilot scale trials were performed but further technical trials are required.
- Economic and financial analysis of the prototype products developed in this project were undertaken, and results indicated that the process for their production (involving spray drying at 20%) was not commercially viable, with further technical trials required to overcome this difficulty.

Opportunity/Benefit

The opportunity exists to further investigate the potential waste stream of Cider production in collaboration with industrial personnel. The research group benefited from improved links with industry (Cybercolors).

Collaborating Institutions

Cybercolors

Project Number: 5932

Funding Source: EI (IP/2007/0495)

Date: March, 2012

Project Dates: Nov 2008 – Oct 2010

How to Proceed

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Technology

UPDATE

Improved Biotraceability of Unintended Microorganisms and Their Substances in Food and Feed Chains

Key External Stakeholders

Irish Farmhouse Cheesemakers (FSAI)

Practical Implications for Stakeholders

- The data obtained contributes to a better understanding of the potential risk that *L. monocytogenes* presents to cheese producers (growth on the product, if it is contaminated) and constitutes a very useful set of data for further modelling studies in food.
- Persistent strains of *L. monocytogenes*, that are more difficult to control, were identified in some processing environments

Main Results

- Sixteen cheesemaking facilities were sampled during the production season at monthly intervals over a one-year period. Thirteen facilities were found to have samples positive for *L. monocytogenes* on at least one occasion
- 19% of samples at farm level were positive for *L. monocytogenes*
- This study demonstrates the prevalence of *L. monocytogenes* in the dairy farm and processing environments and the need for good hygiene practices to prevent its entry into the food chain
- Predictive modeling is not always applicable to food

Opportunity/Benefit

- Contamination of food processing facilities (not food) was shown. There is an opportunity to use this pre-emptive knowledge to improve hygiene at processing facilities and prevent future issues with food contamination
- Predictive modeling is not always applicable to food – challenge studies are necessary
- A database of pulsed field gel electrophoresis (PFGE) profiles of *L. monocytogenes* isolates from Ireland was generated

Collaborating Institutions

Principally the Danish Technical University, Copenhagen and the University of Veterinary Medicine, Vienna. There were 45 other participants in the project.

Project Number: 5691

Funding Source: EU FP7 Project no. 036272

Date: July 2013

Project Dates: Jan 2007-Dec 2011

How to Proceed

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Technology

UPDATE

Bio-Actives from By-Products of Food Processing

Key External Stakeholders

Vegetable processors, government authorities/ legislators, consumers, national food research institutes.

Practical Implications for Stakeholders

Large volumes of waste are produced as a result of processing of foods. This project highlighted the potential of this waste as a source of bio-active compounds for inclusion in functional foods.

Main Results

- Fruit and vegetable by-product and waste sources in Ireland were tested for their antioxidant activity and polyphenol content. The highest levels of antioxidants measured by both ferric reducing antioxidant power (FRAP) and diphenyl-picrylhydrazyl (DPPH) assays were detected in whole kiwifruit. Of the vegetable by-products, broccoli stems showed the best antioxidant potential.
- A pressurised liquid method for the extraction of antioxidants from apple pomace utilising 60% ethanol at a temperature of 102°C was developed.
- A solid-liquid extraction method for recovering antioxidant from apple pomace was also developed utilising 56% ethanol, 80°C and 31 min.
- Chitin extraction optimisation, using different organic acids, times and temperatures, was evaluated. The optimal conditions for chitin extraction were 2M concentration, 2h steeping time 24ºC temperature which resulted in 98.86% and 90.28% purity for citric acid and lactic acid, respectively, at the ratio of 1:10.
- Optimal conditions of 75% ethanol, 80ºC and 22 min for the extraction of antioxidants from potato peel were determined using solid-liquid extraction. The use of pressurised liquid extraction did not enhance the extraction of antioxidants from potato peel.

Opportunity/Benefit

The potential of high volume fruit, vegetable and fish processing waste as a source of bio-active compounds has been highlighted. A number of methods for the recovery of bio-active compounds using food friendly solvents have been developed. The methodologies developed could be used as a basis for up-scaled methods to recover bio-active compounds from food waste for inclusion in functional foods.

Collaborating Institutions

Dublin Institute of Technology, National University of Ireland, Galway, Trinity College Dublin, Natures Best Ltd, Keeling Fruit Importers

Project Number: 5713

Funding Source: DAFM (06RDTAFRC519)

Date: November, 2011

Project Dates: Dec 2006 – Nov 2010

How to Proceed

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Technology

UPDATE

BIOCONTROL: Bio-active Ingredients for the Control of Undesirable Bacteria in Ready-to-Eat Foods

Key External Stakeholders

Food manufacturers and processors.

Practical Implications for Stakeholders

In 2003, the US Food and Drug Administration issued a Final Rule which explicitly states that post-processing technologies must be included to limit the growth of *Listeria* in ready-to-eat products.

The Biocontrol project has resulted in the generation of a suite of food grade antimicrobials on which future novel anti-*Listeria* biopreservative products could be based.

- The identification of nisin derivatives with enhanced activity against Gram positive pathogens, including *Listeria*, is a major breakthrough. The fact that single amino acid changes can have such dramatic impacts is particularly noteworthy. From a commercial perspective it is significant that nisin is the only bacteriocin which has been approved as a food additive and nisin derivatives may be more likely to be approved by authorities than completely new compounds. In addition, nisin has been shown to have a number of other applications in animal and human health. Thus enhanced forms of nisin have the potential to impact on food safety, health and agriculture.

- A *Lactobacillus salivarius* strain producing an ABP118-like bacteriocin, which we designated salivaricin P, was identified. The fact that bacteriocins are produced by potentially probiotic strains is relevant to industry and consumers, since such strains could potentially be employed to control pathogens in the gut or to alter the overall gut microbial composition in a beneficial way.

Main Results

- Novel anti-*Listeria* agents were identified and developed.
- Food trials to demonstrate effectiveness were performed.
- Patented IP resulted.

Opportunity/Benefit

A patent relating to the novel nisin derivatives was filed: Publication number: WO2011076903

Collaborating Institutions

University College Cork

Project Number: 5367

Funding Source: DAFF (04/RD/C/232)

Date: March, 2012

Project Dates: Jul 2005 – Jun 2009

How to Proceed

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Technology

UPDATE

Buttermilk Powder and Cheese Yield

Key External Stakeholders

Dairy processing industry.

Practical Implications for Stakeholders

Buttermilk powder is readily available and despite containing high levels of potential natural emulsifiers, its use to fortify cheese milk protein levels results in significantly reduced adjusted cheese yield due to increased losses of both fat and protein to whey.

- Fortification of cheese milk with buttermilk powder results in cheeses with significantly higher levels of moisture and moisture-in-non-fat-substance levels. Fortification with milk ultra filtration retentate produces cheeses with significantly lower levels of moisture and moisture-in-non-fat-substance levels, in comparison to cheeses produced from control cheese milks.
- Fat losses to whey were higher (20-30%) in cheeses produced from milks fortified with buttermilk powder compared to control cheeses (15-18%). They were also significantly higher when compared to cheeses produced from milks fortified with milk ultra filtration retentate (9-12%).

- Analysis of moisture adjusted cheese yields in which fat and protein contents adjusted to reference levels showed yields of cheeses produced from milks fortified with buttermilk powder (10.48%) were lower than control cheeses (10.85%) and were significantly lower than cheeses produced from milks fortified with milk ultra filtration retentate (11.42%).

Main Results

- This study concluded that despite containing high levels of potential natural emulsifiers, the use of buttermilk powder to fortify cheese milk protein levels results in significantly reduced cheese yield due to increased losses of both fat and protein to whey.
- However the study does highlight the potential for the cheese industry for fortification of cheese milk with milk ultra filtrate to reduce losses to whey and to increase cheese production efficiencies.

Opportunity/Benefit

The enhanced knowledge base arising from this study is available to industry decision makers in order to assist them in increasing cheese manufacture yield efficiency.

Collaborating Institutions

N/A

Project Number: 5980

Funding Source: Dairy Levy Fund

Date: March, 2012

Project Dates: Jun 2009 - Jun 2011

How to Proceed

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Technology

UPDATE

Characterisation and Enrichment of "Buttermilk" Fat Globule Membrane Composition Using Novel Technologies

Key External Stakeholders

Dairy processors, butter manufacturers, ingredient innovators.

Practical Implications for Stakeholders

This project has demonstrated that the milk fat globule membrane (MFGM) residue contained within buttermilk possesses biological activity and offers potential for greater commercial exploitation and adding value.

A key implication for dairy producers and processors is a realisation that buttermilk as a by-product of buttermaking is presently under-utilised through processing into a relatively low-value commodity buttermilk powder.

- Expertise and analytical capability were developed, in relation to bioscience aspects and technological features of MFGM, which is key to understanding the fate of MFGM proteins and phospholipids during processing.

- Specific analytical capabilities developed during the project were made available to interested dairy processors thereafter to enable them to characterise the composition of buttermilk and MFGM fractions generated by their processes. This, in turn, led to international food and nutritional company reaction e.g. expressions of interest on the part of infant milk formula manufacturers.

Main Results

- Analytical techniques were established which enabled, for the fist time, the fate of MFGM proteins and phospholipids to be tracked during processing simulations performed on freshly-produced milk.
- MFGM proteins are partitioned mainly into buttermilk during cream churning, some of these proteins were also detected in the resulting butter. All major MFGM phospholipids, i.e. PE (phosphotidylethanolamine), PI (phosphotidylinositol), PC (phosphotidylcholine), PS (phosphotidylserine), SM (sphingomyelin), as well as high quantities of LC (lactosylceramide) were detected in the various sample streams irrespective of mechanical action and/or heat treatment of cream prior to processing.
- Significant anti-cancer effects were detected in the various buttermilk fractions produced experimentally.

Opportunity/Benefit

Follow-on research is necessary to elaborate our scientific understanding of MFGM and document further biological evidence to support health benefit claims but the expertise developed from this project would be key to such commercially focused research and possible links with industry.

Collaborating Institutions

Dublin City University

Project Number: 5552

Funding Source: DAFF (05/R&D/TD/370)

Date: March, 2012

Project Dates: Oct 2008 – Mar 2009

How to Proceed

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UPDATE

Developing Novel Convenient Meat Based Products by Application of High Pressure Processing (HPP)

Key External Stakeholders

Meat processors, chilled ready meal producers, state agencies.

Practical Implications for Stakeholders

The output of this research provides a broad range of data which can assist many players in the chilled meat product chain to understand the relevance of a minimal processing technology such as high pressure processing (HPP). Results also provide valuable information to assist in understanding, at a proteome level how, HPP exerts its effects on quality.

- Influence of different HPP treatment levels were observed with lower pressure (200MPa) being more appropriate than higher for meat.
- Higher pressure (600MPa) appeared to be more relevant for processing vegetables.

- Industry was positively disposed towards the availability of a HPP central treatment facility.

Main Results

- Mild pressure treatments minimally influence meat quality while improving meat hygiene.
- While high pressure levels would promote lipid oxidation, mid-range levels had no impact on fatty acid profile.
- Results suggest that increases in pressure result in increased precipitation of sarcoplasmic proteins onto myofibrils.
- Processing at 600MPa and blanching were the treatments that best preserved the antioxidant capacity of vegetables.
- The enhanced nutritional profile of the chilled ready meal concept garnered higher levels of consumer acceptance especially amongst respondents in the family life stage.
- The overall result from the 300 consumer acceptance tests, indicated that a pressure treatment of 200 MPa was most acceptable to the majority of consumers.
- Further education and technical training is warranted to increase industry awareness of HPP.

Opportunity/Benefit

This project provides valuable information for scientific and consumer audiences and provides a good starting point for further research or development by others, including industry. As a non-thermal treatment which can influence microbial safety, HPP holds potential as a minimal process technology of relevance to the production of ready to eat meat products which are microbiologically safe and possess superior sensory and nutritional attributes. Expressions of interest in further developing this research are welcome.

Collaborating Institutions

University College Cork

Project Number: 5580

Funding Source: DAFF (R&D/TAFRC/521)

Date: March, 2012

Project Dates: Nov 2006 – Jun 2010

How to Proceed

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UPDATE

Development of Food Ingredients for Modulation of Glycaemia

Key External Stakeholders

Ingredient suppliers, nutritional beverage manufacturers.

Practical Implications for Stakeholders

This research provides scientifically validated knowledge on how to combine dairy proteins and carbohydrates for controlled structure development and glucose release in foods. This included studying the effect of the interaction between carbohydrates and dairy proteins on viscosity development and susceptibility to enzymatic hydrolysis and explored the possible modulating effects of dairy proteins, i.e. alpha(α)-casein, beta(β)–casein, beta(β)-lactoglobulin & alpha(α)-lactalbumin on the gelatinisation characteristics and related functional behaviour of starch (waxy maize) in food formulations.

We found that it is possible to develop different physical properties in solution due to the interactive effects of varying combinations of carbohydrates (konjac glucomannon, starch, maltodextrin and inulin) and proteins (alpha(α)-casein, beta(β)-casein,

alpha(α)-lactalbumin and beta(β)-lactoglobulin). Rheological analysis demonstrated that under suitable gelling conditions;

- Inulin had little effect on the gel-strength of β-lactoglobulin compared to konjac glucomannon
- Konjac glucomannon enhances gelling properties
- Adding maltodextrin to starch in solution results in higher viscosity than starch alone during pasting and the gelatinisation profiles of starch alter when maltodextrin is present.

Main Results

- Inulin had little effect on the gel-strength of β-lactoglobulin compared to konjac glucomannon which enhances gelling properties.
- The gelatinisation profiles of starch alter when maltodextrin is present, e.g. the addition of maltodextrin to starch in solution results in higher viscosity than starch alone during pasting.
- It is hypothesised that gelatinisation of starch in structured casein networks provides a method for decreasing the digestion rate of the starch and can thus contribute to modulation of postprandial glucose fluctuations.
- Different proteins, in particular α- casein and β-casein, have different abilities to alter the viscosity and subsequent glucose release of food systems.
- Caseins reinforce the structure of starch granules during gelatinisation.

Opportunity/Benefit

The combination of different proteins and selected carbohydrates creates new opportunities for developing functionality in dairy based beverages. The project can contribute to the development of nutritional formulations designed for sports and/or medical applications such as patients with Type 2 diabetes and/or glucose intolerance. Expressions of interest in accessing or furthering this research are welcome.

Collaborating Institutions

University College Cork

Project Number: 5590

Funding Source: DAFF (06/R&D/TMFRC445)

Date: October, 2011

Project Dates: Sep 2006 – Nov 2010

How to Proceed

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UPDATE

Early Detection of Mushroom Bruising Using Imaging Technology

Key External Stakeholders

Mushroom producers, mushroom packers, supermarket chains.

Practical Implications for Stakeholders

- The capability to identify damaged mushrooms before browning becomes visible has been developed.
- The technology has the potential to reduce acceptance problems for mushroom lots at both wholesale and retail level.

Browning of mushrooms because of damage during harvesting and transportation results in a monetary loss for the mushroom industry. This project investigated the use of a rapid, non-destructive system, near infrared (NIR) spectroscopy and hyperspectral imaging (NIR-HSI), which has the potential to identify the damaged mushrooms before browning is visible. The technique is capable of on-line installation and operation and could eventually be deployed for screening of sample or whole lots.

Main Results

- Conventional NIR spectroscopy can discriminate between damaged and undamaged mushrooms with almost 100% accuracy.
- Conventional NIR spectroscopy is capable of predicting post-harvest age in damaged and un-damaged mushrooms with a high level of accuracy.
- NIR–HSI can discriminate between damaged and undamaged mushrooms within 1 day of harvest at rates of 72 and 86% respectively.

Opportunity/Benefit

Expressions of interest from mushroom producers or distributors relating to exploitation of this emerging technology through engagement with Teagasc are welcome. Teagasc can develop turnkey applications for interested companies on request.

Collaborating Institutions

Dublin Institute of Technology, University College Dublin

Project Number: 5708

Funding Source: DAFF (06/R&D/DIT487)

Date: February, 2011

Project Dates: Nov 2006- Jul 2010

How to Proceed

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Technology

UPDATE

Exploitation of Cheese Cultures for Flavour Diversity and Functionality

Key External Stakeholders

Dairy industry, starter supply companies, research community.

Practical Implications for Stakeholders

Microorganisms are critical for cheese manufacture and ripening and are a key contributor to its flavour development. Thus, application and control of the cheese microbial flora during manufacture and ripening offers the cheese manufacturer a means to develop cheeses with flavours and functionalities targeted to specific markets. This project was sought to determine the impact of various microorganisms on cheese flavour and functional properties with a view to identifying strains with beneficial traits that could be exploited by the industry.

The main issues addressed included investigations into:

- The potential of exopolysaccharide (EPS) producing starter to cheese manufacture and ripening.

- The contribution of *Streptococcus thermophilus* to Cheddar cheese flavour.
- Identification of new bacterial strains for cheese manufacture.

Main Results

- A bank of 142 EPS producing lactic acid bacteria was assembled.
- It was clearly demonstrated that EPS producing strains have the capacity to improve cheese yield and enhance the texture properties of reduced-fat Cheddar cheese.
- *St. thermophilius* when used as a starter or starter adjunct impacted on flavour development in a strain specific manner.

Opportunity/Benefit

The successful implementation of this project provides a range of options to cheesemakers to produce cheeses with improved and diverse flavours and functional properties. By so doing the project supports the efforts of Irish cheese makers to exploit markets for cheese with diverse and unique flavours, such as the speciality and extra mature Cheddar markets in the UK, to which only limited access is currently available. Expressions of interest from companies interested in this area are welcome.

Collaborating Institutions

University College Cork

Project Number: 5431

Funding Source: DAFM (04/R&D/TD/309)

Date: March, 2012

Project Dates: Jan 2005 – Sep 2009

How to Proceed

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Technology

UPDATE

Functional Properties of Beta-glucans from Barley

Key External Stakeholders

Food manufacturers, bakeries, food ingredients companies.

Practical Implications for Stakeholders

- Barley fractions are feasible functional ingredients that can be used in the formulation of yeast breads of a high baking, sensory and nutritional quality.
- Barley middlings, considered a by-product or waste stream, contain high levels of beta-glucan and were successfully used to produce viable bread products that may have potential for commercialisation.

Past studies have shown barley to be an excellent source of dietary fibre and beta-glucan, a polysaccharide that when consumed regularly has important health benefits including reducing the risk of heart disease. This project studied a variety of barley cultivars and evaluated their use as low cost, high beta-glucan-containing functional ingredients. Optimisation of milling procedures generated a range of milled barley fractions that were

then blended with wheat flours and used in bread formulations which were evaluated for their rheological, textural and nutritive properties.

Main Results

- A range of new and nutritious barley fractions were isolated by optimising the milling process.
- Barley middlings were found to be an important source of beta-glucan and can be used in the formulation of bread products.

Opportunity/Benefit

The opportunity exists for bakers, ingredient companies and other relevant industry personnel to link with Teagasc in order to optimise milling conditions, formulate flour blends and develop functional bread products with enhanced levels of dietary fibre and beta-glucan.

Collaborating Institutions

University College Cork, Cork Institute of Technology, University College Dublin

Project Number: 5715

Funding Source: DAFF (06/RD/C/462)

Date: June, 2011

Project Dates: Sep 2006 – Sep 2010

How to Proceed

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Technology

UPDATE

FUNLAC: Lacticin-Based Ingredients for Biopreservative and Functional Food Applications

Key External Stakeholders

Food producers.

Practical Implications for Stakeholders

- A genome sequence of the lacticin producing strain was completed, which allows identification of genes relevant to industrial and food safety applications. This genetic blueprint can additionally be used to identify and exploit other interesting traits (both fundamental and commercial) associated with the strain.
- A *Lactococcus lactis* strain identified as producing elevated antimicrobial activity was investigated. This is of relevance to the food industry given that the use of this strain results in elevated lacticin 3147 activity at no additional cost, thereby improving commercial value and impacting on the use of the antimicrobial lacticin 3147 in food industry applications.
- When assessed *in vivo*, lacticin 3147 was found to be degraded within the gastrointestinal tract by the enzyme a-chymotrypsin. Thus, lacticin 3147 was deemed safe for ingestion, given that it would not impact negatively on commensal gut flora. Additionally, the fact that lacticin 3147 is effective in the oral cavity provides the opportunity to influence dental health through the development of oral food applications.
- Lacticin 3147 has been demonstrated to be a robust antimicrobial with the ability to control food spoilage and pathogenic bacteria in non-dairy-foods. It was found to be particularly effective for the control of *Bacillus cereus* on beansprouts, with results indicating that it is more effective than the conventional hypochloride solutions, currently used.

Main Results

- The genome sequence of the lacticin 3147 producing strain was completed.
- In one of the first reports of its kind, where a lantibiotic was assessed *in vivo*, lacticin 3147 was found to be degraded within the gastrointestinal tract by the enzyme a-chymotrypsin. Thus, lacticin 3147 was deemed safe for ingestion.
- Lacticin 3147 was demonstrated to be a robust antimicrobial with the ability to control food spoilage and pathogenic bacteria in non-dairy foods.

Opportunity/Benefit

Lacticin 3147 has been demonstrated to be effective against all Gram positive bacteria tested to date, and has a free from additive status. It is a natural antimicrobial that could be the solution to a broad range of microbial problems for food producers in food biopreservation and shelf life extension applications, as well as having potential for biomedical applications. Expressions of interest are welcome from such companies to optimise this technology with a view to licensing.

Collaborating Institutions

University College Cork

Project Number: 5363

Funding Source: DAFF (04/R&D/TD/317)

Date: December, 2010

Project Dates: Oct 2005 – Aug 2009

How to Proceed

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Technology

UPDATE

Heart Friendly Foods

Key External Stakeholders

Food manufacturers, dairy industry, pharmaceutical companies.

Practical Implications for Stakeholders

- Dairy products enriched in soluble dietary fibre and beta-glucan, based on the use of novel adjunct food-grade cultures with soluble fibre – producing capacity during milk fermentation, were developed in this project. These cultures were also used as dietary adjuncts for *in situ* production of beta-glucan in the gut, and shown to exhibit cardioprotective properties.
- A cardioprotective diet enriched in dietary fibre, is recommended to protect against the development of cardiovascular disease. Dairy products are poor sources of soluble dietary fibre and beta-glucan, therefore, this represents an opportunity for the dairy industry to produce functional foods and dried dairy ingredients for protection against the development of cardiovascular disease, for functional and medical food markets.
- With cardiovascular disease being the leading cause of death and morbidity in the EU, and on the increase among the Irish population, the availability of such functional foods within the market would be of significant benefit to consumers and food producers alike.

Main Results

- Soluble fibre-producing food-grade cultures, including beta-glucan producing cultures from culture collections and novel sources were identified and characterised.
- *In situ* production of beta-glucan by food-grade cultures resulted in increased survival of the beneficial strain in conditions of elevated heat, simulated gastric juice, acid, bile and antibiotic stress.
- The low-fat yogurt developed with these adjunct strains exhibited superior functional properties compared to product manufactured without the cultures.
- Development of dried dairy ingredients and functional dairy foods enriched with soluble fibre and beta-glucan producing cultures with excellent rheological properties were developed.
- Efficacy was demonstrated against atherosclerosis development of selected soluble fibre and beta-glucan producing cultures in an animal model of lipid-driven atherosclerosis.

Opportunity/Benefit

The opportunity exists to further investigate the potential of microbially produced soluble fibre as a potent bio-active food ingredient and potential pharmaceutical product for human health benefit with a view to commercialisation.

A patent application is in the process of being filed. Expressions of interest from relevant companies are welcome and opportunities to collaborate and license this technology can be discussed.

Collaborating Institutions

University College Cork

Project Number: 5647

Funding Source: FIRM (06RDTMFRC450)

Date: November, 2012

Project Dates: Jan 2007 – Dec 2010

How to Proceed

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UPDATE

Investigation of the Presence of Anti-Nutritional and Toxic Compounds in "Health Foods"

Key External Stakeholders

Manufacturers, wholesalers and retailers of health food products, general public, regulatory agencies: DAFF, FSAI, IMB.

Practical Implications for Stakeholders

The objective of this project was to investigate the occurrence of microcystin (MC) and aristolochic acid (AA) toxins in algal and herbal products, respectively.

- Methods were developed and validated to detect AA and MC toxins, which can be employed to monitor the safety of health foods.
- Contaminated products were detected and removed from the Irish market.
- A number of health alerts were published worldwide including, Ireland, the UK and Canada.

Main Results

- MC toxins were detected in Klamath Lake blue green algae (BGA) products, which are sold in health foods shops throughout the island at concentrations between <0.5 and 3 mg/kg.
- MC toxins were not detected in spirulina BGA products, which may be used as a substitute for Klamath Lake products.
- AA toxins were detected in some herbal preparations sold on the island but these products have been removed from the market.

Opportunity/Benefit

- Stakeholders can now access analytical methods for detecting AA and MC toxins.
- A novel biosensor assay was developed for detecting MC toxins, which has the potential to be exploited as a rapid test.

Collaborating Institutions

Xenosense Ltd., Belfast.

Project Number: 5429

Funding Source: DAFF (Safefood 04CR-06)

Date: January, 2010

Project Dates: Oct 2005 – Oct 2008

How to Proceed

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Technology

UPDATE

National Food Residue Database (NFRD)

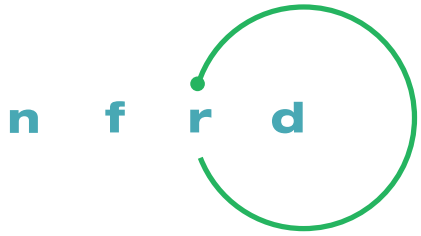
Key External Stakeholders

Food industry, state agencies (DAFF, Pesticide Control Service, FSAI, RPII, EPA, Marine Institute, State Laboratory), scientific community, general public.

Practical Implications for Stakeholders

This funding has ensured the continued development and enhancement of the National Food Residue Database (NFRD), leading it to becoming the 'one stop shop' for chemical residue information in food in Ireland.

The project resulted in 49 new datasets being published on the NFRD website, along with two NFRD annual reports. An exposure assessment to pesticide contamination in food showed that the exposure to pesticides was well below the allowable daily intake (ADI) and the risk to the consumer from pesticides was low.



Consumer and industry confidence in food production and processing is key to the sustainability of the food industry in this country. The information contained on the NFRD can be used to promote the safety and quality of Irish food, through its use by the food industry and policy/regulatory agencies. In addition, 'country of origin' for pesticide results can aid importers of fruit and vegetable products to identify countries with safer produce. The NFRD needs to be continuously developed and maintained to help ensure that food safety is at the heart of the development of the food industry in Ireland.

Main Results

- 49 new datasets were uploaded and published on the NFRD website over the duration of the project.
- Two issues of the NFRD Report (2007/2008 and 2009) were published.
- Exposure analyses were conducted for 10 of the most commonly found pesticides (captan, carbendazim, chlorpyrifos, diphenylamine, fenahexamid, imazalil, iprodione, malathion, prochloraz and thiabendazole).
- Results from this study showed that exposure to pesticides was well below the ADI and the risk to the consumer (both adult and child) from pesticides was low.
- Extensive dissemination was been carried out during the project through publication on the NFRD website, NRFD annual reports and through a workshop.

Opportunity/Benefit

The National Food Residue Database can be used as a reference tool by exporters, when queried about the safety of Irish food. It can also be used by importers and processors when buying products from outside of Ireland.

Collaborating Institutions

University College Dublin

Project Number: 5640

Funding Source: DAFF (06RDTAFRC535)

Date: January, 2012

Project Dates: Nov 2006 – Nov 2009

How to Proceed

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Technology

UPDATE

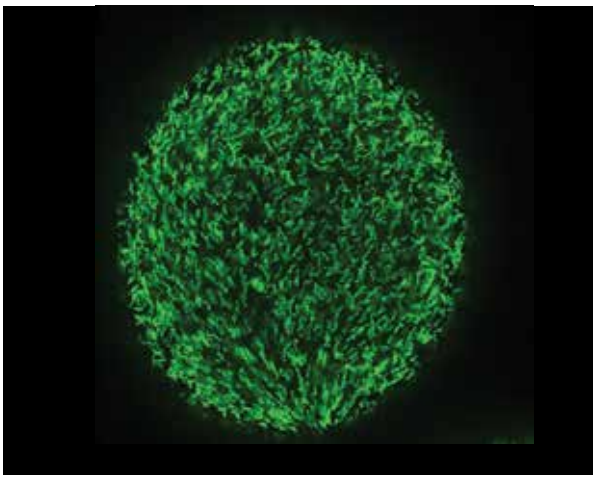
Novel Gel-Encapsulation Technology

Key External Stakeholders

Food/Medical food, pharmaceutical and animal feed companies, biotechnology start-up companies.

Practical Implications for Stakeholders

- A novel gel-encapsulation technology was developed, using dairy based micro beads which would be of interest to companies wishing to incorporate sensitive components, including probiotics, into their products.
- Encapsulation matrices are suitable for incorporation into liquid of high moisture food/feed.



Main Results

- A novel gel-encapsulation technology was developed and validated for the protection of probiotic bacteria but would also be suitable for other sensitive ingredients such as peptides or phytochemical compounds.
- Gel-encapsulation ensured high probiotic viability during extended storage in fruit-based products, such as cranberry juice.
- *In vivo* gastro-intestinal transit demonstrated delivery of high numbers of live probiotic bacteria to the lower intestine.

Opportunity/Benefit

A patent application has been filed by Teagasc covering process conditions for generating gel microbeads and application of the encapsulation method. This provides food and related companies with the opportunity to benefit from improved cost efficiency and product shelf-life through use of this robust encapsulation process. Teagasc is seeking partners for commercialisation of the technology with a view to licensing in a number of fields of use.

Collaborating Institutions

University College Cork

Project Number: 5457

Funding Source: Dairy Levy Fund

Date: February, 2010

Project Dates: Jul 2005 - Dec 2009

How to Proceed

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Technology

UPDATE

Nutraceutical and Functional Food Bio-active Peptides in Beef, Bovine Offals and Fermented Meat Products

Key External Stakeholders

Beef processing sector.

Practical Implications for Stakeholders

The main outcome of this research provides support for a strategic approach to recovering value from the meat processing chain. Clear evidence has been presented that bio-active peptides can be generated from low value meat and offal. The capabilities for generating, isolating and characterising bio-active peptides from meat sources have been established at Teagasc. The assays have been optimised and are now part of a full peptide isolation, purification and characterisation infrastructure available to the Irish food industry. The potential of generating bio-active peptides from bovine offal and low value muscle has been demonstrated in this project. Research in the extraction of commercially valuable peptides from

meat and meat industry by-products is in its infancy and this project provides a solid foundation on which future development and discovery will inevitably yield scientific advancement and commercial return.

Main Results

- Capabilities established for the generation, isolation and characterisation of bio-active peptides from meat sources.
- Antioxidant peptides successfully generated from bovine liver.
- Peptides with antioxidant and antihypertensive activity isolated from brisket fractions.
- Peptides generated from bovine lung which exhibited antioxidant, antihypertensive and antithrombotic activity.
- Heart peptide fractions displayed antioxidant and antimicrobial activity.
- Bio-active peptides generated from proteins isolated from bovine muscle.

Opportunity/Benefit

Knowledge generated in this research will be beneficial in developing strategies to recover value from meat processing streams. Such scientific expertise and infrastructure should act as a springboard to encourage the exploitation of the protein component of offal and waste streams produced by the meat industry, as a source of high value biologically active ingredients with food and pharmaceutical applications.

Collaborating Institutions

University College Cork

Project Number: 5636

Funding Source: DAFF (06RDTAFRC472)

Date: March, 2012

Project Dates: Dec 2006 – Nov 2010

How to Proceed

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Technology

UPDATE

Phage-Insensitive Cultures for the Production of Fermented and Probiotic Foods

Key External Stakeholders

Commercial culture suppliers, fermented dairy food producers, wider dairy industry, lactic acid bacteria and phage research communities.

Practical Implications for Stakeholders

Bacteriophages are the primary cause of fermentation failure in the fermented dairy foods industry. Lysis of the starter culture can delay or even halt the milk fermentation process leading to low quality products, or even discarding of the milk. The destructive potential of these agents is exaggerated in modern processes which employ cultures on a more or less continuous basis and where huge numbers of starter cells are required to process large volumes of milk to cheese. The economic impact of such attacks can be significant, particularly in a commodity product such as cheese where profit margins are very tight.

The main outcomes generated from this project are:

- Food-grade strategies have been developed to improve commercial starter cultures with respect to bacteriophage resistance.

- Improved cultures have been transferred to industry where they have replaced bacteriophage-sensitive strains, thus improving the efficiency, reliability and longevity of starter cultures.

Main Results

- The molecular mechanisms underpinning phage-host interactions were characterised. The host response is strongly targeted to the cell wall, suggesting that the phage presence is sensed as an extracytoplasmic stress, affecting membrane integrity.
- Phages infecting commercial probiotic cultures were isolated and characterised.
- Classical food-grade approaches and novel mobilisable plasmids were used to improve the phage-resistance phenotype of commercial starters, some of which have been transferred to industry.

Opportunity/Benefit

There is an ongoing opportunity for other starter culture and dairy companies to benefit from the capabilities developed within this project through sponsored research or service provision. Expressions of interest from relevant companies are welcome.

Collaborating Institutions

University College Cork.

Project Number: 5458

Funding Source: Dairy Levy

Date: October, 2011

Project Dates: Jun 2005 – Dec 2010

How to Proceed

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Technology

UPDATE

Product Reformulation and *In Vitro* Testing of Low Glycaemic Breads

Key External Stakeholders

Food ingredients companies, bakeries, millers, food manufacturers, consumers.

Practical Implications for Stakeholders

Significant findings of the research conducted in this project include detailed information on a range of low glycaemic index (GI) grains and fibres/flours, and their application in novel low glycaemic index (GI) bread formulations. How these fibres behave under mixing, proofing and baking conditions has been assessed, and their shelf life (texture) and sensory properties have been established. This project has led to the development of new, high quality, low GI bread formulations.

A large number of new bread recipes containing a range of different low GI ingredients have now been formulated, and information is now available relating to the optimal water addition and mixing characteristics,

and expected bread, shelf life and sensory properties of the products. Both quantitative and qualitative sensory trials have shown that low GI flours may be introduced into a wheat bread formulation without significantly negating the sensory properties of the resulting breads.

Main Results

- Compositional characterisation of low GI grains.
- Flour blending and baking methods for new low GI bread formulations.
- Sensory properties of new low GI formulations.
- Fundamental rheology, baking and molecular aspects of the new formulations.
- An *in vitro* method for calculating the glycaemic index of the formulations.
- Scientific and technical publications describing the research methods and how the results and formulations may be utilised by an end-user.

Opportunity/Benefit

Advice, consultancy work and/or technical services, relating to the methods and/or formulations developed during this project can be provided at Teagasc Food Research Centre, Ashtown, particularly in the areas of cereal chemistry, dough rheology and baking processes.

Collaborating Institutions

University College Cork

Project Number: 5714

Funding Source: DAFF (06/R&D/TAFRC/522)

Date: March, 2012

Project Dates: Oct 2006 – Mar 2010

How to Proceed

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Technology

UPDATE

Rapid Methods for Food Authentication and Quality Confirmation

Key External Stakeholders

Food manufacturers, consumers, regulatory agencies.

Practical Implications for Stakeholders

The outcome is a clear indication of the power and utility of rapid, non-destructive spectroscopic methods for demonstrating conformance to specification of foods and food ingredients.

- Variations in raw material quality may be detected and defective material rejected.
- In-process changes may be mapped and controlled.
- Final product consistency may be measured and assured.
- This technology facilitates the application of PAT (Process Analytical Technology) in the food industry.

Main Results

- Spectroscopic models have been developed which are capable of discriminating between closely-related food products e.g. extra virgin olive oils from Liguria and other regions in Italy, Corsican honey and honey from neighbouring territories.
- A spectroscopic method for confirming the identity of a branded product was demonstrated. Spectroscopy combined with mathematical modelling has been demonstrated to be suitable for demonstrating conformance to specification in a range of food products.

Opportunity/Benefit

By interaction with this expertise at Teagasc Food Research Centre Ashtown, food processors can reduce variability in the functional and other characteristics of their products, and move towards a PAT approach in food processing.

Collaborating Institutions

See full Technology Update

Project Number: 5430

Funding Source: FP6 (2003-Food-2A-0060942)

Date: January, 2011

Project Dates: Jan 2005 – Dec 2011

How to Proceed

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Technology

UPDATE

Secondary Cheese Processing

Key External Stakeholders

Irish manufacturers of cheese, processed cheese and milk protein powders, scientists with interest in the field of secondary cheese processing.

Practical Implications for Stakeholders

Key production variables that significantly affect the characteristics of processed cheese products (PCPs) were identified: characteristics of the natural cheeses used, types and levels of emulsifying salts, product pH, and processing conditions. The research provided insights into the mechanisms by which these variables affect PCPs. They alter protein hydration, protein voluminosity and fat emulsification, all of which in turn influence the structure and continuity of the protein network that forms the structural framework of the PCP.

Main Results

Using a given generic formulation and product composition, PCPs with widely different functionalities could be achieved by alteration of natural cheese characteristics, emulsifying salt type and level, product pH and processing conditions.

Processing was accompanied by a large increase in the solubility of the protein of natural cheese and other ingredients (e.g. rennet casein) used in the formulation, as a consequence of emulsifying-salt mediated demineralisation; nevertheless, most of the calcium and phosphorous in PCP remain insoluble in the form of insoluble calcium phosphate or calcium citrate inclusions.

Reducing the level of emulsifying salt below a critical level prevented the successful formation of PCP, owing to insufficient calcium removal from, and solubilisation of, the natural cheese protein.

Increasing processing time, temperature and shear had similar effects on PCP properties, albeit differing in magnitude of effect: significant increases in firmness and elasticity modulus and reductions in the fracture strain and in the flowability and fluidity of the melted PCP.

Opportunity/Benefit

The research provides an extensive database on how the functional properties of PCPs (e.g. texture, rheology and melt characteristics) may be altered by changing different process variables. It provides scientifically supported insights into the mechanisms operating during the manufacture of PCPs, and how these may be modulated for control of potential defects (such as *overcreaming*, oiling-off, low heat-stability) or customisation of product characteristics. This database is available to Irish dairy companies by way of scientific publications and provision of customised workshops.

Collaborating Institutions

N/A

Project Number: 5451

Funding Source: Dairy Levy

Date: February, 2011

Project Dates: Jan 2005 – Dec 2007

How to Proceed

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Technology

UPDATE

Understanding and Exploiting the Biogenesis of Cheese Flavour

Key External Stakeholders

Cheese producers, dairy industry, food manufacturers.

Practical Implications for Stakeholders

The project investigated mechanisms to control and accelerate Cheddar cheese flavour and the information generated within this project has significantly enhanced the understanding of flavour generation in Cheddar cheese which can also be applied to many other cheese varieties.

- This research has provided invaluable information on a range of factors that influence cheese quality and the rate of cheese ripening.
- Factors which impact on the activity of chymosin were elucidated.
- Mechanisms to enhance lipolysis in Cheddar cheese were identified.
- The performance of commercial accelerating ripening agents in Cheddar cheese were evaluated.

- Microfluidisation was identified as a practical method to create specific populations of attenuated lactic acid bacteria for use as adjuncts in cheese production.
- Microfluidisation was identified as a suitable method to create food grade liposomes which can be used to deliver exogenous enzymes in cheese curd, with minimum losses to the whey.
- Factors governing the encapsulation efficiency of enzymes and cell free extracts in liposomes were determined.

Main Results

This project investigated a range of factors that influence the ripening of Cheddar cheese. The major areas of focus were enhancing lipolysis and proteolysis through addition of exogenous enzymes, use of adjunct cultures and process manipulation of cheesemilk to control and accelerate cheese ripening.

Opportunity/Benefit

The capacity and expertise generated within this project is readily available and can be utilised for specific cheese applications by contacting the relevant researchers involved.

Collaborating Institutions

University College Cork; University of Limerick; Institute of Chemical Technology Prague; McGill University

Project Number: 5433

Funding Source: DAFF(04/R&D/C/238)

Date: March, 2011

Project Dates: Jan 2005 – Jun 2009

How to Proceed

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Technology

UPDATE

Understanding the Perception of Creaminess in Dairy Foods

Key External Stakeholders

Food and food ingredient manufacturers, dairy industry.

Practical Implications for Stakeholders

- High pressure processing was shown to enhance the creaminess of yogurts and produce low-fat yogurts as creamy, or *even creamier,* than their conventionally produced full-fat counterparts.
- A better understanding of the relationship between product structure and creaminess perception, based on composition and processing has been developed.

The results of this work have led to further funding from Enterprise Ireland under the Commercialisation Fund and Teagasc researchers are currently developing a new platform technology for manufacturing size controlled protein particles, specifically to be used as novel fat replacer

ingredients. Access to such an energy efficient and innovative food processing technology would benefit dairy and food ingredient companies greatly by allowing them to produce higher quality, low fat dairy-based products with enhanced nutrition at significantly lower production costs.

Main Results

- High pressure milk processing (microfluidisation) was shown to significantly improve the creaminess of low fat yogurts.
- The development of a new dynamic imaging technique for assessing product quality.
- A predictive model for creaminess based on composition, rheology and microstructure.
- Increased understanding of how microstructure can be controlled to enhance creaminess.
- Demonstration that fat release from food matrices can be controlled by pH and emulsifier type.

Opportunity/Benefit

There is an opportunity for dairy food ingredient manufacturers to partner with Teagasc to investigate the true potential of such high quality low fat dairy based ingredients using this novel approach through optimisation and validation for specific applications. Expressions of interest from relevant companies are welcome.

Collaborating Institutions

University College Cork

Project Number: 5606

Funding Source: DAFF (06/RD/TMFRC/431)

Date: July, 2011

Project Dates: Nov 2006 – Dec 2010

How to Proceed

For further information access the full Technology Update at:
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Technology

UPDATE

Status of the Phytochemical Compound, Falcarinol, in Minimally Processed Vegetables

Key Stakeholders

Vegetable processors, government authorities/ legislators, consumers, research community

Practical Implications for Stakeholders

Recently a group of falcarinol type polyacetylenes were shown to be protective against tumour development in humans. In comparison to other compounds with cancer protective effects, relatively little was known about the occurrence of these compounds in plant foods or the effect of industrial or domestic processing on their retention. This project examined the effect of various production processes (peeling, washing, cutting, packaging and storage) on the level of polyacetylenes in a selection of vegetables

including carrots, parsnips and fennel. Protocols have been developed for the maximum retention of these polyacetylenes in minimally processed vegetables.

Main Results

- The initial washing stage had no effect on polyacetylene levels.
- Significant losses occurred after peeling in carrots.
- The best retention of polyacetylenes was observed in shredded carrots.
- Polyacetylenes were not susceptible to further degradation when subjected to low or high oxygen MAP (modified atmosphere packaging) and stored for 7 days under chill conditions.
- The use of an air-breathable film as opposed to a conventional polyester-polypropylene film did not have a significant effect on levels of polyacetylenes in stored products.

Opportunity/Benefit

The results of this project will allow vegetable processors to optimise processing protocols for the retention of health promoting polyacetylenes in vegetables including carrots, parsnips and fennel.

Collaborating Institutions

NUI Galway, Natures Best Ltd., Wonderfoods Ltd.

Project Number: 5473

Funding Source: DAFF 06RDTAFRC518

Date: August, 2012

Project Dates: Dec 2006 – Nov 2010

How to Proceed

For further information access the full Technology Update at:
www.teagasc.ie/publications

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Technology

UPDATE

Meat4Vitality: Enhancement of texture, flavour and nutritional value of meat products for older people

Key External Stakeholders

Meat processors; Ingredients companies; Regulatory agencies: charities; nutritionists; care homes; DAFM.

Practical Implications for Stakeholders

Meat intake of elderly people is often reduced since meat is a complex matrix that can present a challenging substrate from a texture perspective. Older people pay closer attention to the texture of the food and are more demanding in this regard. There is considerable evidence that texture modified meat products will be more acceptable to older adults and lead to improvement in intakes. Meat products are ideal vehicles for fortification with extra protein, vitamins and minerals and reformed products will provide enhanced and targeted nutrition to promote healthy ageing and vitality in the older population.

Main Results

- Beef patties were enriched with plant-based protein ingredients: pea protein isolate, rice protein and lentil flour at two inclusion levels (3% and 7%) and their technological characteristics assessed.
- Preliminary results indicated that rice protein demonstrates good potential to enhance protein intakes as part of healthy beef products for the elderly.
- Currently, texture enhanced beef steaks are being developed.

Opportunity/Benefit

Healthy aging is a grand challenge of growing international importance. Red meat is intrinsically a source of certain nutrients which are particularly important for healthy aging. These include: protein for growth and repair, omega-3 fatty acids for cognitive function, as well as vitamins and micronutrients (iron, calcium, selenium and zinc).

Within the project we will optimize the meat processing formulation and packaging technologies in relation to food structure, flavour and nutritional value. We will demonstrate that meat products can be made more appealing to older adults by modifying their texture, while retaining or enhancing their nutritive value.

Eating healthy and getting active means you are less likely to develop a chronic disease at any age, “it’s never too late”.

Collaborating Institutions

University College Cork

Project Number: 11/F/045

Funding Source: FIRM

Date: 03/06/2015

Project Dates: 01/04/2013-31/07/2016

How to Proceed

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Technology

UPDATE

WPI impedes weight gain by reducing the size of the stomach and intestine

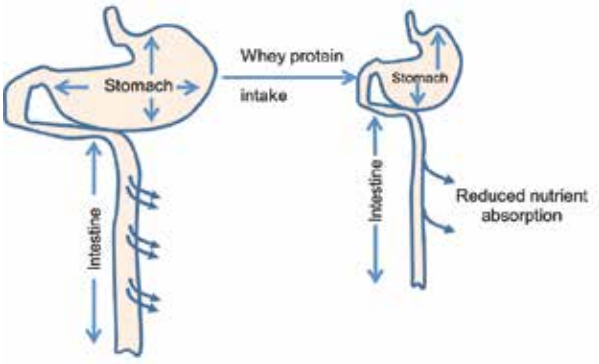
Key External Stakeholders

Dairy industry; ingredients companies; regulatory agencies; nutritionists; athletes; general public.

Practical Implications for Stakeholders

According to the World Health Organisation, nearly all Irish adults will be over-weight by year 2030. Thus, there is an urgent need to develop interventions that prevent the development of obesity.

Because whey is a by-product of cheese manufacture, there is a considerable economic benefit to using whey constituents as health promoting food products. Notably, whey protein isolate (WPI) has been shown to impede weight gain by reducing the size of the stomach and intestine. These findings provide the scientific backing for creation of whey protein enriched food ingredients or ready-made food products with anti-obesity effects.



Main Results

- Animals fed WPI show reduced weight gain compared to those fed casein.
- WPI reduced the size of the gastro-intestinal tract, which appeared to restrict the amount of food that can be ingested to support weight gain.

Opportunity/Benefit

Much attention has focused on identifying the bioactivity associated with milk proteins that reduce weigh gain by causing satiety (reduction in meal number) and satiation (reduction in meal size). We have identified a new mechanism by which WPI impedes weight gain involving the stomach and intestine. Thus, the dairy and Functional Food Industry will now be able to focus attention on WPI and develop protein enriched food ingredients or ready-made food products with anti-obesity effects. The efficacy of such products can be tested by undertaking animal feeding trials in Teagasc, which will help to further establish health claims, and commercialise the related products.

Collaborating Institutions

UCC, UCD, University of Helsinki (Finland), Chinese Academy of Sciences (Beijing, China).

Project Number: RMIS5974

Funding Source: Teagasc

Date: 30/04/2015

Project Dates: 01/05/2009-31/09/2014

How to Proceed

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Technology

UPDATE

A Food Matrix Approach to Meat Product Development

Key external Stakeholders

Primary meat processors; Ingredients companies; SMEs; Regulatory agencies: DAFM

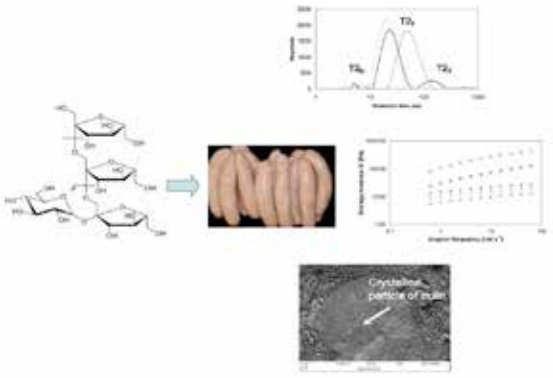
Practical Implications for Stakeholders

Processed meat products represent complex systems that can be considered as a 'matrix' of interacting components.

Increasing consumer awareness of health issues associated with high dietary intake are driving the need for change in the products available to them. Therefore, the meat industry is examining the possibilities of meat products with reduced fat salt and additives as well as meat-based functional foods as an opportunity to improve its public image and update dietary goals.

However, the removal of traditionally used ingredients with the goal of improving health and well-being, e.g. fat and salt, in processed meat products represents a significant technical challenge.

This is due to the fundamental role they play in the



structure or the formation of effective gels, allowing them to function as cohesive meat products.

By improving our understanding of the impact of interactions between the food matrix and novel ingredients on technological and sensory performance, we are developing strategies to optimise healthier versions of traditional meat products such as reduced fat and salt products and products including bioactive compounds and prebiotic fibres.

Main Results

- Comminuted products (burgers, breakfast sausages, and frankfurters) formulations were optimised using consumer sensory panels and instrumental measurements with regards to salt and fat levels that represented a significant decrease in their respective contents compared to their retail counterparts (controls).
- Using advanced experimental design software, both comminuted and whole muscle products formulations containing functional ingredients, such as fibre, prebiotics, omega-3 fish oils and antioxidants were optimised.
- Detailed ultra-structural analyses better elucidated the underlying forces governing overall product quality, the knowledge of which can be used in a more systematic scientific approach to new product development.

Opportunity/Benefit

A series of templates available to industry that can be used in future to predict the effects of alteration of various parameters on microstructure, molecular interactions and their relationship with product quality.

Collaborating Institutions

University College Cork,

Project Number: 5957

Funding Source: DAFM (08/RD/TAFRC/671)

Date: May, 2014

Project Dates: Dec 2008 – May 2014

How to Proceed

For further information access the full Technology Update at:
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Technology

UPDATE

Exploration of Irish Meat Processing Streams for Recovery of High Value Protein Based Ingredients for Food and Non-Food Uses

Key Stakeholders

Meat sector, food (human and pet), beverage, protein processors, sports, nutrition, biomedical, cosmetics.

Practical Implications for Stakeholders

Recovery of high value protein-rich functional co-products from meat processing streams represents an area of significant opportunity to enhance the economic performance and improve the environmental impact of the Irish meat Industry. ReValueProtein will capitalize on many potential opportunities to valorise meat processing secondary, by-product or waste streams. As there is no Irish based strategic initiative to support this exploitation, there is a pressing requirement for a nationally funded effort to support the meat industry in capitalizing on this opportunity. ReValueProtein is an ambitious project which brings together a multidisciplinary team [food chemistry, biosciences, tissue engineering, process (novel and pilot scale) technologies, consumer science, food and beverage technology] to generate technical know-how to develop functional co-products with applications in food, beverage, health and biomedical

engineering. Intellectual property, protocols and products generated will have relevance across all of these sectors.

The main activities fall under **three key scientific pillars:**

I. **Characterization** of source materials (offal, blood, trim etc), extracts and novel products;

II. **Processing** of source materials to generate products (including assessment of novel process technology and working up to pilot scale production);

III. Evaluation of **applications**: techno-functional (emulsification etc), health promoting, bioactive, bioavailability, tissue engineering etc.

All of these are underpinned by analysis of consumer attitudes and preferences pertaining to sustainable processing and the products generated.

Main Results

Assessing processing technologies which are of relevance for the recovery of functional proteins from low, neutral or negative value products.

Proteins exhibiting techno-functional (emulsification) properties recovered from bovine offal.

Other raw materials reviewed with a view to extracting or generating high value functional proteins or peptides.

Opportunity/Benefit

Recovery of value from meat processing streams holds strong potential for the meat sector to generate higher value products from existing low/neutral value products. These higher value products can have applications in a variety of arenas such as the food and beverage (emulsifiers, binders, flavour etc), sports/nutrition, biomedical (bioactive peptides, collagens for wound repair) sectors.

Collaborating Institutions

University College Cork, University College Dublin, NUIGalway, Tralee IT/Shannon ABC

Project Number: 6430

Funding Source: DAFF 11F043

Date: April 2014

Project Dates: March 2013 – Feb 2018

How to Proceed

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UPDATE

Development of Healthier Meat Products

Key External Stakeholders

Meat processing companies, functional ingredient suppliers and consumers.

Practical Implications for Stakeholders

Meat and meat products are considered vital components of a healthy diet. A lack of consumer confidence in meat has been triggered by the link between meat consumption and illnesses such as cardiovascular disease, cancer, hypertension and obesity. Research into the development of healthier functional meat products is advantageous to the prepared consumer foods industry and the consumer as the link between diet and disease prevention continues to grow. This project examined potential for the manufacture of functional meat products containing health-promoting plant extracts (Rosemary, Oregano, Sage, Echinacea, Green Tea Extract, Green Coffee Antioxidant, Lutein, Sesamol and Ellagic Acid).

Main Results

- Plants extracts were incorporated as functional ingredients into processed beef (raw and cooked minced patties, sliced beef) and pork products (raw and cooked minced patties, sausages, black puddings, hams).
- Plant extracts demonstrated lipid antioxidant activity in functional meat products.
- Beef and pork quality and shelf-life parameters were not negatively influenced by plant extracts.
- Digested fractions from beef and pork patties enriched with oregano, sage, lutein, sesamol or ellagic acid exhibited varying degrees of bioactivity in cell culture.

Opportunity/Benefit

- Manufacture of superior quality functional meat products with health enhancing properties.
- Restore consumer confidence in meat products.
- Concerns regarding the safety and toxicity of synthetic antioxidants may be overcome by the use of health promoting plant extracts.

Collaborating Institutions

School of Food and Nutritional Sciences, UCC.
Teagasc Food Research Centre, Ashtown.

Project Number: 04/R&D/C/236

Funding Source: DAFM - FIRM

Date: June, 2015

Project Dates: Jan 2005 – Dec 2008

How to Proceed

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University College Cork, Ireland

UPDATE

Developing Novel Convenient Meat Based Products by Application of High Pressure Processing

Key External Stakeholders

Meat processors, consumers

Practical Implications for Stakeholders

The output of this research showed that a combination of high pressure (HP) processing (300 or 400 MPa for 5 mins) and mild temperatures (20 or 60°C) or organic acids (OA) can increase significantly the shelf-life and safety of a convenience muscle-base meal (meat+vegetables+sauce) products packaged under modified atmosphere packaging (MAP).

Main Results

- HP treatment can affect the physicochemical quality parameters such as texture and lipid oxidation of meat products.
- From the microbiological and physicochemical characteristics, the best HP treatment to increase shelf-life and have good overall acceptability of the convenience meal was 400 MPa for 5 mins at 20°C.
- The combined treatment of OA-HP (300 MPa)-MAP exhibited a synergetic interaction and it was the most efficient in extending the shelf-life of chicken breast fillets, which maintained their sensory and microbiological quality for up to 28 days.
- For OA-MAP and HP-MAP fillets, the storage life was estimated to be two weeks while that of the untreated fillets (Control-MAP) was estimated to be one week.
- Colour, tenderness and overall acceptability were the best maintained sensory attributes during storage for OA-HP-MAP samples.
- This confirms the potential utility of the hurdle strategy for improving the shelf-life of meat products

Opportunity/Benefit

The synergistic effect of this HP-based hurdle strategy was higher than those previously reported when applying several combined hurdles to meat based products. Expressions of interest in accessing or furthering this research are welcome.

Collaborating Institutions

Food Research Centre, Ashtown

Project Number: 5590

Funding Source: DAFF (R&D/TAFRC/521)

Date: April 2014

Project Dates: Sep 2006 – Nov 2010

How to Proceed

For further information access the full Technology Update at:
www.teagasc.ie/publications

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UPDATE

High Pressure Processing to Control Pathogens in Ready-to-Eat, cooked meat products with reduced-sodium, lower preservatives and no artificial colours or flavours

Key External Stakeholders

Meat processors, consumers

Practical Implications for Stakeholders

Sodium in meat products has a variety of functions: microbiological safety, preservation, taste, flavour, texture, structural integrity, nutrition, and colour. The reduction of sodium in meat products presents significant challenges to develop meat products maintaining their quality attributes in an acceptable and affordable manner. e.g. too little sodium in meat products can result in unstable emulsions with poor texture. High pressure processing (HPP), is an alternative method for food preservation, fulfilling consumer requirements for minimally processed and additive-free products and inactivates pathogenic and spoilage micro-organisms, including; Salmonella, Escherichia coli, and Listeria at room temperatures, maintains sensory and nutritional properties and

contributes to the development of meat products with lower salt content. Hurdle technology presents vast opportunities for processing and preserving food of excellent quality.

Main Results

This project will:

- Reformulate traditional meat products with significantly reduced sodium and preservatives
- Investigate the use of HPP and organic acids as hurdles to control pathogens and increase shelf-life in these products.
- The impregnation of flavour by HPP on lower cost meat small joints of beef and pork leading to added-value-products.
- Through shelf-life extension, a reduction in retailer supply chain wastage of these products is foreseen, improving sustainability.

Opportunity/Benefit

The innovative approach of this project is to develop meat products with significantly reduced-sodium and preservatives through a product reformulation by product optimisation using RSM and demonstration of the manufacture of these products with increased shelf-life, safety and quality achieved with the application of hurdle technology at laboratory and industrial level. Expressions of interest in accessing or furthering this research are welcome.

Collaborating Institutions

Food Research Centre, Ashtown

Project Number: 11/F/031

Funding Source: DAFM FIRM

Date: May 2015

Project Dates: 01/08/2013 –30/08/2017

How to Proceed

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University College Cork, Ireland

UPDATE

Smart packaging systems containing novel optical O_2 and CO_2 sensors for the food industry

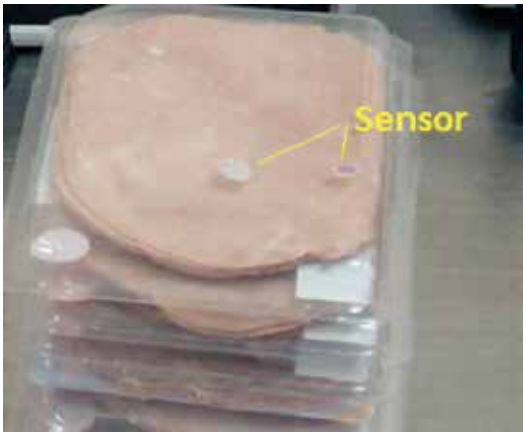
Key External Stakeholders

Department of Agriculture, Food and Marine, FIRM.

Food and Packaging industry.

Practical Implications for Stakeholders

The SENSOPACK project is aimed to develop a range of advanced sensor materials and intelligent packaging materials specifically tailored to food packaging applications, which allow up-scaling, cost reduction and integration.



Main Results

- New types of O_2 sensor materials with improved performance and integration options, reduced cost
- New smart packaging materials integrated with O_2 sensors
- Detailed sensor characterisation and testing in small and medium scale laboratory and industrial trials

Opportunity/Benefit

A range of new O2 sensor materials is available for testing with various types of packaged food products and beverages – in laboratory and medium-scale trials with industrial partners – on their packaging facilities or at UCC labs.

Collaborating Institutions

Queen's University of Belfast (Prof. Andrew Mills)
UCC Packaging laboratory (Dr. Joe Kerry)

Project Number: DAFM 11/F/015

Funding Source: FIRM

Date: 04.05.2015

Project Dates: Jan 2013-Sep 2016

How to Proceed

For further information access the full Technology Update at:
www.teagasc.ie/publications

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UPDATE

PROSSLOW: Development of Consumer Accepted Low Salt and Low Fat Irish Traditional Processed Meats

Key external Stakeholders

Meat and processed meat industries

Practical Implications for Stakeholders

PROSSLOW optimises traditional processed meats (TPMs), including **cured** and **uncured meats**, through the reduction and or replacement of salt and fat with respect to functionality, food safety, consumer sensory quality and commercial viability.

Main Results

- To date we have completed the experimental and data input for two large studies.
- These first two studies determined the impact of different salt and fat levels on the physiochemical and sensory properties of white and black pudding sausages.

Opportunity/Benefit

Salt and fat levels in commercial black and white pudding were evaluated as well as consultation with the FSAI salt reduction programme report 2013. Salt and fat levels were set in these product matrices reflecting this variation as well as levels above and below these levels as well as FSAI targets. PROSSLOW optimises traditional processed meats (TPMs), including **cured** and **uncured meats**, through the reduction and or replacement of salt and fat with respect to functionality, food safety, consumer sensory quality and commercial viability. **The minimum concentrations of preservatives** will be identified while maintaining the above attributes in order to determine the very limits of such removal. Sensory consumer research will be employed to optimise each of these approaches as well as using active coatings on **packaging innovation**, through the use of non contact bioactive materials, to synergistically replace preservatives and maintain functionality, food safety and shelf-life of products where preservatives have been removed, reduced or replaced. The project will show clear quantitative goals for the sequential reduction of salt and fat in TPMs.

Collaborating Institutions

Teagasc, Ashtown

Project Number: 11/F/026

Funding Source: FIRM

Date: April 2014

Project Dates: Sept 2012 – Sept 2015

How to Proceed

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Food Innovation Alliance

Expertise

Technology

EXPERTISE

Cereal and Bakery Technologies

Teagasc researchers can provide specialist know-how, facilities and services in cereal science and bakery technology. This includes, but is not limited to, product formulation, innovation and sample testing. Researchers at Teagasc are available to provide consultancy or carry out contract/collaborative research for companies in the aforementioned areas with a view to exploitation of novel products/processes in bread and baked goods markets. A range of testing services is also offered from shelf life to microbial to residue analysis.

Background

Through internally and externally funded research Teagasc researchers have developed significant expertise in the area of baked goods and cereals technology. Numerous collaborations with third level institutions and companies have produced many successful research outputs, and we continue to encourage such links and to work with companies to assist in product innovation, new product development and service provision.

Benefits to Industry

The expertise and facilities, primarily at Teagasc Food Research Centre in Ashtown allows millers, bakers and food companies access to state-of-the-art facilities and specialist knowledge, as well as offering a range of specialist and routine services.

Areas of Expertise

- Wheat flour chemistry and rheology.
- Gluten-free formulations.
- Low glycaemic breads.
- Beta-glucan enriched breads.
- Health/functional snacks.

Facilities/Equipment

- Mill Room.
- Test bakery.
- Dough rheology laboratory.
- Access to National Imaging Centre.
- Sensory testing facility.
- Product development plant/incubation units.

Range of Solutions

Depending on the nature of work requested and the inputs from each party, contract research or collaborations can be considered. This could range from new product development, to pilot scale trials. Ingredient sourcing, consumer research and testing services (shelflife, microbial, quality testing, residue analysis etc.) are other options available.

Of Interest to

- Millers, bakers and those in the snack food industry who incorporate cereal and flours into their products.
- Niche baked goods manufacturers.
- Health food specialists in breads/confectionary/baked goods market.

How to Proceed

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Teagasc
Agriculture and Food Development Authority

Technology

EXPERTISE

Cheese Technology

Teagasc, through its resources at its Food Research Centre, Moorepark has extensive knowledge on the science and technology of a range of cheese types including Cheddar, Mozzarella and novel hybrid varieties. This knowledge, combined with an active ongoing research programme, offers the cheese industry a range of leading edge technologies to support the innovation of cheese products and optimisation of cheese making efficiency.

Background

The fundamental knowledge on the critical factors affecting the composition, yield, biochemistry, rheology, and cooking properties of natural cheeses and processed cheese products are well understood. Teagasc has been engaged in this research for many years with food research institutes and universities on national and international platforms.

Benefits to Industry

Engagement of cheese manufacturers with Teagasc gives access to state of the art facilities and an extensive research expertise in all aspects of cheese science and technology. This facilitates the innovation of new cheese products and optimisation of manufacturing efficiency.

Areas of Expertise

- Texture and functionality of natural cheese and processed-/analogue-cheese.
- Manufacturing efficiency and component recoveries.
- Cheese flavour control and diversification.
- Development, scale-up and diversification of a range of cheese types: brine salted, dry salted, reduced-fat variants.
- Advanced methodologies for assaying cheese texture and functionality.
- Range of analytical capabilities for composition, biochemistry, microbiology, rheology, and functionality.
- Ripening rooms, mixers, culture production unit for specialised starter blends.
- Filtration and dehydration equipment for manufacture of ingredients for use in cheese products.

Range of Solutions

Teagasc can provide a range of solutions through consultancy services, contract research and collaborative arrangements with industry, including:

- Identification and selection of micro-organisms with potential to influence flavour development.
- Development and scale-up of different cheese types.
- Increasing cheese making efficiency.

Facilities/Equipment

- Pilot plant facilities for milk standardisation equipment, pilot scale cheese vats 500-3000L.
- Cookers for processed-/analogue-cheeses.

How to Proceed

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Technology

EXPERTISE

Whey Processing Capabilities

Teagasc has the expertise and experience to isolate and fractionate individual components of whey with a view to adding considerable value to these sought after protein ingredients. There is considerable commercial value in fractionation of individual whey proteins with well characterised functional and biological properties for use in consumer foods, nutraceutical and therapeutic applications.

Background

Whey protein is a mixture of a number of proteins that have their own unique nutritional, functional, physiological and nutraceutical properties. These properties are not fully exploited in whey protein concentrates and isolates, hence the value in characterising the individual whey proteins for their potential use in consumer foods, nutraceuticals and therapeutics. Teagasc, Moorepark, has extensive experience of working with companies in this area, as well as state-of-the-art facilities and equipment.

Benefits to Industry

Teagasc can assist manufacturers of whey products and end-users who use whey protein as an ingredient in formulated foods such as infant formula, sports and other beverage applications. Expertise is available for development, scale-up, optimisation and technology transfer of whey protein separation processes based on centrifugal and membrane filtration technologies. This should allow manufacturers of whey ingredients and nutritional beverages to develop new products centred on scientifically proven functional attributes.

Areas of Expertise

- Separation of whey protein fractions at laboratory and pilot scale and scale-up of processes.
- Optimisation/modification of existing whey protein separation processes.
- Analytical capabilities including HPLC electrophoresis, texture/rheology measurements, analysis of protein functionality, gelation, emulsification, foam formation, solubility.
- Engineering, rheology, microscopy and heat stability capabilities.

Facilities/Equipment

- Pilot plant facilities of Moorepark Technology Ltd.
- Cross-flow membrane filtration technology (tubular, spiral-wound, plate and frame).

- Centrifugal technology.
- Electro-dialysis plant 2500l/hr whey.
- Analytical instrumentation.

Range of Solutions

We can provide a range of solutions from technical services, contract production of whey fractions for market evaluation, consultancy and project management, to partnering in collaborative research in the area of whey processing.

Of Interest to

- Manufacturers of dairy ingredients and nutritional beverages including infant formula, medical and sports applications.
- Any companies using or interesting in adding value to their whey protein as an ingredient, from consumer foods to nutraceuticals to therapeutic applications.

How to Proceed

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Technology

EXPERTISE

Meat Technologies

Teagasc, through its food research centre at Ashtown, supports innovation in the Irish meat industry through the delivery of high quality research and industry development programmes. Areas of expertise include meat quality and safety, process technologies as well as the development of healthier and more functional added value meat products. Facilities include a research abattoir, cooked meats facility, sensory unit and state-of-the-art research laboratories.

Background

Research projects funded especially through DAFF, but also Enterprise Ireland and industry have strengthened the meat research expertise and facilities at Teagasc. State-of-the-art facilities include a pilot scale meat unit incorporating a licensed abattoir, production units for meat processing and packaging under controlled refrigeration systems and a cooked meat facility for curing, smoking and cooking.

Benefits to Industry

Teagasc supports competitiveness and sustainability in the meat sector through excellence in science, technology and management systems. Advice in areas such as packaging/labelling, legislation and food assurance standards, ingredients and equipment sourcing can be provided through consultancy. Various testing services are offered on a fee-paying basis as well as access to training and skills development programmes and facilities.

Areas of Expertise

- Enhancement of meat quality.
- Evaluation of meat quality.
- Development of healthier functional products and value added processed meat products.
- Exploitation of meat by-products and waste streams.

Facilities/Equipment

- Slaughtering/boning.
- Meat processing and cooking.
- Packaging.
- Chilling and freezing.
- Analytical (incl. GC, GC-MS, HPLC, NMR).
- Sensory testing facilities.
- Product development plant/incubation units.

Testing services

- Shelf-life and microbial testing.
- Residue and chemical analysis.
- Compositional and nutritional analysis.
- Consumer and sensory studies.
- Quality testing including flavour, colour and textural analysis.

Range of Solutions

Companies have the opportunity to pay for consultancy services, product development support, access to facilities, training programmes on an individual and confidential basis. Also, routine and speciality meat testing services are available. Collaborations in meat research with academic and industrial partners are also actively undertaken.

Of Interest to

- Meat processors and manufacturers.
- Consumer food manufacturers incorporating meat into their products.
- Research institutes/universities seeking collaborators.

How to Proceed

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Technology

EXPERTISE

Innovative Dairy Flavours

Researchers based at Teagasc Food Research Centre, Moorepark have developed a strong scientific base on the understanding of dairy flavour pathways, particularly in relation to cheese, cheese concentrates, butter and yogurt which is now available for exploitation by companies. We can provide specialist know-how and analytical services in formulating and processing natural cheeses in combination with other ingredients in order to develop a range of dairy flavour ingredients to suit particular food applications in the convenience and snack-food industry.

Background

Less personal time for food preparation has led to an increase in the consumption of prepared and semi-prepared convenience foods. Food manufacturers have to target these developments to ensure competitiveness. Dairy ingredients are an important component in many foods, used to provide flavour, functional and/or visual attributes. At Teagasc a strong scientific base has been developed on the understanding of dairy flavour pathways, particularly in relation to cheese, cheese concentrates, butter and yogurt, through years of research and commercial interaction.

Benefits to Industry

Engagement with Teagasc by food companies provides

- Access to expertise, state-of the-art infrastructure and specific technological services.
- Assistance in development of new dairy flavour ingredients.

Areas of Expertise

- Development and use of concentrated dairy and cheese flavours, and enzyme-modified cheeses.
- Selection of commercial food grade enzymes through database of key enzyme activities.
- Biotechnological approaches to flavour development.
- Selection of bacterial cultures for flavour development.
- Identification of off-flavours e.g. lipolytic & oxidative rancidity.
- Use of micro-encapsulation for flavour protection.
- Advanced microbiological, biochemical and analytical capabilities.

Facilities/Equipment

- Pilot plant facilities incl. mixers and tall-form spray drier.
- Separation, concentration, homogenisation and heating systems.

- Analytical capability incl. advanced chromatographic techniques, GC-MS, GC-O, GC-FID, GC-PFPD, HPLC.

Range of Solutions

There are several routes by which companies can engage with Teagasc, from provision of technological services, to consultancy, contract or collaborative research.

Of Interest to

- Food ingredient companies involved in development of dairy flavoured ingredients.
- Food manufacturers using dairy flavours in preparation of convenience and snack-foods.

How to Proceed

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Technology

EXPERTISE

Seafood Technology

Teagasc, through it's food research centre at Ashtown, supports innovation in the seafood sector through delivery of high quality, commercially-relevant research. Researchers and technologists have wide-ranging expertise and work closely with industry to develop innovative concepts with unique selling points and world-leading technologies.

Background

As an island country, off the mainland of Europe, Ireland has a vast marine biodiversity that can be exploited in a variety of ways. Over twenty years of seafood research funded by DAFF, Enterprise Ireland, Bord Iascaigh Mhara (BIM), EU funding and private industry has provided world-class knowledge in the areas of packaging, ingredients and processing technologies. Teagasc works closely with BIM to ensure that Irish seafood SME's have access to emerging technologies and assistance in applying them within their businesses. The Marine Functional Food Research Initiative, led by Teagasc Ashtown, is focused on the identification of novel marine food ingredients and products which will allow for diversification into new markets. Teagasc is currently investigating the use of fish processing waste, the sustainable exploitation of underutilised species of fish and seaweed, and the development of value-added products from finfish and shellfish.

Benefits to Industry

Research staff and technologists at Teagasc, Ashtown recognise that viable seafood concepts are underpinned by strong science and an understanding of the interactions between the product, process and packaging. The wide ranging expertise and interdisciplinary team approach ensures solutions can be developed to maximise product quality and eating experience. Teagasc works closely with industry and has established linkages with international experts in the field of seafood R&D including NOFIMA, CSIC, SEAFISH-UK and other world-class institutions. Industry-relevant workshops ensure companies are kept up to date with relevant packaging, labelling, food safety and processing developments and Teagasc scientists ensure that knowledge is transferred from research to industry via close interactions with BIM and seafood sector businesses.

Areas of Expertise

- Processing technologies.
- Packaging technologies.
- Temperature mapping.
- Effect of processing on eating quality and nutrition.
- Interaction of multi-component ready meal solutions.
- By-product utilisation and nutraceutical development.

Facilities/Equipment

- Seafood processing and cooking equipment.
- Packaging equipment.
- Chilling, freezing and freeze-drying facilities.
- Analytical equipment (GC, GC-MS, HPLC, NMR).
- Sensory testing facilities.
- Product development plant/incubation unit.

Range of Solutions

Teagasc provides a range of services to seafood companies and undertakes collaborative/contract research incorporating new product development, pilot scale trials, packaging solutions, ingredient sourcing, consumer research and testing (microbial, quality, sensory, residue etc.).

Of Interest to

- Seafood processors and related companies.
- Seafood ready-meal manufacturers.
- Food industry companies wishing to incorporate marine ingredients.

How to Proceed

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Technology

EXPERTISE

Consumer Behaviour and Food Marketing

Improving strategic marketing performance of the Irish agri-food sector is the main objective of the Consumer and Market Insights Research team at Teagasc Food Research Centre, Ashtown. We carry out both consumer and market research on many food related topics and use qualitative and quantitative research techniques. The team provide advice on consumer behaviour, innovation management, new product development, market development and food policy.

Background

Through internally and externally funded research Teagasc researchers have developed significant expertise in the area of consumer behaviour and food marketing. Numerous collaborations with third level institutions and companies have produced many successful research outputs, and we continue to encourage such links and to work with companies to assist in new product development through market insights and understanding the target consumer.

Benefits to Clients

Knowledge and insights regarding consumers' wants, needs and perceptions are essential for focusing innovation efforts developing and marketing new products. The market insights covers innovation management, strategic market planning, marketing channels, and supply chain and relationship management.

Areas of Expertise

- Consumer-led new product development.
- Segmentation and consumer profiling.
- Insights into consumers e.g. behaviour and attitudes.
- Risk perception and communication.
- Market analysis and planning.

Facilities/Equipment

- Quantitative research
  - Consumer surveys
  - Product testing
- Qualitative research
  - Individual depth interviews
  - Mini-group discussions
  - Telephone depth interviews
  - Focus groups
- Executive interviews

Range of Solutions

Depending on the nature of work requested and the inputs from each party, contract research or collaborations can be considered. This can range from surveys to smaller focused studies to market trends and reviews.

Of Interest to

Expertise and services will be of interest to

- Food manufacturers.
- Food retailers.
- Business start-ups.
- Public agencies and policy makers.
- Researchers interested in commercialising their research.

How to Proceed

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Technology

EXPERTISE

Food Authenticity and Quality Confirmation

Teagasc researchers can provide specialist know-how, facilities and services in food quality and authenticity confirmation, with a view to the development of appropriate solutions to issues of quality control and product authenticity. This includes, but is not limited to, raw material analysis, in-process testing and final product clearance. Specifically, this includes the use of infrared spectroscopy combined with sophisticated mathematical procedures to perform direct, rapid, non-destructive and real-time analysis of composition and quality.

Background

Over the years, Teagasc researchers have developed world-class expertise in the area of infrared spectroscopy and multivariate data analysis. Extensive collaborations with third level institutions and companies both in Ireland and abroad have produced a wide-range of successful research outputs. Teagasc encourages the growth of such links nationally to assist in the development of rapid, non-destructive and low-cost solutions to the problems of confirming conformance to specification of incoming raw materials, in-process and finished goods in companies all across the food processing industry. Such solutions also contribute to effective traceability systems.

Benefits to Industry

Through Teagasc staff and infrastructure, food companies operating across all sectors can access state-of-the-art facilities and specialist knowledge. This expertise is of significant value for the protection of brand integrity through confirmation of conformance to specification of raw, intermediate or finished products.

Areas of Expertise

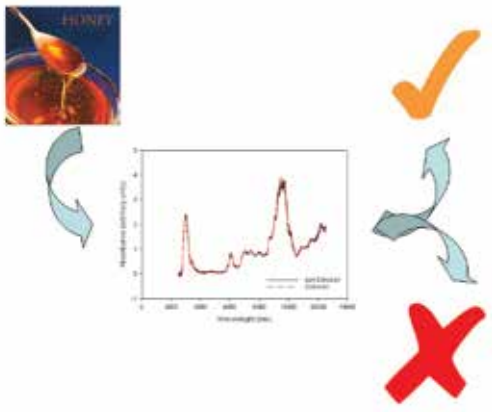
- Near and mid infra-red spectroscopy.
- Multivariate data analysis.
- Calibration development for quantitative applications.
- Discriminant and class-modelling analysis for quality assurance and authenticity applications.

Facilities/Equipment

- Near infrared scanning instrument.
- Mid-infrared scanning instrument.
- A full range of accessories for both.
- Access to a wide suite of appropriate software packages.

Range of Solutions

Depending on the nature of work, service provision or contract/collaborative research can be considered. This could range from new, off-line testing protocols, batch conformance to specification analysis through to on-line systems and quality monitoring. Equipment sourcing, evaluation of the role of hand-held equipment, software identification and early-stage training are other options.



Of Interest to

- Companies in all sectors of the prepared foods industry.
- Food ingredient manufacturers.
- Companies in the beverage and spirits industries.
- Commodity producers in the meat and milk sectors.

How to Proceed

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Technology

EXPERTISE

Generation and Characterisation of Bioactive Compounds

The Functional Foods Facility at Teagasc provides specialist know-how and services in the field of bioactive compound generation, isolation and chemical and biological characterisation with a view to exploitation of novel products/processes in the development of functional food and beverages. Expertise available include the generation of bioactive compounds from a myriad of raw material sources, including meat and fish by-products, cereal, plant and milk processing waste streams.

Background

The Food for Health research programme is central to Teagasc's role in the development of the knowledge based bio-economy, since it aims to assist Irish food companies to set more ambitious targets for innovation and technology development. Teagasc has significant expertise and infrastructure in the area of bioactive component isolation and characterisation. Numerous collaborations with third level institutions and companies have led to many successful research outputs, and we encourage such links and work with companies to assist in product innovation, new product development and service provision.

Benefits to Industry

Functional food research is particularly important at the present time due to the European Food Safety Authority regulations with regards to functional food health and novel food claims, both of which are of interest to food and beverage manufacturers alike. Teagasc Food Research Centre, Ashtown incorporating the new nutraceutical research facility allows food companies access to state-of-the-art facilities and equipment as well as specialist knowledge through a variety of means.

Areas of Expertise

- Marine carbohydrates, proteins, peptides, lipids.
- Flavour ingredients from terrestrial and marine sources.
- Meat and marine bioactive peptides.
- Beta-glucan ingredients.
- Heart health, antimicrobial and anti-diabetic functional ingredients.
- Low salt ingredients.
- Alternative natural flavour ingredients and preservatives.

Facilities/Equipment

- HPLC, NMR, MS facilities and expertise.
- Sensory testing facility.
- Product development plant/incubation units.

Range of Solutions

Depending on the nature of work requested, service provision or contract/collaborative research can be considered. This ranges from new product development, to pilot scale trials, ingredient sourcing, consumer research and testing (shelf-life, microbial, quality, residue etc.).

Of Interest to

- Food, beverage and snack companies.
- Niche manufacturers and entrepeneurs.

How to Proceed

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Technology

EXPERTISE

Thermal Analysis of Foods

Teagasc researchers can provide specialist know-how, facilities and services in thermal analysis of foods and ingredients. This includes food materials and product process evaluation, stability studies and sample testing. Researchers at Teagasc Food Research Centre, Moorepark are available to carry out contract or collaborative research with companies in the aforementioned areas with a view to exploitation of novel ingredients, products/processes. A range of testing services and consultancy is also offered.

Background

An understanding of the influence of temperature on physicochemical/structural changes in food provides manufacturers with a mechanism for optimisation of processing conditions and, ultimately, improves product quality. Teagasc, with the support of the Teagasc Vision Program, recently installed state-of-the-art DSC and DMA instrumentation at Teagasc Food Research Centre, Moorepark. Methodologies have been developed and the instruments are validated for a comprehensive range of thermal analysis applications.

Benefits to Industry

This state-of-the-art thermal analysis equipment strengthens the research and development capabilities of the Irish food industry. This equipment enables the measurement of the physical properties of food materials and products and determination of their thermal and mechanical histories. Hence, thermal analysis will assist in the optimisation of processes used in food manufacture and the stability of foods in various environments.

Areas of Expertise

- Phase/state transitions of food ingredients.
- Crystallisation and melting behaviour of fat.
- Thermal properties of proteins, including thermal and freezing induced denaturation.
- Gelatinisation behaviour of starches and interactions with other ingredients.
- Oxidative decomposition, oxidation stability of food components.
- Mechanical relaxation of food ingredients.
- Mechanical and viscoelastic behaviour/properties of food.

Facilities/Equipment

- Differential Scanning Calorimetry (Q2000 Tzero DSC, TA Instrument).
- Dynamic Mechanical Analyser (Q800 DMA, TA Instrument).
- Humidity Control Unit and Liquid Nitrogen Cooling system.

Range of Solutions

There are several possibilities by which companies can engage with Teagasc, from provision of services, to contract or collaborative research.

Of Interest to

- Dairy and Food Industry.
- Food Ingredient and Infant Formula Manufacturers.

How to Proceed

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Technology

EXPERTISE

Food Bio-test Capabilities

The prevalence of major diseases such as obesity and diabetes is increasing in the human population. Therefore, a major focus of the industry involved in the Functional Food sector is to develop food ingredients that could improve our health and reduce diseases. An important aspect of assessing such ingredients is feeding trials. Teagasc is in a position to assist companies in this process through its state-of-the-art Food Bio-test facility and related experience, based at Moorepark, by testing the food ingredients of interest *in vivo*.

Background

As part of Teagasc's on-going commitment to improving the health of people in Ireland, a Food Bio-test facility was established with the aim of identifying bioactive nutrients, prebiotics, probiotics and their derivatives. In this facility, feeding trials are being carried out on pigs and mice in two dedicated research units. By utilisation of state-of-the-art technology, we are able to assess how each potential dietary ingredient that we test affects physiology and cellular activity.

Benefits to Industry

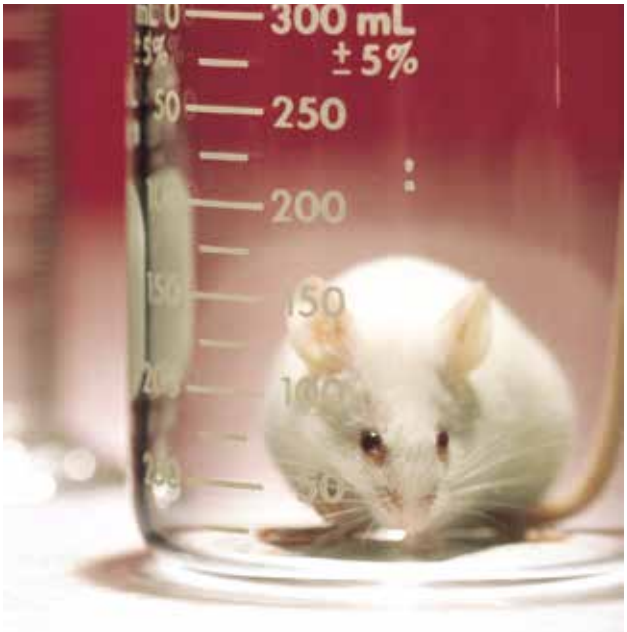
By carrying out feeding trials on behalf of clients, we can assist food ingredient manufacturers interested in functional foods in the establishment of health claims for food ingredients.

Areas of Expertise

- Human diseases such as obesity and associated clinical conditions.
- Gut health.
- Physiology, biochemistry and molecular biology.
- Dietary challenges to mice and pigs.

Facilities/Equipment

- Dedicated research units to perform animal trials.
- State-of-the-art technology to measure physiological parameters such as food intake, body weight, body composition and locomotor activity, circulatory factors such as hormones, cellular activity including expression of genes.



Range of Solutions

We are able to perform either short term (days) or long term (months) trials to understand how the food ingredients may influence health over time. In addition, quantity and quality of the food ingredients could also be varied to identify the optimum dietary challenges that give rise to the most beneficial effects on health.

Of Interest to

Companies and any institute involved in the functional food sector.

How to Proceed

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EXPERTISE

ICT for AgriFood

The future growth of Ireland's agri-food and marine industry is based on a strategy of ensuring the highest possible returns are secured for the high-quality food produced through traceable, sustainable and information-driven production practices. Meanwhile, the Internet Of Things (IoT), through new, smart, connected systems with embedded IoT sensors, are creating new manufacturing efficiencies, products and services that redefine the customer value proposition. The interface between ICT and agri-food represents an ideal opportunity for Ireland to achieve the ambitious goals set forth under the Innovation agenda in Ireland's Harvest 2020 strategy.

Background

Tyndall National Institute is one of Europe's leading research centres in Information and Communications Technology (ICT) hardware and systems integration.

Our institute hosts the only full Silicon CMOS, Micro-Electro Mechanical Systems (MEMS) and III-V Wafer Semiconductor fabrication facilities and services in Ireland. We are experts at designing, miniaturising and prototyping products particularly in the electronics, medical devices, energy, communications and photonics sectors.

As Ireland's largest research institute, we host over 460 researchers, engineers and support staff, including 135 full-time postgraduate students. Together we generate over 200 peer-reviewed publications each year.

Benefits to Industry

The Tyndall ICT programme for Sustainable Agri-food brings together up to 10 research teams across the whole institute, who have been working in this space for more than a decade.

- Micro/Nano systems PAT for Food & Beverage production
- Smart Sensors and Systems
- Cyber Physical Systems for the Internet of Things
- Data Analytics
- Smart packaging

With a network of over 200 industry partners and customers worldwide, we are focused on delivering real impact from our excellent research. We generate approx. €30M in income each year, with over 85% coming from competitively won contracts.

Areas of Expertise

- Wireless Sensor Networks
- Microelectronic and Photonic integration

- Nanosensor Development
- Embedded sensor technology

Facilities/Equipment

- Full silicon CMOS fabrication
- Sensor semiconductor fabrication
- Micro/nano visualisation (SEM,TEM & AFM)

Range of Solutions

There are several possibilities by which companies can engage with Teagasc, from provision of services, to contract or collaborative research.

Of Interest to

Dairy and Food Industry.

How to Proceed

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EXPERTISE

Food Packaging Expertise at UCC

Researchers in the Food Packaging Group at UCC can provide specialist know-how, facilities and services in the area of food and beverage packaging. This includes food packaging materials, product composition, product-process evaluation, stability studies and sample testing. Researchers in the Food Packaging Group within UCC are available to carry out contract or collaborative research with companies in the aforementioned areas with a view to exploitation of novel packaging technologies. A range of testing services and consultancy is also offered.

Background

The packaging of meat or any other food or beverage product is the most critical form of preservation applied to food products today. It is the process which will ultimately deliver the product in as near a state of quality as was originally possessed by the product at the point of packaging, but deliver this over a longer time frame; often referred to as shelf-life or storage life. Packaging is a dynamic and ever-changing process with new packaging systems and materials coming on to the market all of the time. It is essential that the Irish meat, food and beverage industries adopt these technologies and materials so that competitive advantage can be obtained by doing so.

Benefits to Industry

This state-of-the-art packaging facilities that exist in the School of Food and Nutritional Sciences contain very specialised analytical systems and test equipment which is required in order to authenticate packaging materials and systems and pin-point where these materials and systems are failing to properly contain, protect and preserve food products and most importantly of all; why they are failing to do so. The Food Packaging Group at UCC have a very good working relationship with the meat, food and beverage industries and the benefits to the industry is being able to meet members of the group, discuss their technical difficulties and find solutions to their problems. The Food Packaging Group at UCC is a unique grouping of researchers, working in a very specialised research field and there to service the industry where required.

Areas of Expertise

- Advice on assessment/selection criteria for industrial usage of packaging
- Packaging testing – all aspects - package material authentication through to identification of package defects
- Shelf-life stability testing
- Product composition and labelling

- Developments in the areas of smart packaging technologies

Facilities/Equipment

- State-of-the-art packaging facilities with high spec packaging test equipment
- Shelf-life testing facilities
- Environmental rooms and support facilities
- Sensory science support services

Range of Solutions

There are several possibilities by which companies can engage with the Food Packaging Group at UCC, from provision of services, to contract or collaborative research.

Of Interest to

Meat, Food, Beverage and Packaging companies.

How to Proceed

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EXPERTISE

Strategies for Enhancing Meat Product Quality

UCC has a long history in meat research and supports innovation and development in the Irish meat industry. Through state-of-the-art facilities, equipment and know how, researchers in UCC can carry out independent, contract or collaborative research into technologies and strategies for the enhancement of meat and meat product quality. Expertise includes new product development, formulation and manufacture, quality and shelf-life analysis/extension. Animal dietary supplementation studies can be carried out in conjunction with research/ industry partners where the influence of modified diets on meat quality can be determined.

Background

Research projects funded by DAFM and industry have strengthened the capabilities of UCC in technologies used for the enhancement of meat and meat product quality. Pre-slaughter strategies investigated have included supplementation of animal diets with antioxidant compounds such vitamin E, rosemary, green tea, bearberry, grape seed and marine extracts rich in seaweed polysaccharides. Understanding the fate of such compounds in complex monogastric and ruminant digestive systems and subsequent deposition in meat is of key importance for such quality improvement practices. Post-slaughter enhancement involves the addition of key ingredients (e.g. omega-3 and fish oils) and compounds (e.g. plant extracts) utilising a variety of product formulations and technologies.

Benefits to Industry

Access to state-of-the art facilities and expertise in meat quality enhancement is available through engagement with UCC.

Areas of Expertise

- Enhancement of meat quality.
- Animal dietary supplementation studies.
- Manufacture of processed meat products.
- New product development.
- Determination of meat quality and shelf-life.
- Sensory evaluation of meat.

Facilities/Equipment

- Meat processing and packaging facilities.
- Shelf-life/testing laboratory.
- Sensory analysis unit.
- Meat processing equipment including mincers, bowl-chopper, multi-needle injector etc.

Range of Solutions

UCC can provide a range of solutions including:

- Design and implementation of animal feeding trials.
- Evaluation of product ingredients/test compounds.
- Optimisation of meat product formulations.

Of Interest to

- Meat processing companies.
- Animal feed manufacturers.
- Ingredient suppliers.

How to Proceed

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EXPERTISE

Novel Processing Technologies for the Prepared Consumer Food Sector

Scientists in UCC have an extensive novel processing technologies application research programme on prepared consumer foods, fresh & processed meat, packaging technologies (modified atmosphere & vacuum packaging, vacuum-skin packaging, active & smart packaging) novel processing technologies (e.g. high pressure processing (HPP)), novel preservation technologies, meat safety & texture, as well as food formulation using novel ingredients.

Background

In today's world of global markets, stiff product competition, increasing consumer demands for higher quality, safety and greater convenience, it is becoming imperative for companies to explore ways to improve their manufacturing processes by adopting strategies that allow food manufacturers to exert greater safety & quality over the products that they produce so that they meet consumer demands, and those placed upon them by national & international regulatory bodies, and by ever-demanding retailing standards. Additionally, proce-sses and technologies that minimize waste, reduce energy costs, make manufacturing leaner & more envi-ronmentally friendly or simply provide new retail- and consumer-friendly products that possess visual appeal & are convenient to use will always be of interest to the food industry. Whatever the reason, assessments of new technologies as they appear on the market need to be assessed so as to determine their true effectiveness.

Benefits to Industry

The muscle foods research group in UCC allows food companies access to the state-of the-art facilities and equipment as well as specialist knowledge in novel processing technologies, meat science and technology.

Areas of Expertise

- Application of novel thermal and non-thermal processing technologies to extend shelf-life, improve quality and safety of food products.
- Development of new food products using novel processing technologies
- Food reformulation for salt and fat reduction in meat products and development of reduced sodium meat products using HPP
- Novel active packaging solutions for muscle-based food products
- Microbiological safety assessment of foods
- Food product formulation, novel ingredients to produce desired functionality and nutritional profile.
- Shelf-life analysis and extension of food products.

Facilities/Equipment

- Meat processing facilities
- HPP unit for pressures up to 900 MPa.
- Sensory laboratory with kitchen for sample preparation.
- Shelf life testing laboratory
- Flexible multi-mode for R&D retort capable of running processes including water immersion, saturated steam, water spray, and steam air.

Range of Solutions

There are several possibilities by which food processing companies can engage with UCC, from provision of services, to contract or collaborative research.

Of Interest to

Meat and Food Industry.

How to Proceed

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EXPERTISE

Optical Oxygen Sensors for Food Safety and Security

UCC researchers can provide specialist know-how, dedicated equipment and services in non-destructive analysis of residual oxygen (headspace and dissolved) and rapid high throughput analysis of microbial load and growth in various types of packaged foods and beverages using phosphorescence based oxygen sensing technologies. This includes a range of low-cost O2 sensor stickers and inserts (disposable and reusable), test vials with built-in sensors, and corresponding smart multi-functional reader such as handheld Optech® and benchtop GreenLight® 930 system (Mocon). These systems are now used routinely for package integrity testing, leak detection, shelf life studies, optimisation of packaging materials and processes, testing of samples. Researchers at UCC are available to carry out contract or collaborative research with companies in the aforementioned areas with a view to exploitation of novel sensor technologies, products/processes. A range of testing services and consultancy is also offered.

Background

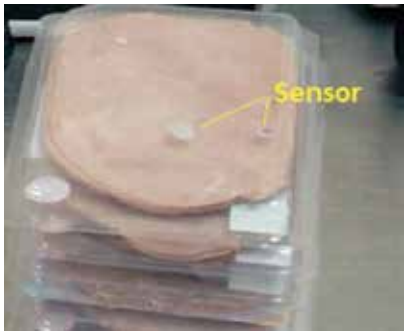
Residual oxygen and microbial load are the two key parameters of packaged foods which ultimately determine their quality and safety. UCC, with the support of the FIRM and EPA/MI recently developed advanced optical O2 sensing platforms particularly for food industry. A versatile number of tools and integrated system are now available for testing residual oxygen and microbial load in packaged foods and beverages.

Benefits to Industry

The new O2 sensor systems strengthen the research and development capabilities of the Irish food industry, enhance product quality and safety control. They enable the non-destructive testing and monitoring of O_2 in large number of food packs and rapid quantitative analysis of microbial load by simple sampling. These sensors will assist in the optimisation of packaged food products and improvement of their quality and safety.

Areas of Expertise

- Rapid testing of residual O_2 and microbial load
- Non-destructive measurement of headspace and dissolved O_2 in packaged foods and beverages
- Integration of O_2 sensors in food packs, development of smart packaging materials.
- Troubleshooting of food packaging processes.
- Shelf life studies with various food products.



Facilities/Equipment

- Optech® handheld reader, GreenLight® 930 system (Mocon), custom-built O_2 sensors.
- Sensor characterisation and package testing equipment
- Hi-spec fluorescent spectrometers, microscopes.

Range of Solutions

Companies can engage with UCC by means of services, contract or collaborative research.

Of Interest to

Dairy and Food Industry. Packaging companies.

How to Proceed

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EXPERTISE

Food Business & The Consumer

UCC researchers can provide specialist know-how in: consumer food behaviour, consumer-oriented new product development, and retail & supply chain management. This includes expertise in consumer acceptance of new and novel foods, food and health behaviours, needs based segmentation, food shopper behaviour, entrepreneurship and innovation, sustainable supply chain management and competitiveness.

Background

An understanding of consumers and supply chains support food companies' efforts to design, develop and deliver products to market in an efficient and effective manner. Deep insights into consumer needs, which draw on an understanding of the drive behind these needs, will ensure that product offerings align to various target market lifestyles and lived experiences. Appreciation of how to efficiently configure / reconfigure the supply chain will add value, minimise waste, reduce cost and ultimately bolster profits. The Food Business and the Consumer group in UCC has extensive experience of these issues at product, category and sectoral levels. Particular expertise in consumer research translates findings into insight to promote effective business decisions.

Benefits to Industry

This knowledge and skillset can support the attainment of the growth targets set for the Agri-food Sector by assisting industry align their innovation efforts to the needs of end users and other stakeholders. Furthermore, this expertise can help foster the strategic design and deployment of sustainable supply chains. Education and training offered by the group facilitates ongoing leadership development within the sector both nationally and internationally.

Areas of Expertise

- Consumer, Food and Health.
- Food and Consumer Acceptance.
- Food Shopper Behaviour.
- Enterprise Management and Innovation
- Supply Chain Management.
- Food Policy and Competitiveness.

Facilities/Equipment

- State-of-the-art executive education programmes delivered through on-line and blended learning formats with interactive workshops and classroom sessions.
- Survey data analysis software.
- Advanced qualitative data analysis support software.
- Access to modern, consumer research and innovation spaces for focus groups, in-depth interviews and meetings.

Range of Solutions

Food Companies can access expertise in various ways including contract, collaborative and consortium based projects. Open access part-time accredited programmes are available in Supply Chain Management and related fields. In addition customised accredited programmes can be offered in response to specific company requirements.

Of Interest to

All sectors across the food industry.

How to Proceed

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EXPERTISE

Sensory Analysis of Foods (UCC)

The Packaging Group of The School of Food and Nutritional Sciences, UCC works with universities and food companies to help them understand the sensory quality of food, food choice and food acceptance by trained panelists and consumers. They deal with all types of food including; meats (beef, poultry, lamb, pork, processed meats), beverages, fish, shellfish, dairy, confectionary, soups and convenience. They also have expertise in food packaging and assess how the consumer rates a package as well as determining its effects on product quality and shelf-life. The Sensory group is also involved in traditional food promotion through innovation and public service work including the development of the "Irish National Food Awards".

Background

Sensory Science in UCC has its origins in the sensory evaluation of foods, and in applying multivariate data analysis tools for the evaluation of trained panel and consumer test results. The overall activities aim to contribute to knowledge and expertise relevant for improving the sensory quality of products and meals and promoting health through the enjoyment of food.

Benefits to Industry

As a centre of excellence we provide state of the art multivariate, holistic, sensory-based consumer-driven innovation solutions for new product development and optimisation for the food and beverage industries

Areas of Expertise

- Descriptive profiling (trained panellists)
- Sensory acceptance testing (Hedonic)
- Difference testing
- Product innovation and new product development
- Sensory based product optimisation
- Packaging development and optimisation
- Multivariate data analysis (advanced modelling of data)
- Sensory shelf-life and microbial testing
- Compositional and nutritional analysis

Facilities/Equipment

- Sensory laboratory at UCC, fulfil the requirements of the international standards ASTM, 1986 and ISO, 1988.
- Training and conference rooms
- Product development kitchen
- Fully equipped food processing area particularly designed for fresh and processed meats.
- Fully equipped food packaging facilities.

Range of Solutions

There are several possibilities by which companies can engage with the sensory group, from provision of services, to contract or collaborative research.

Of Interest to

- Meat, Food and Beverage Industry.
- Large companies, SME's and Start-ups.

How to Proceed

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Services

Technology

SERVICE

New Product Development for Food SMEs

Teagasc researchers and technologists have extensive knowledge, expertise and facilities available to support food businesses in new product development at its two food research centres at Ashtown and Moorepark. There is a special focus on supporting new product development (NPD) in SME and start-up food businesses.

Background

Advances in the food sector are accelerating the development of a wide range of new and improved, added-value products and services. The future success of the Irish food industry depends in large on its ability to be at the forefront of this scientific and innovative activity. Teagasc is committed to supporting the food processing sector and provides a range of supports including new product development services.

Benefit to Clients

The competitive position of food businesses is very dependent on their capacity to absorb new knowledge and skills and develop innovative products. Teagasc recognises the constant challenge faced by food companies and aims to support and assist them in the new product development process.

Product development supports are backed by the wide-ranging food research programme at Teagasc which has extensive linkages with food research institutes worldwide.

Support and Facilities

- Food development facilities are available at Teagasc Food Research Centres in Ashtown, Dublin and Moorepark, Cork.
- These include pilot and full scale regulatory approved production facilities containing modern equipment for the development of dairy, beverage, meat, bakery and prepared foods.
- Specially designed incubation units are available for sole use by client companies.
- Well-equipped and modern laboratories are available for microbiological, chemical, physical and sensory testing of products.

Of Interest to

Product development support is of interest to food processing businesses, and to suppliers of materials, services and development support to the food processing sector.

Service contracts

Service contracts are agreed with clients and work is carried out on a confidential basis.

A schedule of fees is available on request for the various services provided.

How to Proceed

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Technology

SERVICE

Sensory Analysis

Teagasc, through its researchers and technologists at both its food research centres at Ashtown and Moorepark, has extensive knowledge, expertise and facilities available to identify the sensory requirements of food businesses and devise suitable testing methodologies.

Background

Sensory analysis is a scientific discipline used to measure and interpret reactions to foods as they are perceived by the senses (sight, sound, smell, taste and touch). It provides valid and accurate information on sensory characteristics using precise, documented techniques. People closely involved with a product frequently find it difficult to be objective when comparing it with those of competitors. Sensory analysis is used to judge the acceptability of products at many stages of product development (from concept to launch) and in quality control and quality assurance.

Benefits to Clients

Sensory Analysis provides a powerful tool in terms of new product development, and can be used to bench mark a new product against competitor's products.

Teagasc sensory staff work closely with other Teagasc experts to correlate sensory and instrumental data. Off-flavour investigation is carried out in conjunction with our flavour chemists. Each client's needs are assessed and advice given on appropriate test methodology.

Service Details

- We carry out the full range of discrimination tests including triangle tests, duo trio, paired comparison, and other tests as required.
- We use an established panel of assessors experienced in the sensory analysis of a range of products. The panel was recruited and screened following International Standard ISO 8586-1, 1993.

Facilities

- Our sensory facilities consist of a preparation area and an adjoining controlled testing facility.
- The testing facility comprises 8 individual booths each equipped with Compusense® 5.0 software for sensory data collection from panellists.
- The area is equipped with adjustable lighting and the temperature, ventilation and odour can be controlled.
- Training and conference rooms are also available for panellist training sessions and focus groups.

Of Interest to

Sensory evaluation is relevant to food processing businesses, ingredient manufacturers and suppliers, food service companies, retailers and distributors.

Service contracts

Contracts are agreed with clients and work is carried out on a confidential basis. Cost is dependent on the method of testing used and sample numbers.

How to Proceed

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SERVICE

Technical Food Information Support

Teagasc provide a food information service that can help address the technical and practical questions that arise in the food industry. This is a key service for many food companies where keeping up-to-date may seem impossible with the amount of information being produced and the number of journal articles being published each week.

Background

Teagasc Food Research Centre, Ashtown provides an Information Service to help meet the continuous need of food companies for reliable and expert information. The service aims to address the technical and practical questions that can arise for the food industry. Topics include food safety issues, new developments and technologies, food marketing and food legislation.

Benefits to Clients

Teagasc have access to external databases and other information sources, including information generated from the extensive research programme of Teagasc plus national and international scientific linkages. These can be used to provide rapid food information solutions to companies operating in a competitive sector.

Service Details

Teagasc can provide the following Food Information Solutions:

- We can work with bespoke projects whether it is a food safety issue or processing problem.
- We can carry out an information search on a range of topics and provide a customised review to suit a product sector.
- We offer advice on accessing technology information sources.
- We can supplement a company's own resources and help to fill knowledge gaps.

This is a confidential service where we will work with the client to put together the most relevant information solution.

An appropriate fee will be agreed in advance.

Of Interest to

This service is of benefit to any food and related industries who need asistance in keeping up-to-date with technical and practical issues arising in the food industry.

How to Proceed

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SERVICE

Consultancy in Food Quality Assurance

Teagasc, through its Food Research Centre at Ashtown, provides a unique specialist technical service package to state bodies, regulatory agencies and industry, especially SMEs. This package encompasses specialist technical advice and standards development, technology/ information transfer of research programme outputs and benchmarking through advanced technical assessment of completed processes.

Background

Emerging stringent legislative principles and quality assurance standards clearly place the responsibility for assuring food safety on food sector management. Commercial customers and retailers are conscious of the realities of market-place incidents and seek assurance from their suppliers on the adequacy and effectiveness of the control systems that are in place.

To address these requirements, food quality management systems (incorporating food safety) must increasingly be robust to meet such demands, whilst also remaining cost effective in order to meet commercial objectives. There is an increasing focus on the quality assurance chain incorporating traceability from farm to fork. This, together with renewed government support, has provided unprecedented challenges and opportunities for the Irish food sector and supporting organisations.

Benefits to Clients

Companies who implement and operate world class quality assurance standards enjoy the following benefits:

- Increased market access.
- Customer and consumer confidence.
- Enhanced ability to meet stringent legislative requirements.

Service Details

This is a confidential service. We work with the client to put together the most suitable package in terms of assessment, consultancy and implementation and may include the following service options:

- Independent audits of food/feed businesses against appropriate industry standards.
- Supplier audits.
- Pre-certification audits for various standards including Bord Bia, BRC etc.

- Confidential reports on levels of compliance and non-compliance with relevant legislation/standards.
- Technology capability assessments and advice.
- Trouble-shooting/ problem-solving.

Of Interest to

This service is relevant to food SMEs, state agencies and regulatory bodies, who wish to benefit from such specialist technical advice.

How to Proceed

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Technology

SERVICE

Flavour Profiling of Foods and Beverages

Teagasc has significantly enhanced its flavour chemistry capability in terms of expertise and equipment. The expertise and instrumentation available are used in research but also as a resource to carry out services for industry. The service based on such capabilities can be used to work with companies to improve processes, as an aid in new product development, product mapping, stability testing, shelflife analysis or to identify taints and off-flavours.

Background

Approximately 75% of the perception of the flavour is related to odour and 25% to taste. The odour of a product is due to the balance of volatile odour active compounds that are present. Over the last few years, Teagasc has developed a strong capability in the identification of odour active compounds in foods and beverages through the use of sophisticated extraction techniques and advanced chromatographic methodologies. Such resources can be used to identify both positive and negative compounds associated with specific sensory attributes. Flavour chemistry can also be used in tandem with descriptive sensory analysis to identify the compounds directly responsible for sensory perception. Multivariate statistical analysis is used to interpret complex volatile data sets in order to distinguish discriminating differences in the volatile components within samples/products.

Capabilities on Offer

- Optimisation of product quality
- Aroma profiling
- Identification of odour active compounds
- Product mapping
- Process modification – impact on flavour
- Product comparison/matching
- Stability/storage evaluation
- Predictive modelling
- Taints/off-odours

Equipment

- Extraction
- Thermal Desorption
- Olfactory Analysis
- Solid Phase Micro-Extraction
- Purge & Trap
- Steam Distillation
- In-Tube- Extraction
- Gas Chromatography
- Triple Quadrupole Mass Spectrometry

Of Interest to

Food, beverage and packaging companies.

Nature of Service

Service contracts are agreed with clients and all work is carried out on a confidential basis. A schedule of fees is available for the different services provided. Flavour profiling can also be incorporated into a larger contract or collaborative research project.

How to Proceed

For further information contact:

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Technology

SERVICE

Specialised Training and Seminars

Teagasc provides specialised technical training and seminars for the food sector, in the areas that include food safety, quality management, compliance with food legislation, and product development, through its Food Industry Training Programme. This programme is offered as a schedule of public courses to industry, development agencies and regulatory bodies each year. In-house delivery of customised training is available on request. Seminars are also held each year covering topical issues of interest.

Background

As the food sector is now a knowledge intensive industry sector, there is a continual need to upgrade knowledge and skills. The environment in which the industry operates is constantly changing in relation to regulatory and customer requirements, product lines and innovations. The Teagasc Food Industry Training Programme, through effective knowledge transfer and certification, enables the sector to keep abreast of these changes. The programme is quality assured, and course topics are updated regularly to reflect the changing needs of the sector.

Benefits to Clients

The Teagasc Food Industry Training Programme provides food businesses with the knowledge and skills required to keep up to date with changes in legislation, technology and good practice and thus compete effectively in a highly populated sector.

Courses are continually updated to ensure information is current and represents best practice. All trainers are highly qualified and experienced and many of the courses on offer are certified through Quality and Qualifications Ireland (QQI).

Service Details

The programme includes training in the following areas:

- Food Safety Management (HACCP)
- Hygiene Management
- Quality Management (based on Third Party Standards)
- Systems Auditing
- Laboratory Quality Management & Auditing.
- Trainer Skills
- Compliance with Legislation & Labelling
- Innovation Management and NPD

- Dairy Product Manufacture & Cheese-making
- Dairy Plant Operation, Spray-drying etc
- Meat Processing & Butchery Skills
- Thermal Process Validation

A range of seminars are scheduled annually. Themes are chosen based on current topical issues and input from the food sector. Expert speakers are drawn from agencies, industry and the retail sector.

Of Interest to

This service is relevant to food industry personnel involved in technical or quality management, as well as supervisory staff, business owners & entrepeneurs, regulatory and development agency staff.

How to Proceed

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Visit:www.teagasc.ie/food/research/training/

Technology

SERVICE

Testing for Agrochemical Residues

Teagasc is offering a range of analytical tests for the food industry for the detection and quantification of agrochemical residues in foods, through their well established laboratories at Teagasc Food Research Centre, Ashtown. Tailored analytical solutions can be developed upon request to provide more cost effective analysis.

Background

Veterinary drugs, feed additives and pesticides are used in the treatment of infections in food producing animals and can result in undesirable levels of residues in food. Regulatory agencies such as the Committee for Veterinary Medicinal Products and the European Food Safety Authority have set maximum residue limits (MRLs) for a range of agrochemical residues in food. The purpose of these MRLs is to protect public health and promote trade between countries.

Product labels on agrochemical products have been carefully prepared to ensure good agrochemical practice including application rates of products and withdrawal periods. If label claims are not carefully followed, non-compliant levels of residues can occur in food. The European Commission require each member state within the European Union to carry out national surveillance of their food production annually and demonstrate compliance with legislation. In addition, there are requirements on industry to carry out self-monitoring for residues, and it forms a basic part of a company's HACCP plan.

Competitive Advantage

- Teagasc has a long history in veterinary drug residue detection and the laboratories at our Food Research Centre, Ashtown have been accredited for this work for over 25 years.
- State-of-the-art ultra high performance liquid chromatography coupled to tandem mass spectrometry is used in the majority of such analyses, giving the best possible result to clients.
- Tailored analytical solutions can be developed on request to provide more cost effective analysis.

Testing Details

Some of the drug residues that we cover include:

- **Nitrofuran antibiotics** - 4 residues in liver, meat, eggs, honey and aquaculture products.
- **Anticoccidials** - 21 residues in eggs and meat.
- **Anticoccidials** - 8 residues in liver.
- **Anthelmintics** - 40 residues in liver, meat, milk.
- **Carbamate pesticides** in eggs, honey and liver.
- **Pyrethroid pesticides** in egg, fat and honey.

Of Interest to

These tests are relevant to all sectors of the Irish food industry. If we do not carry out a specific type of testing on site we can outsource the work at a highly competitive rate.

How to Proceed

For further information contact:

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SERVICE

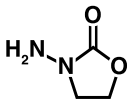
Nitrofuran Residue Testing

The Chemical Residues Laboratory at Ashtown offers a suite of analytical testing services. One of the most important of these is the nitrofuran test method, which tests for residues of nitrofuran antibiotic drugs in meat, plasma, fish, eggs and honey. This method represents an essential service for both importers and exporters of animal products.

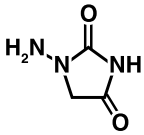
Background

Nitrofurans are a class of broad-spectrum antibiotics that were widely used in food-producing animals. Concerns about their potential toxicity resulted in them being banned for use in the EU in the 1990s. Despite this, nitrofuran contaminants remain a frequent source of alerts in the EU Rapid Alert System for Food and Feed (RASFF), with 72 cases of semicarbazide (the marker residue for nitrofurazone) in shrimp in 2009.

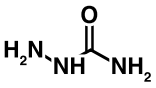
Teagasc have developed an assay that employs liquid chromatography coupled to tandem mass spectrometry (LC- MS/MS) to detect and quantify in a single analysis the metabolites of four of the main nitrofuran drugs (shown below). We are offering this test as a service to food companies. The test can ensure the absence of nitrofuran drug residues down to extremely low levels.



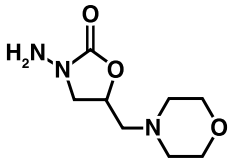
3-Amino-2-oxazolidinone (AOZ)



1-Aminohydantoin (AHD



Semicarbazide (SEM)



3-Amino-5-morpholinometh
2-oxazolidinone

Benefits to Clients

Under Directive 96/23/EC the food industry are required to have a self-monitoring programme in place to monitor for residues in food of animal origin.

By using this test you can be satisfied that you are in compliance with EU legislation and customer specifications.

Testing Details

The Nitrofurans test has been validated in liver, muscle, fish, plasma, egg and honey samples according to the 2002/657/EC guidelines. The method is very sensitive and has a limit of detection of <0.10 µg/kg for all four residues in most matrices. The method has been accredited by the Irish National Accreditation Board.

Figure 1: Analyst placing sample extracts for injection into liquid chromatograph for LC-MS/MS analysis

How to Proceed

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SERVICE

Sensory Services at UCC

The Packaging Group, School of Food and Nutritional Sciences, UCC aims to provide a scientific basis for understanding of sensory food quality, food choice and acceptance and to offer research based solutions to academic and commercial projects. They have expertise in dealing with such products as beverages, meats, fish, shellfish, dairy, confectionary, soups, convenience foods, to mention just a few products and also the sensory and consumer evaluation of product packaging and the subsequent effects on product quality and shelf life. Their expertise and access to facilities allows them to provide assistance to commercial food manufacturers of all sizes and for all products.

Background

Sensory Science in UCC has its origins in the sensory evaluation of foods, and in applying multivariate data analysis tools for the evaluation of trained panel and consumer test results. The overall activities aim to contribute to knowledge and expertise relevant for improving the sensory quality of products and meals and promoting health through the enjoyment of food.

Competitive Advantage to Clients

- Survey of market sector: Establish all competitor products across the retail spectrum.
- Questionnaire developmenPhone: Bespoke product specific sensory solution.
- Sensory evaluation (Consumer Preference and Descriptive profiling) of a product against all competitor products in the marketplace.
- Advanced multivariate data analysis of compiled data. APLSR, DPLSR.
- Determination of the positive and negative sensory drivers of a product based on consumer preference and using multivariate data analysis.
- Optimisation of positive sensory drivers and minimisation of negative driver effects within the sensory specification.

It is well documented that more than 90% of all New Product Development (NPD) in the food and beverages industry fails - some claim the figure is in fact closer to 98%. The methods developed at UCC have proven effective with our commercial clients allowing them to increase their market share.

Service Details

Sensory evaluation of products (Consumer Preference and Descriptive profiling) over the specification shelf life.

The Sensory data can be combined with analytical (i.e. lipid oxidation, pack gas analysis) and microbiological analysis to establish optimum shelf life. This process can be achieved across the supply chain and can be designed to account for temperature and humidity fluctuations during product storage.

Sensory evaluation of products (as above) over the specification shelf life to optimise a packaging solution (existing or new packaging material or modified gas atmosphere).

Sensory evaluation of products (as above) over the specification shelf life after reformulation with a new recipe or after ingredient substitution.

Of interest to

All food and beverage companies of all sizes.

How to Proceed

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SERVICE

Food Industry Training Unit, UCC

The Food Industry Training Unit, UCC services the part-time training, continuing education and professional development needs of people working in, or associated with, the food and related industry sectors.

Background

The Food Industry Training Unit, UCC, established in 1993, is dedicated to the provision of part-time executive education and continuing professional development programmes for those at work in the food and related sectors.

Within UCC, the Food Industry Training Unit works in partnership with the School of Food and Nutritional Sciences, Department of Food Business and Development, Microbiology, Department of Geography, Centre for Adult Continuing Education, Biological, Earth and Environmental Sciences, Process and Chemical Engineering, Alimentary Pharmabiotic Centre, School of Asian Studies.

The Unit also works in partnership with industry, Government and state agencies including; Teagasc; Enterprise Ireland; the Department of Agriculture, Food and the Marine; Bord Iascaigh Mhara; ICOS and Skillnets.

The activities of the Food Industry Training Unit reflect national industry needs and are a response to meet industry's challenge to develop the quality and skills levels of its management and workforce. This is in line with the recommendations for an integrated human resources development strategy for the Irish food processing industry.

Services

Accredited Courses

- Diploma in Food Science and Technology
- Diploma in Meat Technology
- Certificate in Seafood Innovation
- Diploma in Manufacturing Management
- Diploma in Corporate Direction (Food Business)
- Diploma in Speciality Food Production

Customised Short Courses / Workshops in:

- Food business
- Food chemistry
- Food microbiology
- Food technology
- Nutrition

Event Management

The Food Industry Training Unit has a strong track record of organizing national and international conferences, symposia and workshops and the Unit coordinates all aspects of event management.

How to Proceed

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SERVICE

New Food Product Development using Novel Processing Technologies

The muscle foods research group in UCC have the capability in developing new muscle-based products using novel processing technologies such as HPP, novel packaging systems (modified atmosphere packaging, vacuum packaging, vacuum-skin packaging, flexible retortable packaging, etc.; develop new food products or improve their own products from the safety, consumer acceptability, packaging issues and carry out shelf-life analysis of the developed food products from the microbiological or physicochemical point of view.

Background

Consumer preferences with respect to food are constantly changing. The most obvious trend in recent years has been the increasing demand for high quality food; with a higher degree of convenience being associated with it. Natural taste and freshness are highly appreciated, especially in cooked meat products, to increase their readiness for consumption. Consequently, good processing and packaging procedures are essential to achieving longer shelf-life.

Competitive Advantage to Clients

The muscle foods research Group in UCC is a unique facility offering a one stop shop for food businesses interested in developing new muscle-based food products using novel processing technologies maintaining the sensory and quality attributes and improvement in safety and shelf-life stability. Through the development of these products, the food businesses will differentiate their products from those of competitors to retain and expand their customer base, penetrate new markets and contribute to greater sales.

Service Details and facilities

The muscle foods research group in UCC work with food business or start-up food business to develop new food products or improve their own products from the safety, consumer acceptability, packaging issues and carry out shelf-life analysis of the developed food products from the microbiological or physicochemical point of view. UCC has a wide range of equipment and facilities including: Two litre capacity High pressure processing unit; Flexible multi-mode for R&D retort capable of running numerous processes including water immersion, saturated steam, water spray, and steam air; Shelf life evaluation lab, state of the art physicochemical analysis lab, food processing facilities and dedicated meat processing facilities (HACCP-compliant) equipped with state of the art equipment including oven, smoke generators, liquid

smoke atomisation system, texture analyser, bowl cutter, vacuum packaging system, modified atmosphere packaging system, cookers, Grills, meat grinder, meat band saws, Injection machine, vacuum tumbler, sausage stuffer, burger/meat ball former, meat slicers, meat dicer, blast freezer, roaster, chilling and freezing room for raw and cooked meat, APV twin screw-extruder, etc.

Of interest to

The expertise/facilities at UCC is of interest to all meat and food processing companies as well as companies manufacturing packaging materials. Companies can avail of consultancy, services/contract research and collaborations.

How to Proceed

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SERVICE

Meat Processing Facilities at UCC

The Muscle Foods Research Group in UCC has over 50 years of experience in muscle foods research, training and education at all levels within this field. The state-of-the-art meat processing facilities have been developed over many years to be capable of dealing with both fresh and fully processed muscle-based products and facilities include; the fresh meat and muscle foods processing hall, the processed meats and muscle foods processing hall, small to industrial-scale cooking facility, novel technologies processing room, series of walk-in chills and freezing units, simulated retail display area and all of this supported by the meat processing analytical, packaging and sensory laboratories.

Background

The meat processing facilities at UCC has provided a significant number of services to the meat industry over the past 50 years, typically on a case by case basis. The services that can be availed of are;

- Mincing, flaking, bowl chopping technologies followed by a host of available forming technologies, including nugget, sausage and stuffing lines
- Complete curing technologies line
- Full pre-dusting, battering and breading line with flash frying facility
- Smalll to industrial scale cooking facilities, including large and small electric kettles
- Wood chip, log, friction and liquid-smoking facilities
- A wide range of mixing and formulation equipment for niche and novel products manufacture
- Dehumidifying and ripening chambers for fermented-styled meats
- Extrusion equipment for novel processed meat manufacture
- State-of-the-art retorting facility for can, glass and pouched product processing
- Super-chilling and blast-freezing facilities and supported by walk-in chills and freezers
- Simulated retail-display area for assessment of retail-ready products with respect to storage stability, shelf-life etc.
- Meat packaging area (MAP, vacuum, overwrapping, canning etc.)
- Meat analytical facilities for measurement of product attributes; colour, texture, microbiological status, sensory etc.

Of interest to

The expertise/facilities at UCC is, and should be, of interest to all meat companies.

How to Proceed

For further information contact:

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SERVICE

Cell-Based and Metabolic Assays

The Biophysics and Bioanalysis lab at UCC offers a unique suite of cell based and metabolic assays which allow detailed assessment of bioenergetics and functional characteristics of test cells (prokaryotic and eukaryotic) and tissue samples. The assays operate on commercial multi-label readers in high throughput format with cell populations. They can be tuned for customer's cells and application requirements. Another group of assays is conducted by live cell confocal FLIM microscopy (Fluorescence Lifetime IMaging) in high content format with individual cells.

Background

Cell based assays are becoming increasingly popular, with a number of multi-parametric platforms developed in recent years. The Cell Energy Budget (CEB) platform developed by our team provides rapid and detailed assessment of cell metabolisms and bioenergetics.

This CEB platform measures a set of key metabolic parameters of test cells including:

- Oxygen consumption rate (OCR) – OxPhos
- Extra-Cellular Acidification: lactate related (L-ECA) - glycolysis and total (T-ECA) – Krebs cycle activity
- Total cellular ATP content
- Total protein content (for normalisation)

It operates on most commercial plate readers: Perkin Elmer, BMG, Tecan, Biotek, and other.

Competitive Advantage to Clients

Detailed functional comparison of different cells (strains, mutants, transformed cells)

Optimisation of culturing conditions (media, nutrients)

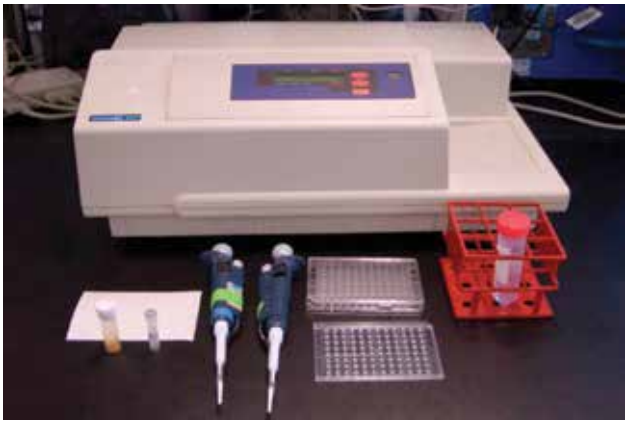
Antibiotic resistance, drug action on cells.

Mechanistic studies, metabolic responses to treatments

Service Details

Prices available on request

Cell numbers required – 1-2M cells per batch (20-50 assay points). Can be cultured at UCC.



Of interest to

Institutes or bodies engaged in cell based and metabolic projects interested in accessing facilities providing specialised experties, high sample throughput and turnaround time. There are numerous potential industry-related applications such as assessing the impact of specific foods and ingredients on the gut microbiota, characterisation and QC of probiotic strains, testing animal tissue samples and many more.

How to Proceed

For further information contact:

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SERVICE

Chemical and Shelf life Testing of Meat Products

Researchers in UCC have extensive experience and expertise in the chemical analysis and shelf-life evaluation of meats and meat products. The availability of state-of-the-art facilities, equipment and technical knowhow enables UCC researchers to provide a detailed and complex evaluation of meat quality, stability, safety and shelf-life parameters such as colour, lipid stability, microbiology and sensory analysis. The impact of quality enhancement compounds and techniques can also be measured.

Background

The shelf-life of meat is of critical importance with respect to quality, safety, and sensory acceptability. The chemical composition of meat and meat products renders it susceptible to a range of quality deterioration processes with a negative impact on factors such as colour, lipid stability, microbiology and sensory properties. A range of strategies (e.g. antimicrobial and antioxidant compounds, modified atmosphere packaging (MAP)) are available for the control of quality deterioration in meat products. Measurement of the impact, efficacy and potency of such compounds and storage conditions is key to developing meat products with adequate quality and shelf-life properties.

Facilities, Equipment and Testing

- Meat processing and packaging facilities.
- Shelf-life/testing laboratory.
- Sensory analysis unit.
- Meat processing equipment including mincers, bowl-chopper, multi-needle injector etc.
- Modified atmosphere packaging (MAP) and vacuum packaging technologies.
- Gas sensor and package integrity testing.
- Compositional analysis (Protein, moisture, fat, ash).
- Microbiological analysis of muscle foods.
- Warner-Bratzler shear force and texture profile analysis (TPA).
- Analytical instrumentation (Minolta colorimeter, HPLC, GC-MS, FT-IR spectrometer and microscope.
- A vast array of chemical analysis techniques including fatty acid analysis, measurement of lipid stability (TBA test) and *in vitro* antioxidant assays (TPC, DPPH and FRAP).

Of interest to

- Meat processing companies.
- Ingredient manufacturers and suppliers.

How to Proceed

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SERVICE

Food Packaging Assessment and Testing Capabilities

The Food Packaging Group in UCC have nearly 15 years of experience in food packaging science and technology, with particular expertise in package optimisation, testing, product development, reformulation, shelf life analysis/extension and trouble shooting. The state-of-the-art facilities include packaging and shelf life testing laboratories, environmental rooms, process / packaging facilities (with packaging equipment for bulk gas flushing, modified atmosphere packaging, vacuum packaging, overwrapping, canning etc.) and sensory laboratories.

Background

Optimising and testing food packaging materials is based on a range of physical, chemical and microscopic techniques available at UCC.

Physical:

- Packaging material identification and optimisation comprising assessment of film strength, colour and appearance. Physical strength measurement includes; tensile strength puncture test, elongation, yield point, torque on or off strengths etc.
- Pack integrity testing for evidence of burst leak and seepage problems
- Taptone testing is a non-destructive assessment of potential leaking cans
- Heat seal and integrity testing

Chemical/microscopic:

- Determine gas permeability of packaging films and plastic bottles
- Measure and analyse gas composition in head-spaces of food packs non-destructively and continuously, thereby, optimising packaging and gas utilisation
- Assess and identify packaging materials using FTNIR-FTMIR (and IR microscopy)
- Analyse pack colour/light barrier using advanced spectroscopic methodologies
- Evaluate chemical migration from pack materials to food

Shelf-life Analysis and Extension

- Shelf-life analysis and extension uses a combination of scientific expertise in microbiology, chemistry and sensory science and can assist companies with
- Trouble shooting i.e. problems based on chemical composition, ingredient interactions, microbial contamination and sensory quality
- Solutions for extended shelf-life
- Microbiological assessment of foods

New Packaging Technologies

- Develop and optimise in-pack sensors suitable for detecting levels of gases in gas-sensitive products (indicators of product quality/safety)
- Environmental packaging applications
- Develop new smart packaging technologies for application to food products/beverages for maintenance of sensory and quality attributes and improvement in safety and shelf-life

Consumer Driven Development

- Optimise packing, design and formation based on consumer identified attributes
- Determine compositional and nutritional profiles of packaged foods for compliance with food labelling requirements

Of interest to

The expertise/facilities at UCC is of interest to all food and beverage companies and to companies manufacturing packaging materials and components. Companies can avail of consultancy, services, contract research and collaborations.

How to Proceed

For further information contact:

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Profiles

Technology

PROFILE

Declan J. Troy

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Education

M.Sc. (Biochemistry) University College Dublin. 1987.

Graduateship of Royal Society of Chemistry, RSC, UK. 1982.

Career

2010–Present: Assistant Director of Research, Teagasc.

Head of Centre, Ashtown Food Research Centre, Teagasc.

Head of Meat Technology Department, Ashtown Food Research Centre, Teagasc.

Principle Research Officer, Ashtown Food Research Centre, Teagasc.

Expertise

Declan has published over 100 scientific peer reviewed publications, book chapters and scientific articles, mainly in the area of food / meat quality. The main focus of his research was on the biochemistry of muscle proteins and their effects on meat tenderness. Declan has always encouraged the up-take of science based innovations by the food industry and has interacted widely with the sector to this end. His work has contributed to the introduction of new technologies at industrial level particularly in Irelands competitive beef sector.

He has coordinated numerous EU meat science projects and has coordinated *ProSafeBeef*, a €20 million project with 41 transnational partners aimed at advancing beef safety and quality through research and innovation. This landmark project included close interaction with the meat science and industry community. He also coordinated two EU Framework Marie Curie Training Sites for early stage career meat science PhD students in meat biochemistry and functional meat products. Currently he is the Director of the Marine Functional Food Research Initiative (NutraMara) a multidisciplinary programme aimed at discovering bioactive components from Irish marine sources for use in added value functional food products. He has collaborated in his research programme with many different research groups from all around the world including Australia, Korea and USA. He has been invited to speak at many international scientific conferences and industry seminars. He has supervised numerous PhD students to completion. Declan sits on many national and international committees formulating research priorities in food science and advising state agencies and companies. Currently as Assistant Director of Research and Head of Technology Transfer, Declan is leading the Teagasc Technology Transfer Strategy.

Selected Publications

- Byrne, C.E., Troy, D.J. and Buckley, D.J. (2000). Postmortem changes in muscle electrical properties of bovine *M.longissimus dorsi* and their relationship to meat quality attributes and pH fall. Meat Science, 54, 23–34.
- Byrne, C.E., Downey, G., Troy, D.J. and Buckley, D.J. (1998) Non-destructive prediction of selected quality attributes of beef by near-infrared reflectance spectroscopy between 750 and 1098nm. Meat Science, 49 (4), 399–409.
- Tsitsilonis, O.E, Stoeva, S., Echner, H., Balafas, A., Margomenou, L., Katsoulas, H.L., Troy, D.J., Voelter, W., Papamichail, M. and Lymberi, P. (2002) A skeletal muscle troponin –t ELISA based on the use of an antibody against the soluble troponin T (16–31) fragment. Journal of Immunological Methods 268 (2), 141–148.
- Troy, D. J. and Kerry, J. (2010) Consumer perception and the role of science in the meat industry. Meat Science, 86, (1), 214–226.
- Juárez, M., Marco,A., Brunton, N.,Lynch, B., Troy,D.J. and Mullen, A.M. (2009). Cooking effect on fatty acid profile of pork breakfast sausages enriched in conjugated linoleic acid by dietary supplementation or direct addition Food Chemistry, 117, (3), 1 393–397.

Technology

PROFILE

Dr Mark Fenelon

Head of Food Research Programme

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Education

Diploma in Process and Chemical Engineering University College Cork. 2007.

Ph.D Food Science and Technology, University College Cork. 2000.

B.Sc. Dairy and Food Science, University College Cork. 1994.

Higher Diploma in Food Science and Technology. 1993.

Career

March 2015 –Present: Head of Food Programme (Ashtown and Moorepark Centres), Teagasc Food Research Centre, Moorepark, Fermoy, Co. Cork

Jun 2010–Present: Head of Food Chemistry & Technology Department, Teagasc Food Research Centre.

2004–2010: Principal Research Officer, Teagasc Food Research Centre, Moorepark, Fermoy, Co. Cork.

2000–2004: Food Technologist/ Project Manager at Wyeth Nutritionals, Askeaton, Co. Limerick.

Expertise

- Current programme focuses on ingredient interaction, i.e., protein - protein, protein- carbohydrate and protein - mineral interactions and impact during processing. Research includes improving the functional aspects of re-formulated foods in the nutritional beverage sector.
- Responsible for the recent development and implementation of the new separations / dehydration and ingredients facility located at Teagasc Food Research Centre, Moorepark.
- Experience includes chemistry and process related knowledge of dairy products including cheese, ingredients and infant formula. Knowledge of project management systems from both an academic and industrial perspective.

Selected Publications

1. Maher G. P., M. A Auty, Y. H. Roos, L.M. Zychowski and M. A. Fenelon. 2015. Microstructure and lactose crystallization properties in spray dried nanoemulsions. Food Structure Vol 3; 1-11
2. Murphy, E.G., Y. H. Roos, S. A. Hogan, P. G. Maher, C. G. Flynn, and M. A. Fenelon. 2015. Physical stability of infant milk formula made with selectively hydrolysed whey proteins. International Dairy Journal 40; 39-46
3. Maher G. P., Y. H. Roos and M. A. Fenelon. 2014. Physicochemical properties of spray dried nanoemulsions with varying final water and sugar contents. Journal of Food Engineering. Volume 126; 113–119
4. Murphy, E.G., M.A. Fenelon, Y.H. Roos and S. A. Hogan. 2014. Decoupling Macronutrient Interactions during Heating of Model Infant Milk Formulas. Journal Agricultural & Food Chemistry 62; 10585−10593
5. McCarthy, N. A., P. M. Kelly, P. G. Maher and M. A. Fenelon. 2014. Dissolution of milk concentrate (MPC) powders by Ultrasonication. Journal of Food Engineering. 126; 142 – 148

Technology

PROFILE

Dr Tom Beresford

Head of Department

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Education

BSc. University College, Cork, Ireland. 1985

PhD. University College, Cork, Ireland. 1991

Research Experience

1990–1991: Post Doctoral Research Scientist BioResearch Ireland, University College Cork.

1991–1993: Post Doctoral Research Scientist New Zealand Dairy Research Institute.

1993–2000: Research Officer.

2000–2002: Senior Research Officer.

2002–2005: Principle Research Officer.

2005–present: Senior Principle Research Officer Teagasc Food Research Centre, Moorepark.

Management Experience

2000–2004: Acting Head, Cheese Department.

2004–2009: Head, Food Cultures & Safety Department.

2009–present: Head, Food Biosciences Department.

Expertise

My primary research interests relate to aspects of cheese microbiology, in particular, the influence of various starter and non-starter organisms on the biochemistry of cheese ripening. Of particular interest is the contribution of *Lactobacillus helveticus* as a cheese ripening organism. As part of this work the complete sequence of DPC4571, an *L. helveticus* strain with interesting technological characteristics from the Moorepark culture collection, has been elucidated. A particular focus of my current research relates to the potential of bacterial exopolysaccharide to impact on both the techno- and bio-functionality of dairy products. In addition, I am interested in microbial fermentation with particular reference to the capacity of a range of bacteria to release bioactive peptides from protein molecules. I also undertake research on microbial quality of milk.

Selected Publications

1. Callanan, M.J., Kaleta, P., O'Callaghan, J., O'Sullivan, O., Jordan, K.N., McAuliffe, O., Sangrador-Vegas, A., Slattery, L., Fitzgerald, G. F., Beresford, T.P., Ross, R.P. (2008) Genome sequence of *Lactobacillus helveticus*, an an organism distinguished by selective gene loss and insertion sequence element expansion. *Journal of Bacteriology,* 190, 2, 727–735.
2. Kaleta, P., O'Callaghan, J., Fitzgerald, G.F., Beresford, T.P., Ross, R. P. (2010) Crucial role for insertion sequence elements in *Lactobacillus helveticus* evolution as revealed by interstrain genomic comparison. *Applied & Environmental Microbiology* 76, 1, 212–220
3. Costa, N.E., Hannon, J.A., Guinee, T.P., Auty, M.A.E., McSweeney, P.L.H and Beresford, T.P. (2010) Effect of exopolysaccharide produced by isogenic strains of *Lactococcus lactis* on half-fat Cheddar cheese. *Journal of Dairy Science* 93, 3469–3486
4. Slattery, L., O'Callaghan, J., Fitzgerald, G.F., Beresford, T.P., and Ross, R.P. (2010) Invited review: *Lactobacillus helveticus* – A thermophilic dairy starter related to gut bacteria. *Journal of Dairy Science* 93, 4435–4445
5. Quigley, L., O'Sullivan, O., Beresford, T., Ross, R.P. Fitzgerald, G.F. and Cotter, P. (2011). Molecular approaches to analyzing the microbial composition of raw milk and raw milk cheese. *International Journal of Food Microbiology* 150, 81–94

Technology

PROFILE

Mr. Pat Daly

Head of Department

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Education

Honours Degree in Chemistry and MSc, Food Science.

Career

He is a Principal Research Officer and Head of Food Industry Development at Teagasc, the Irish Agriculture and Food Development Authority.

Expertise

He has worked with Teagasc since 1988 where he leads the Teagasc Food Industry Development programme. He leads a team of scientists and technologists providing technology development support for the food processing sector through product development supports, training programmes, scientific seminars, consultancy services, food market research and technical information service. The work programme operates from two Teagasc Food Research Centres, Ashtown, Dublin and Moorepark, Co. Cork. The team also support food research knowledge and technology transfer to industry through training courses, seminars, consultancy work and R&D supports. A wide range of expertise, pilot scale processing facilities and product testing services are available to industry for business start-up, new product development and innovation supports. A focus of the work programme is supporting small and medium sized (SME) enterprises and start-up food businesses. This work is carried out in conjunction with Enterprise Ireland and other national and regional food development agencies. Previously he worked as a technical consultant and trainer in the food industry and other sectors with the Irish Institute for Industrial Research and Standards. He has over twenty years experience working with the food processing sector as a trainer and consultant, specialising in the area of food safety and quality management systems. During this time he worked with a large number of leading international food manufacturing companies with production operations in Ireland and also with the many SMEs throughout the country. He has also carried out several projects for Government Departments and other state agencies. He has participated in EU food research projects, international assignments and study visits in relation to the food processing sector. He has represented Teagasc on many national food technical committees and contributed to the development of a number of national policy documents and standards for the food sector.

Technology

PROFILE

Dr Geraldine Duffy

Head of Food Safety Department

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Education

PhD on "Development of rapid methods for the isolation and detection of *Listeria monocytogenes* from meat" University of Ulster, Jordanstown, N.I. (1994)

Bachelor of Science Degree, University College Dublin, Belfield, Dublin 4.

Career

Head of Food Safety, Teagasc, Food Research Centre, Ashtown, Dublin (2005 to present)

Principal Research Officer, Teagasc Food Research Centre, Ashtown, Dublin

OECD Postdoctoral fellowship, Eastern Regional Research Centre, Agricultural

Research Service, U.S.D.A., Philadelphia (1996)

Post Doctoral Fellowship at University of Nottingham and Unilever, UK (1994)

EU training fellowship, TNO, The Netherlands Organisation for Applied and Scientific Research (1993)

Expertise

Research focuses on transmission, behaviour and control of microbial pathogens, in particular verocytotoxigenic *E. coli*, *Salmonella* and *Campylobacter* along the farm to fork chain. The research is applied to the development of food safety management systems including quantitative risk assessment models and novel interventions for control of known and emergent food borne pathogens. She has published widely in the field of microbial food safety with over 90 peer reviewed publications including books and book chapters. Dr Duffy has considerable experience in the co-ordination of national and international research programmes and under the European Commission Framework Research Programme is currently co-ordinating a 41 partner multi-national

European Union Framework integrated research project on beef safety and quality (*Prosafebeef*). She is member of a number of professional committees including the Scientific Committee of the Food Safety Authority of Ireland and serves as a food safety expert for the European Food Safety Authority (EFSA) W.H.O / FAO and I.L.S.I. (International Life Science Institute).

Selected Publications

1. Thomas, K.M., McCann, M., Collery, M.M, Logan, A., Whyte, P., McDowell, D.A. and Duffy, G, (2012). Tracking Verocytotoxigenic *Escherichia coli* O157, O26, O111, O103 and O145 in Irish Cattle at slaughter. *Int J. Food Micro* 153(3):288–96
2. Rivas L, Coffey B, McAuliffe O, McDonnell MJ, Burgess CM, Coffey A, Ross PR, and Duffy G. (2010) The *in vivo* and *ex vivo* evaluation of bacteriophage e11/2 and e4/1c for the control of *Escherichia col*i O157: H7. *Appl Environ Microbiol*. 76(2 1):721 0–7216
3. Duggan, S.J., Mannion, C., Prendergast, D.M. , Leonard, N., Fanning, S. , Gonzales-Barron, U., Egan, J., Butler, F. and Duffy, G. (2010). Tracking the *Salmonella* status of pigs through the slaughter process in the Republic of Ireland. *Journal of food Protection* 73, 12: 2148–2160.
4. McCabe, Evonne; Burgess, Kaye; O'Regan, Edel; McGuinness, Sheila; Barry, Thomas; Fanning, Seamus; Duffy, Geraldine. (2011) Development and evaluation of real-time DNA and RNA PCR-based assays for the detection of *Salmonella enterica* in fresh and processed meat samples. *Food microbiology* 28 (3):447–56.
5. Walsh, D., Molloy, C., Carroll, J., Cagney, C., O'Brien, S., Fanning S., Iversen, C. and Duffy, G. (2011). Survival characteristics of environmental and clinically derived strains of Cronobacter sakazakii in infant milk formula (IMF) and ingredients. *J Appl Microbiol.* 11 0(3):697–703.

Technology

PROFILE

Dr Paul Allen

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Education

B.Sc. Biological Sciences, University of Exeter.

M.Sc. Applied Genetics University of Birmingham.

PhD Faculty of Agriculture, NUI University College Dublin.

Certified Diploma in Accounting and Finance, ACCA.

Career

1977–1978: Genetics Advisor, Meat and Livestock Commission, UK.

October 1978–Present: Member of the Research Staff at Teagasc Food Research Centre Ashtown in the Food Chemistry and Technology Department, specialising in meat research.

Expertise

- Automated and non-invasive methods of carcass grading and evaluation
- Factors affecting meat quality
- Meat packaging
- Meat processing
- Healthier meats
- Imaging methods to predict eating quality
- Novel processing

Selected Publications

1. Jackman, P., Sun, D.-W., Allen, P., Brandon, K. and White, A. (2010). Correlation of consumer assessment of *longissimus dorsi* beef palatability with image colour, marbling and surface texture features. Meat Science, 84, 564–568.
2. Hayes, J., Stepanyan, V., Allen, P., O'Grady, M.N. and Kerry, J.P. (2010). Effect of lutein, sesamol, elagic acid and olive leaf extract on the quality and shelf-life stability of packaged raw minced beef patties. Meat Science 84, 613–620.
3. Romvari, R., Dobrowolski, A., Repa, I., Allen, P., Olsen, E., Szabo, A. and Horn, P. (2006). Development of a computed tomographic calibration method for the determination of lean meat content in pig carcasses. Acta Veterinaria Hungarica, 2006, 54, 1–10.
4. Beggan, M., Allen, P. and Butler, F., (2006). Effect of oxygen concentrations on blooming ability of aged beef *longissimus lumborum* steaks following ultralow oxygen and vacuum storage. Journal of Muscle Foods, 2006,17, 267–276.
5. Sorenson, D., Henchion, M., Marcos, B., Ward, P., Mullen, A.M. and Allen, P. (2011). Consumer acceptance of high pressure processed beef-based chilled ready meals: The mediating role of food-related lifestyle factors. Meat Science 87, 81–87.

Technology

PROFILE

Dr Mark A.E. Auty

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Education

PhD Dairy Chemistry (University College Cork) 2004.

BSc Microbiology (Surrey) 1985.

Fellow of the Royal Microscopical Society.

Career

1997–Present: Senior Research Officer, Food Chemistry and Technology Department, Moorepark; manager of the National Food Imaging Centre. Since joining Teagasc, Mark has published 39 peer reviewed scientific articles and generated > €2m in research funding.

1985–1996: Senior Scientist at Leatherhead Food International.

Expertise

Dr Auty is a food structure expert with over 25 years' experience in applying microstructural and rheological analysis to understanding food functionality. Particular research interests include food nanotechnology and relating the microstructure of food ingredients and products to processing and consumption. Mark provides specialist expertise for a wide range of projects at Teagasc, including projects on protein functionality, powders, cheese, probiotics, fermented milks, cereals and meat products. His expertise is in regular demand from industry. With a strong international reputation, he gives many invited and keynote presentations in Europe, the US and China.

Selected Publications

1. Ciron, C.I.E., Kelly, A.L. and Auty, M.A.E. (2012). Modifying the microstructure of low-fat yoghurt by microfluidization of milk under different pressures to enhance rheological and sensory properties. Food Chemistry, 130: 510–519
2. Abhyankar, A.R., Mulvihill, D.M. and Auty, M.A.E. (2011). Combined microscopic and dynamic rheological methods for studying the structural breakdown properties of whey protein gels and emulsion filled gels. Food Hydrocolloids, 25: 275–282. (8th out of top 25 hottest topic articles in 2011).
3. Oboroceanu, D., Wang, L., Kroes-Nijboer, A., Brodkorb, A., Venema, P., Magner, E. & Auty, M.A.E. (2011). The effect of high pressure microfluidization on the structure and length distribution of whey protein fibrils. International Dairy Journal, 21: 823–830.
4. Ciron, C.I.E, Kelly, A.L., Auty, M.A.E. (2011). Effect of microfluidization of heat-treated milk on rheological and sensory properties of reduced-fat yoghurt. Food Hydrocolloids, 25: 1470–1476.
5. Oboroceanu, D., Wang, L., Brodkorb, A., Magner, E., Auty, M.A.E. (2010). Characterization of β-lactoglobulin fibrillar assembly using atomic force microscopy, polyacrylamide gel electrophoresis and *in situ* Fourier transform infrared spectroscopy. Journal of Agricultural and Food Chemistry, 58: 3667–3673. (Top 20 cited article in past 3 years).

Technology

PROFILE

Dr Martin Danaher

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Education

Ph.D. in Analytical Chemistry, University College Cork 2003.

B.Sc. Industrial Chemistry, University of Limerick, 1997.

Career

2002–Present: Teagasc Food Researcher.

1997–1998: R&D Chemist, Gerard Laboratories.

1998–2002: PhD student – "Teagasc Walsh Fellow."

Expertise

- Analytical chemistry: Chromatographic separations, sample purification, mass spectrometry, biosensors and immunoassays.
- Residue analysis: Agrochemical, environmental, natural toxins and medicinal adulterants.
- Databases: Coordinator of Ireland's "National Food Residue" and "Veterinary Drug and Feed Additive" Databases.
- Exposure and Risk Assessment: Exposure and risk assessment to contaminants from food.

Selected Publications

1. O'Mahony, J., Moloney, M., McConnell, R.I., Benchikh, E.O., Lowry, P., Furey, A., and Danaher. M., (2011). Simultaneous detection of four nitrofuran metabolites in honey using a multiplexing biochip screening assay. *Biosensors and Bioelectronics* 26 (10), pp. 4076–4081.
2. Vinogradova, T., Danaher, M., Baxter, A., Moloney, M., Victory, D. and Haughey, S.A. (2011). Rapid surface plasmon resonance immunobiosensor assay for microcystin toxins in blue-green algae food supplements. *Talanta*, 84 (3), pp. 638–643.
3. Whelan, M., Kinsella, B., Furey, A., Moloney, M., Cantwell, H., Lehotay, S.J. and Danaher, M. (2010). Determination of anthelmintic drug residues in milk using ultra high performance liquid chromatography-tandem mass spectrometry with rapid polarity switching *Journal of Chromatography A,* 1217 (27), pp. 4612–4622.
4. Kinsella, B., Lehotay, S.J., Mastovske, K., Lightfield, A.R. and Danaher, M. (2009). New method for the analysis of flukicide and other anthelmintic residues in bovine milk and liver using liquid chromatography-tandem mass spectrometry. Analytica Chimica Acta, 637(1–2), pp. 196–207.
5. Kinsella, B., O'Mahony, J., Malone, E., Moloney, M., Cantwell, H., Furey, A. and Danaher, M. (2009). Current trends in sample preparation for growth promoter and veterinary drug residue analysis. Journal of Chromatography A, 1216(46), pp. 7977–8015.

Technology

PROFILE

Dr André Brodkorb

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Education

1995: Degree in chemistry, Friedrich Schiller Universität Jena, Germany

2001: PhD in bio-physical chemistry, Université Libré de Bruxelles, Belgium

Career

2001–2002: Post-doctorate in bio-physical chemistry, Trinity College Dublin

2002 – present: Research officer in Teagasc Food Research Centre, Moorepark

Expertise

- Protein Structure/Function relationship; Structure = molecular structure (primary, secondary and tertiary), modification, and aggregation; Function = physico-chemical properties (e.g. gelation, viscosity, emulsification, hydrphobicity), bio-activity
- *In vivo and* and *in vitro* gastro-0intestinal digestion of food and food components
- Bioencapsulation - protection of sensitive food ingredients e.g. probiotic bacteria, during processing, storage and gastro-intestinal digestion
- Bioactivity and structure of novel protein/ligand complexes
- Separation and fractionation of proteins/peptides - development and evaluation of novel chromatographic and non-chromatographic purification and fractionation of mainly globular proteins and proteolytic fractions thereof

Selected Publications

1. Minekus, M., Alminger, M., Alvito, P., Ballance, S., Bohn, T., Bourlieu, C., . . . Brodkorb, A. (2014). A standardised static *in vitro* digestion method suitable for food - an international consensus. *Food & Function*, 5(6), 1113–1124.
2. O'Loughlin, I. B., Murray, B. A., FitzGerald, R. J., Brodkorb, A., & Kelly, P. M. (2014). Pilot-scale production of hydrolysates with altered bio-functionalities based on thermally-denatured whey protein isolate. *International Dairy Journal*, 34, 146–152.
3. Sullivan, L. M., Kehoe, J. J., Barry, L., Buckley, M. J. M., Shanahan, F., Mok, K. H., & Brodkorb, A. (2014). Gastric digestion of α-lactalbumin in adult human subjects using capsule endoscopy and nasogastric tube sampling. *British Journal of Nutrition*, 112, 638–646.
4. O'Loughlin, I. B., Murray, B. A., Kelly, P. M., FitzGerald, R. J., & Brodkorb, A. (2012). Enzymatic hydrolysis of heat-induced aggregates of whey protein isolate. *Journal of Agricultural and Food Chemistry*, 60(19), 4895–4904.
5. Doherty, S. B., Auty, M. A., Stanton, C., Ross, R. P., Fitzgerald, G. F., & Brodkorb, A. (2012). Survival of entrapped *Lactobacillus rhamnosus* GG in whey protein micro-beads during simulated ex vivo gastro-intestinal transit. *International Dairy Journal*, 22(1), 31–43.
6. Kehoe, J. J., Wang, L., Morris, E. R., & Brodkorb, A. (2011). Formation of non-native β-lactoglobulin during heat-induced denaturation. *Food Biophysics*, 6(4), 487–496.

Technology

PROFILE

Professor Gerard Downey

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Phone: +353 (0)1 8059533

Education

BSc Queen's University, Belfast 1972.

PhD University College Dublin 1997.

DSc Queen's University, Belfast 2005.

Career

1976–1980: Research Officer, An Foras Talúntais.

1980–2004: Senior Research Officer, An Foras Talúntais and Teagasc.

2004–2010: Principal Research Officer, Teagasc.

2006–2010: Acting Head Of Prepared Foods Department, Ashtown Food Research Centre, Teagasc.

2009: Adjunct full professor in School of Agriculture, Food and Veterinary Science, UCD.

Expertise

My research interests lie in direct measurement of quality in foods and food ingredients. I have concentrated on the application of near infrared, mid-infrared and Raman spectroscopic techniques to qualitative issues in foods. This has involved research activity on the topic of food authenticity and food adulteration, together with confirmation of ingredient or food quality. In recent years, this has expanded to include studies on the detection and identification of bacteria on meat products. A new development has been made on the application of hyperspectral imaging to food issues. Aligned with this spectroscopic research, has been the development of expertise in the multivariate analysis of the complex datasets arising from modern sophisticated analytical instruments.

Selected Publications

1. Di Egidio, V., Oliveri, P., Woodcock, T. and Downey, G. (2011). "Confirmation of brand identity in foods by near infrared transflectance spectroscopy using classification and class-modelling chemometric techniques - the example of a Belgian beer." *Food Research International*, 44, 544–549.
2. Osorio, M.T., Downey, G., Moloney, A.P., Röhrle, F.T., Luciano, G. and Schmidt, O. (2013) "Beef authentication using dietary markers: Chemometric selection and modelling of significant beef biomarkers using concatenated data from multiple analytical methods." *Food Chem.* 141(3), 2795–2801;
3. Hernández-Hierro, J.M., Esquerre, C., Valverde, J., Villacreces, S., Reilly, K., Gaffney, M., González-Miret, M.L., Heredia, F.J., O'Donnell, C.P. and Downey, G. (2014). Preliminary study on the use of near infrared hyperspectral imaging for quantitation and localisation of total glucosinolates in freeze-dried broccoli. *J. Food Eng.,* 126, 107–112.
4. Feng, Y-Z., Downey, G., Sun, D-W., Walsh, D. and Xu, J.-L. (2014) Towards improvement in classification of *Escherichia coli*, *Listeria innocua* and their strains in isolated systems based on chemometric analysis of visible and near-infrared spectroscopic data. *J. Food Engineering*, 149, 87–96.
5. Zhao, M., Downey, G., O'Donnell, C.(2015) "Dispersive Raman spectroscopy and multivariate data analysis to detect offal adulteration of thawed beefburgers." *J. Ag. Food Chem.*, 63, 1433−1441.

Technology

PROFILE

Dr Eimear Gallagher

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Education

PhD. University College Cork (2005)

MSc. University College Cork (2000)

BSc. University College Cork (1997)

Career

2000–Present: Senior Research Officer, Teagasc Research Centre, Ashtown, Dublin 15.

1999–2000: Research Scientist, Scientific Support team, Nestlé PTC, York, YO1 1XY, England. (7 month contract).

1997–1997: Research Assistant, Dept. of Food and Nutritional Sciences, National University of Ireland, Cork.

Expertise

Dr Gallagher's expertise lies predominantly in cereal and bakery research. She has extensive experience in grain milling, empirical dough rheology, confocal and scanning microscopy, digital imaging and sensory analysis. She has developed a particular capability in the gluten-free area, where she has conducted research in product reengineering, instrumental texture analysis, fundamental rheology and nutritional profiling. She is also a coordinator of Sensory Food Network Ireland, a national network of excellence in sensory food science. As well as conducting publicly funded research, Dr Gallagher also has a number of confidential, industry-led short-term projects

Selected Publications

1. Ktenioudaki, A., Alvarez-Jubete, L. and Gallagher, E. (2015). A review of the process-induced changes in the phytochemical content of cereal grains: The breadmaking process. Critical Reviews in Food Science and Nutrition, 55 (5): 611-619.
2. O'Shea, N., Ktenioudaki, A., Smyth, T.P., McLoughlin, P., Doran, L., Auty, M., Arendt, E.K. and Gallagher, E. (2015). Physicochemical assessment of two fruit by-products as functional ingredients: Apple and orange pomace. Journal of Food Engineering, 153: 89–95.
3. O'Shea, N., Arendt, E.K. and Gallagher, E. (2014). Enhancing an extruded puffed snack by optimising die head temperature, screw speed and apple pomace inclusion. Food Bioprocessing Technology, 7 (6): 1767-1782.
4. Ktenioudaki, A., Crofton, E., Scannell, A.G.M., Hannon, J.A., Kilcawley, K.N. and Gallagher, E. (2013). Sensory properties and aromatic composition of baked snacks containing brewer's spent grain. Journal of Cereal Science, 57 (3): 384–390.
5. Sullivan, P., Arendt, E.K. and Gallagher, E. (2013). The increasing use of barley and barley by-products in the production of healthier baked goods. Trends in Food Science and Technology, 29 (2): 124–134.

Technology

PROFILE

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Education

M.Sc. (Agr.) Degree in Food Science & Technology UCD 1993.

Graduate Diploma in Food Science & Technology (IFST, UK) DIT, Kevin St. 1991.

B.Sc. (Biochemistry, Physiology, Human Nutrition) NUI, Galway 1989.

Career

Jan 2010–Present: Food Industry Support – Teagasc, Food Research Centre, Ashtown.

Jan 2008–Jan 2010: Artisan Meat Technologist – Teagasc, Food Research Centre, Ashtown.

Feb 2002–Jan 2008: Food Safety Consultant & Trainer, Teagasc, Food Research Centre, Ashtown.

Sep 2000–Feb 2002: Food Safety Consultant with Verner Wheelock Associates (VWA).

Jan 1999–Sep 2000: Food Safety Consultant (self employed).

Mar 1994–Dec 1998: Quality Assurance Manager Goldstar Meats (renamed Kepak, Glasnevin).

Jun 1992–Mar 1994: Quality Technician – Batchelors Ltd. Bannow Road, Cabra, Dublin 7.

Expertise

Areas of expertise include:
Working as part of the Food Industry Development Department to support food businesses through advice, consultancy, auditing and training, in the areas of sensory analysis, product development, innovation, food safety, labelling and food business technical process development.

Consultancy projects undertaken include:

- Product reformulations, new product development from concept to production trials, sensory analysis of a wide range of food products for food businesses and to support the research programme in Teagasc. A major proportion of product and process development projects undertaken focus on shelf life extensions through product, process and packaging re-design.
- Development, delivery, piloting and validation of certified training programmes for all sectors of the food industry to meet client's customer & legislative requirements (topics include product & process development, food legislation, food labelling, hygiene, food safety, HACCP, plant design & food assurance standards).
- Implementation of quality assurance and food safety management systems in a wide range of food businesses.
- Providing a technical advisory service to the meat & speciality food sector (in conjunction with the Rural Development Unit of the Advisory Services) through mentoring, training and consultancy in the areas of food product and process development, food safety management systems and regulatory compliance.

Technology

PROFILE

Professor TP Guinee

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Education/Career

Professor Timothy P. Guinee is a Principal Research Officer in the Department of Food Processing and Functionality at Teagasc Food Research Centre, Moorepark, Fermoy, Co. Cork, Ireland. He graduated with a BSc in Dairy Science (1980) and a Ph.D. in Dairy Chemistry (1985) from University College Cork. He was employed as a lecturer in Food- and Environmental-sciences at Sligo Regional Technical College between 1984–1986. From 1986 to 1990, he worked in commercial R&D, as a Senior Researcher Scientist in Ireland, Germany and US on various aspects of cheeses (natural, processed, analogue types) and applications of milk protein ingredients in cheese and fermented milk products. He was appointed as a Senior Research Officer in Teagasc in 1990 and was promoted to Principal Research Officer in 2000.

Expertise

His particular interests include the study of the rheology and functional properties (e.g., viscosity, gelation, texture, heating behaviour) of composite high protein food matrices, and the exploitation of these properties in food manufacture and assembly/formulation, with particular emphasis on gels and cheese-based systems. He has extensively studied the influences of various factors on the properties of cheeses, including milk composition/treatments, gelation conditions, processing treatments, added ingredients (proteins, biopolymers), environmental conditions, and ageing. Currently, his research involves the optimisation of protein-protein, protein-mineral and protein-water interactions in the development of low-fat cheese and a new cheese technology platform (based on gelation of reassembled milks). He is currently an editorial board member for International Dairy Journal (from 2005) and Egyptian Journal of Dairy Science (1995), and was formerly a co-editor of the International Dairy Journal (2001–2005). He was a member of the Irish Research Council for Science Engineering and Technology from 2006 to 2010. In January 2011, he was appointed Adjunct Professor to the College of Science, Engineering and Food Science, University College Cork. He is currently on the IDF action team for salt reduction in cheese.

Selected Publications

1. Guinee, T.P., Kelly, O'Kennedy, B.T. and Kelly, P.M. (2008). Micellar casein powders with different levels of calcium and cheeses prepared therefrom. Publication No. WO 2009/150183 A1.
2. Guinee, T.P. (2009). The role of dairy ingredients in processed cheese products. In Dairy-Derived Ingredients: Food and Nutraceutical Uses (ed. M. Corredig), pp. 507–538. Woodhead Publishing Ltd., Cambridge, UK.
3. Guinee, T.P., Kelly, O., B.T. (2009). The effect of calcium content of Cheddar-style cheese on the biochemical and rheological properties of processed cheese. Dairy Science and Technology, 89, 317–333.
4. Guinee, T.P. and Kilcawley, K.N. (2010). Strategies for low-fat, reduced-sodium cheese. Proceedings of 'Dairy Foods Symposium: Microbiology and flavor of cheese: Impact of Lower Salt-In-Moisture Content of Low Fat and Reduced Sodium Cheeses', July 12, 2010, Denver, CL, 2010. Journal of Animal Science 88, E-Suppl. 2/Journal of Dairy Science. 93, E-Suppl. 1/Poultry Science 89, E-Suppl. 1 (Abstract). http://www.innovatewithdairy.com/ADSA/Documents/2010-ADSA-Presentations/2010_ADSA (Presentation).
5. Guinee, T.P. and O'Callaghan, D.J. (2010). Control and Prediction of Quality Characteristics in the Manufacture and Ripening of Cheese. In Technology of Cheesemaking (eds. B.A. Law and A.Y. Tamime), 2nd edition, pp. 260–329. John Wiley & Sons Ltd, Chichester, West Sussex, UK.
6. Guinee T.P (2011). Effects of natural cheese characteristics and processing conditions on rheology and texture of processed cheese. In Processed Cheese and Analogues (ed. A. Y. Tamime), pp. 81–109, Wiley Blackwell Publishing Ltd., Chichester, West Sussex, UK.

Technology

PROFILE

Dr Ruth Hamill

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Education

PhD (Population Genetics), School of Biology and Environmental Science, UCD

BSc (Zoology, 1H1), School of Biology and Environmental Science, UCD

Experience

2006–present: Research Officer, Muscle Molecular Biology, Teagasc Food Research Centre, Ashtown

2002–2005: Post-doctoral Research Fellow, Population Genetics, University of St Andrews, Scotland

Expertise

My expertise focuses on muscle biology and meat science with a view to increasing understanding of the biological processes underpinning meat quality, the development of biological (genomic) markers of quality and understanding the structure/function relationship in meat products. My research programme is collaborative and nationally (FIRM/RSF) and European (FP7/COST) funded and I have also worked on confidential industry projects. I am currently a collaborator on a number of active projects in the healthier meat products area (e.g. Prosslow) and I am PI and Co-ordinator of a FIRM-funded project (Meat4Vitality) focused on developing novel meat products targeting the specific nutritional needs of older people and I previously co-ordinated a project (MeatMatrix) in this area focused on applying spectroscopic, microscopy, calorimetric and rheology techniques in model meat and myofibrillar systems to enhance understanding of the molecular mechanisms underpinning technological and sensorial quality. Through these projects the aim is to help facilitate the adoption of a more knowledge-based approach to the generation of targeted food systems and novel meat products delivering desired characteristics.

Selected Publications

1. Keenan, D. F., Resconi, V. C., Smyth, T. J., Lefranc, C., Botinestean, C., Kerry, J. P., Hamill, R. M. (2015). The effect of partial-fat substitutions with encapsulated and unencapsulated fish oils on the technological and eating quality of beef burgers over storage. Meat Science, available online, doi:10.1016/j.meatsci.2015.04.013
2. Tobin, B. D., M. G. O'Sullivan, R. Hamill and J. P. Kerry (2014). European consumer attitudes on the associated health benefits of neutraceutical-containing processed meats using Co-enzyme Q10 as a sample functional ingredient. Meat Science 97(2): 207–213.
3. Keenan, D. F., Auty, M. A. E., Doran, L., Kerry, J.P., Hamill, R. M. (2014). Investigating the influence of inulin as a fat substitute in comminuted products using rheology, calorimetric and microscopy techniques. Food Structure, 01: 2014
4. Hamill, RM, Aslan, O, Mullen, AM, O'Doherty, JV, McBryan, J, Morris, DG and Sweeney, T (2013). Transcriptome analysis of porcine *M. semimembranosus* divergent in intramuscular fat as a consequence of dietary protein restriction. BMC Genomics.2013, 14:453
5. McArdle, R, Hamill, R.M. and Kerry, J.P. (2011). Utilisation of hydrocolloids in processed meat systems. In: Processed meats: improving safety, nutrition and quality, p. 243–269. Edited by J.P. Kerry and J.F. Kerry, Woodhead Publishing.

Technology

PROFILE

Dr Maria Hayes

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Education

BSc. University College Dublin, Ireland. 2002
PhD. University College Cork, Ireland. 2007
Leadership Development Diploma. 2016

Career

February–March 2015: Hosted researcher at NMBU, Oslo, Norway

October 2008–present: Natural Products Chemist, Teagasc Food Research Centre, Ashtown, Dublin 15

October 2008- present: Guest lecturer Dublin Institute of Technology module TFFP3055 Nutraceutical Product development

June 2007–October 2008: Researcher at the Centre of Applied Marine Biotechnology, Letterkenny Institute of Technology, Donegal, Ireland

December 2006–June 2007: Researcher at Teagasc Moorepark Biotechnology Centre and University College Cork

Expertise

- High quality scientific research skills
- Novel proteins from marine, meat and cereal sources – WP leader on NutraMara, ReValueProtein and NutriCereals Ireland
- Isolation and characterization of techno-functional and health ingredients
- Project management/evaluation
- Technology & knowledge transfer
- Innovation and new product development
- Bioassay development -Heart health, renin, PAF-AH, ACE-I inhibitory, diabetes, mental health, antimicrobial PEP inhibitory, anti-oxidative, opioid
- Allergenicity – member of EU COST Action ImPARAS EU FA1402
- Seaweed and microalgae – member of EU COST Action EU ALGAE EU 1408
- Event organization and moderation (conferences & workshops)
- Book editor and writer

Selected Publications

1. Lafarga, T., O' Connor, P., and Hayes, M. (2015) *In silico* methods to identify meat-derived prolyl endopeptidase inhibitors. *Food Chemistry,* 175, 337–343.
2. Lafarga, T., O' Connor, P., and Hayes, M., (2014) Identification of novel dipeptidyl peptidase IV and angiotensin I converting enzyme inhibitory peptides from meat proteins using in silico analysis. *Peptides*, 59, 53–62.
3. Lafarga, T., Hayes, M., (2014) Bioactive peptides from meat muscle and by-products: generation, functionality and application as functional ingredients. *Meat Science*, 98, 227–239.
4. Ciarán Fitzgerald, Eimear Gallagher, Linda Doran, Mark Auty, Jose Prieto, Maria Hayes. (2014), Increasing the health benefits of bread: Assessment of the physical and sensory qualities of bread formulated using a renin inhibitory *Palmaria palmata* protein hydrolysate. LWT-Food Science and Technology, 56, 2, 398–405. Lafarga, T., Gallagher, E., Walsh, D., Valverde, J., Hayes, M., (2013), Chitosan containing bread made using marine shellfishery by-products: functional, bioactive and quality assessment of the end product. *Journal of Agricultural and Food Chemistry*, 18, 61, 8790–8796.
5. Lafarga, T., Hayes, M., Walsh, D., Valverde, J., Gallagher, E., (2013), Prawn Chitosan Containing Bread: Assessment of Bioactive and Sensory Qualities. *J. Chitin Chitosan Sci*, 1, 150–156.
6. O' Sullivan, A. M., O' Callaghan, Y. C., O' Grady, M. N., Hayes, M., Kerry, J. P., O' Brien, N., (2013), The effect of solvents on the antioxidant activity in Caco-2 cells of Irish brown seaweed extracts prepared using accelerated solvent extraction (ASE®), Journal of Functional Foods, Volume 5, Issue 2, 940–948.

Technology

PROFILE

Dr Maeve Henchion

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Education

Dr Maeve Henchion holds a BAgrSc from University College Dublin (UCD). She also was awarded her MAgrSc and PhD by UCD; both focused on food marketing, the former on farmhouse cheese and the latter on Irish beef.

Career

Maeve stared her research career as a research assistant in University College Dublin during which time she was awarded her PhD for research related to the marketing of Irish beef. She started employment with Teagasc as a research officer in 1996 on a research project that focused on logistics and supply chain management. She has broadened her research interests since then to include innovation management and consumer behaviour. She became Head of the Food Market Research Unit in 2006. In 2006 she was appointed to the Organic Market Development Group (subsequently renamed Foras Orgánach – Organic Market Development Group), while in 2010 she was appointed director to the Institute for International Trade in Ireland. She has published in several international journals relating to marketing, management and economics. In addition she has acted as referee for the British Food Journal, Supply Chain Management: An International Journal, Anthropology of Food, Meat Science, Journal of the Science of Food and Agriculture and the Italian Journal of Food Science. She is a member of the European Association of Agricultural Economists, the Irish Academy of Management and the Agricultural Economics Society of Ireland.

Research interests: Maeve is currently researching projects related to the acceptance by consumer and industry of novel food technologies, innovation management and sustainable food consumption within a portfolio of 10 projects. The majority of these are funded by FIRM, however a project examining the role of networks in the innovation activities of food SMEs is funded by the EU.

Expertise

Maeve has significant experience of conducting market research on various sectors of the food industry using qualitative (e.g. focus groups and individual depth interviews) and quantitative research methodologies (e.g. surveys and product testing). She has an understanding of food science and supply chain issues and hence can relate market research findings to real-world contexts in the research and business world. Based on her research, she can provide advice on consumer behaviour, innovation management, new product development, market development and food policy.

Selected Publications

1. Sorenson, D., Henchion, M. Marcos, B., Ward, P., Mullen, AM and Allen, P (2011) Consumer acceptance of high pressure processed beef-based chilled ready meals: the mediating role of food-related lifestyle factors, *Meat Science* Vol 87(1) 81–87 ISSN 0309–1740
2. Fischer, C., Hartmann, M., Reynolds, N., Leat, P., Revoredo Giha, C., Henchion, M., Albisu, L.M. and Gracia, A. (2009). Factors influencing contractual choice and sustainable relationships in European agri-food supply chains¸ European Review of Agricultural Economics, 36(4), 541–569.
3. Albisu, L. M , M. Henchion, P. Leat and D. Blandford (2010) Improving Agri-food Chain Relationships in Europe: the Role of Public Policy Chapter 16, Agri-Food Chain Relationships C. Fischer and M Hartmann eds, CAB International.
4. Canavan, O., Henchion, M. and S. O'Reilly, (2007), The use of the internet as a distribution channel for Irish speciality food International Journal of Retail and Distribution Management, 35 (2), 178–195
5. Fisher, C., Gonzalez, M., Henchion, M. and P. Leat, (2007), Trust and economic relationships in selected European agri-food chains, Food Economics, 4 (1) 40–49

Technology

PROFILE

Dr Rita Hickey

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Education

2008 FETAC Level 6 Advanced Certificate in Agriculture.

2003 Ph.D. Microbiology from NUI Cork (UCC).

1998 B.Sc. Hons (1H) from NUI Dublin (UCD).

Career

2007–Present Senior Research Officer, Teagasc Food Research Centre, Moorepark, Fermoy, Co. Cork, Ireland.

2005–2007 Process Specialist, Abbott Diagnostics, Sligo.

2004–2005 Research Officer, APC, Teagasc, Ireland.

2003–2004 Postdoctoral Researcher, MFRC, Teagasc, Ireland.

Expertise

- Food oligosaccharides – extraction, enrichment, fractionation and structural analysis for nutraceutical applications.
- Development of bioassays for investigating the bioactive properties of glycans isolated from food sources.
- Manager of tissue culture facilities at Moorepark
- Electrophoresis including 1D and 2D SDS-PAGE, Western Blotting, protein overproduction, concentration and renaturation.
- Chromotography – Size-exclusion, Affinity and Ion Exchange Chromatography.
- Microbial molecular biology techniques

Selected Publications

1. Lane, J. A., Kavanaugh, D., Mariño, K., Rudd, P.M. Carrington, S.D., Naughton, J., Clyne, M. and Hickey, R.M. (2012) Anti-infective bovine colostrum oligosaccharides: *Campylobacter jejuni* as a case study. International Journal of Food Microbiology (In press).
2. Lane, J. A., Marino, K., Slattery, H., Carrington, S. D., Rudd, P. M., and Hickey, R.M. (2012) Methodologies for screening of bacteria-carbohydrate interactions: anti-adhesive milk oligosaccharides as a case study. Journal of Microbiological Methods (In press).
3. Hickey, R. (2012). The role of oligosaccharides from human milk and other sources in prevention of pathogen adhesion. International Dairy Journal, 22: 141–146.
4. Lane, J.A., Carrington, S.D., Mehra, R.K. and Hickey, R.M. (2011) Screening whole bacterial cell adherence to the human milk oligosaccharide, 2'- fucosyllactose using Surface Plasmon Resonance (SPR) technology.m Analytical Biochemistry. 410, 200–205
5. Lane, J.A., Mehra, R.K., Carrington, S.D. and Hickey, R.M. (2010). The Food Glycome: a source of protection against chronic infection in the gastro-intestinal tract. International Journal of Food Microbiology, 142; 1–13.
6. Hickey, R. M. (2009). Harnessing Milk Oligosaccharides for nutraceutical applications. In: Dairy-derived ingredients: food and nutraceutical uses. Corredig, M (ed), p308–343.

Technology

PROFILE

Dr Kieran Jordan

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Education

B.Sc. (University College Galway).

M.Sc., Ph.D.(University College, Cork).

Teagasc Food Research Centre.

Expertise

Dr Jordan works on survival and occurrence of foodborne pathogens in dairy products, including *Listeria monocytogenes, S. aureus* and pathogenic *E. coli*, including adaptive tolerance responses and applications of molecular methodology in the study of foodborne pathogens.

Recent research projects funded include:

- Translating fundamental research on Listeria monocytogenes for the benefit of a multi-sectoral ready-to-eat food industry.
- Assuring the safety of mushrooms by the introduction of novel processes to reduce Listeria monocytogenes biofilms and environmental contamination in mushroom production facilities
- Dairy Processing Technology Centre
- Milk quality for a changing dairy industry.
- Safe and Healthy Foods.
- Risk assessment in relation to coagulase positive *Staphylococcus aureus*.

Selected Publications

1. Robin Condron, Choreh Farrokh, Kieran Jordan, Peter McClure, Tom Ross and Olivier Cerf. 2015. Guidelines for experimental design protocol and validation procedure for the measurement of heat resistance of microorganisms in milk. International Journal of Food Microbiology 192, 20-25.
2. Kieran Jordan. 2014. Monitoring occurrence and persistence of Listeria monocytogenes in foods and food processing environments in the Republic of Ireland. Frontiers in Microbiology 5, 436.
3. Kieran Jordan, Marion Dalmasso, Juergen Zentek, Anneluise Mader, Geert Bruggeman, JohnWallace, Dario De Medici, Alfonsina Fiore, Estella Prukner-Radovcic, Maja Lukac, Lars Axelsson, Askild Holck, Hanne Ingmer andMindaugas Malakauskas. 2014. Microbes versus microbes: control of pathogens in the food chain. Journal of the Science of Food and Agriculture, 94, 3079-3089.
4. Karen Hunt, Francis Butler and Kieran Jordan. 2014. Factors affecting Staphylococcal Enterotoxin C bovine production in milk. International Dairy Journal 39, 41-46
5. David O'Beirne, E. Gleeson, M. Auty and K. Jordan 2014. Effects of processing and storage variables on penetration and survival of Escherichia coli O157:H7 in fresh-cut packaged carrots. Food Control 40, 71-77.

Technology

PROFILE

Dr Sinéad McCarthy

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Education

Dr Sinéad McCarthy graduated with a B.Sc from UCC in 1993. She also completed an M.Sc in UCC in 1996, where she studied dietary vitamin E and lipid stability in turkey tissues. In 2003, she graduated from UCC with a Ph.D., in the area of public health nutrition which examined the predictors and prevalence of obesity in Irish adults.

Career

For nearly 15 years, Sinéad has been involved in many areas of nutrition research, with a focus on food and health and has published 23 peer reviewed papers.

Sinéad's first research post in UCC was the area of human nutritional physiology, examining the anti-oxidative effects of carotenoid and fish oil consumption, as a part of two multi centred EU projects. In 1997, Sinéad moved to TCD as a research officer on the Irish National Food Consumption programmes, from which she was awarded her PhD and attained funding to conduct additional food consumption surveys. She was the Scientific Officer on the Framework 6 Lipgene project and was actively involved in the human nutrition dietary intervention work-package of Lipgene. In 2007, Sinéad joined Teagasc at Ashtown Food Research Centre, where she is responsible for leading Teagasc's consumer behaviour research programme in relation to food and health. She is actively involved in the area of consumer food choice determinants and its potential impact on health. Sinéad is a member of the Food Safety Authority of Ireland Public Health Nutrition sub-committee and the Nutrition and Health Foundation Scientific committee. She is also an active member of the Nutrition Society.

Expertise

Sinéad has significant expertise in the areas of consumer behaviour in relation to nutrition, food and health. She has extensive experience in designing national food consumption surveys in addition to designing and validating consumer behaviour questionnaires. She is experienced in qualitative research techniques such as focus groups and in-depth interviews and has extensive analytical skills using large consumer databases and biostatistics. She has developed a reputation in this area both nationally and internationally and this has been demonstrated in her success in securing external funding. She is involved in five on-going projects covering consumer food and health behaviour, food expenditure patterns, consumer acceptance of novel food technologies, consumer acceptance of marine derived functional foods and drivers of cheese consumption.

Selected Publications

1. Shaw D, Tierney A, McCarthy S, Upritchard J, Vermunt S, Gulseth H, Drevon CA, Blaak E, Saris WHM, Karlstrom B, Helal O, Defoort C, Gallego R, Lopez-Miranda J, Siedlecka D, Malczewska-Malec M, Roche HM and Lovegrove JA. LIPGENE food-exchange model for alteration of dietary fat quantity and quality in free-living participants from eight European countries. British J Nutr (2009), 101, 750–759
2. Joyce T, McCarthy SN, Gibney MJ. Relationship between energy from added sugars and frequency of added sugars intake in Irish children, teenagers and adults. Br J Nutr. 2008 May;99(5):1117–26.
3. Quinio C, Biltoft-Jensen A, De Henauw S, Gibney MJ, Huybrechts I, McCarthy SN, O'Neill JL, Tetens I, Turrini A, Volatier JL. Comparison of different nutrient profiling schemes to a new reference method using dietary surveys. Eur J Nutr. 2007 Dec;46 Suppl 2:37–46.
4. AP Hearty, SN McCarthy, JM Kearney and MJ Gibney. Attitudes towards healthy eating and dietary behaviour, lifestyle and demographic factors in a representative sample of Irish adults. Appetite 2007 48(1):1–11
5. E. Duffy; A. P. Hearty; S. McCarthy; M. J. Gibney Estimation of exposure to food packaging materials. 3:Development of consumption factors and food-type distribution factors from data collected on Irish children Food Add & Contam; 2007 24(1):63–74.

Technology

PROFILE

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Education

M.Sc. (Agricultural Science) 1998–2000
National University College Dublin (UCD).

B.Sc. (Applied Sciences – Food Science and Technology) 1993–1997.

Dublin Institute of Technology, Kevin St. – awarded by Trinity College Dublin.

Career

2010–Present: Food Industry Development, Teagasc Food Research Centre, Ashtown.

2005–2010: Innovation Unit Manager, Teagasc Food Research Centre, Ashtown.

2001–2004: Research Officer, Meat Technology Department, Teagasc.

2000–2001: Research Assistant, National Food Biotechnology Centre, NUI, Cork.

Expertise

- Provision of technological support to Irish food companies, through information and consultancy, product and process development and technical services.
- Development and adoption of technology transfer methodologies.
- Promotion of innovative research developments and transfer of information and technological developments to industry.
- Establishment of collaborative projects with innovative food companies.
- Fostering associations with funding organisations and support agencies such as Enterprise Ireland, Bord Iascaigh Mhara, Bord Bia, IBEC, FSAI in order to provide an integrated support to Irish food SMEs.

Selected Publications

1. McDonagh, C. (2009). Technology Transfer Guides for the Meat Sector
   - A Guide to Intellectual Property for Irish Meat Sector Companies
   - A Guide to Intellectual Property for Meat Researchers
   - A Guide to Technology Development for Meat Researchers
   - A Guide for Technology Developers in the Irish Meat Sector
   - Extracting Ideas from Meat Research
   - A Guide to Commercialising Technologies arising from Meat Research Projects
   - Promotion of Linkages between Research Providers and the Irish Meat Industry
2. McDonagh, C., Sommerfield, A., O'Neill, E., and McCarthy, P. (2006). From Concept to Completion – A Roadmap for Entrepreneurs.
3. Mc Donagh, C., Mullen, A.M, Kerry J.P. & Troy, D.J. (2006). Evaluation of inherent variation in porcine M. *thoracis* et *lumborum* and M. *semimembranosus*. Journal of the Science of Food and Agriculture. 86(2), 292–298.
4. Mc Donagh, C., Kerry J.P., Troy, D.J. & Mullen, A.M. (2005). Relationship between the subjective and objective assessment of pork M. *semimembrosus* and prediction of further processed pork quality. Food Science and Technology International. 11(2), 149–154
5. 2005–2012: Confidential Research Reports for client companies.

Technology

PROFILE

Dr Song Miao

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Education

Ph.D. in Food Science and Technology, National University of Ireland, University College Cork, Ireland

M Sc. in Food Technology, Shanghai Fisheries University, China

B. Eng. in Food Engineering, Shanghai Fisheries University, China

Careers

May 2009–Present: Senior Research Officer (Permanent), Department of Food Chemistry and Technology, Teagasc Food Research Centre, Moorepark, Fermoy, Co. Cork, Ireland.

Feb 2006–May 2009: Research Manager/Drying Granulation Scientist, Foods Structural Design, Unilever Food and Health Research Institute, Unilever R&D Vlaardingen, the Netherlands.

Jan 2005–Feb, 2006: Postdoctoral Research Officer, Biotechnology Centre, Moorepark, Teagasc, Fermoy, Co. Cork. Ireland

Oct 2001–Dec 2004: Research Scientist/PhD Candidate, Department of Food and Nutritional Sciences, University College Cork, Ireland.

Jan 1995–Sep 2001: Senior Lecturer, Faculty of Food Science and Technology, Shanghai Fisheries University.

Jan 1996–Sep 2001: Senior Research Fellow, Faculty of Food Science and Technology, Shanghai Fisheries University.

Expertise

- Physico-chemical properties of biomaterials
- Dehydration and granulation
- Novel foods structural and textural designs
- Stickiness and flowability of powders
- State transition and phase transition in foods
- Encapsulation and functional food ingredients
- Structured emulsions for functional delivery
- Stabilization of probiotics
- Dairy ingredients

Selected Publications

1. Junfu Ji, Kevin Cronin, John Fitzpatrick, Mark Fenelon, Song Miao*. 2015. Effects of fluid bed agglomeration on the structure modification and reconstitution behaviour of milk protein isolate powders. *Journal of Food Engineering*. In press. DOI:10.1016/j.jfoodeng.2015.01.012
2. Like Mao; Yrjö H Roos; Song Miao*, 2015. Effect of Maltodextrins on the Stability and Release of Volatile Compounds of Oil-in-Water Emulsions Subjected to Freeze-Thaw Treatment. *Food Hydrocolloids*. In press. DOI:10.1016/j.foodhyd.2015.04.014
3. Like Mao; Ludivine Boiteux; Yrjö H Roos; Song Miao* 2014. Evaluation of Volatile Characteristics in Whey Protein Isolate-Pectin Mixed Layer Emulsions under Different Environmental Conditions. *Food Hydrocolloids*.41:79–85
4. Song Miao*; Like Mao. 2014. DSC Usefulness to the Measurement of Food Emulsion Stability, In Emma Chiavaro (Eds.) *Differential Scanning Calorimetry: Applications in Fat and Oil Technology*. CRC press, December 2014.
5. Like Mao; Yrjö H Roos; Song Miao*, 2014. Falvour Release from Monoglyceride Structured Oil-in-Water Emulsions through Static headspace Analysis. *Food Biophysics*. DOI 10.1007/s11483–014–9338–3
6. Like Mao, M.D.; Sonia Calligaris; Luisa Barba; Song Miao* 2014. Monoglyceride self-assembled structure in O/W emulsion: formation, characterization and its effect on emulsion properties *Food Research International*. 58:81–88
7. Like Mao; Yrjö H Roos; Song Miao* 2014. Cold-set Emulsion Filled Protein Gel for Flavor Delivery: Gel Properties and Flavor Release. *Journal of Agricultural and Food Chemistry. In press*

Technology

PROFILE

Dr Sheila Morgan

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Education

BSc, NUI Maynooth.

PhD, University College Cork.

Career

1997–present: Teagasc, Food Research Centre, Moorepark.

1995–1997: Microbiology Department, University College Cork.

Expertise

- Antimicrobial research (food and biomedical)
- Antimicrobial powder development
- Gut microbiology and the effect of antimicrobials on gut populations
- Scientific administration and project management

Selected Publications

1. Fate of the two-component lantibiotic lacticin 3147 in the gastrointestinal tract. Gardiner GE, Rea MC, O'Riordan B, O'Connor P, Morgan SM, Lawlor PG, Lynch PB, Cronin M, Ross RP, Hill C. Appl Environ Microbiol. 2007 73: 7103–9.
2. A lacticin 3147 enriched food ingredient reduces Streptococcus mutans isolated from the human oral cavity in saliva. O'Connor EB, O'Riordan B, Morgan SM, Whelton H, O'Mullane DM, Ross RP, Hill C. J Appl Microbiol. 2006 100:1251–60
3. Sequential actions of the two component peptides of the lantibiotic lacticin 3147 explain its antimicrobial activity at nanomolar concentrations. Morgan SM, O'Connor PM, Cotter PD, Ross RP, Hill C. Antimicrob Agents Chemother. 2005 49: 2606–11.
4. Evaluation of a spray-dried lacticin 3147 powder for the control of Listeria monocytogenes and Bacillus cereus in a range of food systems. Morgan SM, Galvin M, Ross RP, Hill C. Lett Appl Microbiol. 2001 33: 387–91.
5. Efficient method for the detection of microbially-produced antibacterial substances from food systems. Morgan SM, Hickey R, Ross RP, Hill C. J Appl Microbiol. 2000 89: 56–62.

Technology

PROFILE

Dr Kanishka N. Nilaweera

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Education

Ph.D. Neuroscience, University of Aberdeen, UK. (1998–2002).

BSc Upper Second Class (Division 1) Honours in Genetics, University of Aberdeen, UK. (1993–1998).

Careers

2009–Present: Senior Research Officer (Permanent Academic Position), Moorepark Food Research Centre, Teagasc, Ireland (http://www.teagasc.ie/).

2007–2009: Post-doctoral Research Associate (Contract Academic Position), School of Biomedical Sciences, University of Nottingham, UK.

2005–2007: Post-doctoral Research Associate (Contract Academic Position), Rowett Research Institute, Aberdeen, UK.

2002–2005: Post-doctoral Research Assistant (Contract Industrial-based Position), Rowett Services Ltd, Aberdeen UK.

1996–1997: Industrial Student Placement (as part of the undergraduate degree), Molecular and Cell Biology Department, Zeneca Pharmaceuticals, UK.

Expertise

My research aims to identify nutrients that could reduce weight gain, so that these could be commercialised as Functional Food ingredients to tackle obesity problem. This work involves animal feeding trials. Utilising this approach, we have shown that intake of whey proteins (a by-product of cheese manufacture) reduces weight gain by reducing the size of the stomach and intestine.

Selected Publications

1. McAllan, L, Speakman, J.R., Cryan, J.F. and Nilaweera, KN. Whey protein isolate decreases murine stomach weight and intestinal length and alters the expression of Wnt signalling associated genes. British Journal of Nutrition 2015, January; 113 (2); 372-379.
2. Finucane OM, Lyons CL, Murphy AM, Reynolds CM, Klinger R, Healy NP, Cooke A, Coll R, McAllan L, Nilaweera K, O'Reilly M, Tierney AC, Morine MJ, Alcala-Diaz JF, Lopez-Miranda J, O'Connor DP, O' Neill L, McGillicuddy FC, and Roche HM. Monounsaturated fatty acid enriched high fat-diets impede adipose NLRP3 inflammasome mediated IL-1β secretion and insulin resistance despite obesity. Diabetes 2015, Ahead of print, doi:10.2337/db14-1098
3. McAllan L, Skuse P, Cotter P, O' Connor P, Cryan JF, Ross RP, Fitzgerald G, Roche HM and Nilaweera KN. Protein quality and the protein to carbohydrate ratio within a high fat diet influences energy balance and the gut microbiota in C57BL/6J mice. PLoS One,2014 Feb 10;9(2):e88904.
4. Patterson E, O' Doherty RM, Murphy EF, Wall R, O' Sullivan O, Nilaweera K, Fitzgerald GF, Cotter PD, Ross RP and Stanton C. Impact of dietary fatty acids on metabolic activity and host intestinal microbiota composition in C57BL/6J mice. British Journal of Nutrition, 2014, June; 111 (11); 1905-1917.
5. McAllan L, Keane D, Schellekens H, Roche HM, Korpela R, Cryan JF, Nilaweera KN. Whey protein isolate counteracts the effects of a high-fat diet on energy intake and hypothalamic and adipose tissue expression of energy balance-related genes. British Journal of Nutrition 2013 Dec;110(11):2114-26.

Technology

PROFILE

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Education

BSc, MSc and PhD in Microbiology from University College Cork.

Career

1976–1977: Research Assistant Clinical Biochemistry Department, St Finbarr's Hospital Cork.

1977–1981: Contract Research Officer, An Foras Taluntais, Moorepark.

1989–2008: Contract Research Officer, Cheese Microbiology and Biotechnology Departments and member of the SFI funded Alimentary Pharmabiotic Centre.

2008–Present: Senior Research Officer in the Biosciences Department, Teagasc Food Research Centre, Moorepark.

Expertise

- Food preservation and biomedical applications of bacteriocins
- Mining the GIT for antimicrobial producing bacteria targeting gut pathogens including *Clostridium difficile*, *Salmonella* sp, *Listeria monocytogenes* and *Cronobacter sakazakii*
- Cheese microbiology including the microflora of smear ripened cheese
- *Mycobacterium avium paratuberculosis*: survival in dairy foods.

Selected Publications

1. M.C. Rea, O. O'Sullivan, F. Shanahan, P.W. O'Toole, C. Stanton, R.P. Ross and C. Hill. (2012). *Clostridium difficile* carriage in elderly subjects and associated changes in the intestinal microbiota J. Clin. Microbiol., 50:867–875
2. M.C. Rea, A. Dobson, O.O'Sullivan, F. Crispie, F. Fouhy, PC. Cotter, F. Shanahan, B. Kiely, C. Hill and RP. Ross (2011). Effect of broad- and narrow – spectrum antimicrobials on *Clostridium difficile* and microbial diversity in a model of the distal colon. Sackler Symposium Microbes and Health Proc. Natl. Acad. Sci. USA, 108 Suppl 1: 4639–4644
3. K. Murphy, O'Sullivan O, Rea MC, Cotter PD, Ross RP, Hill C. (2011). Genome mining for radical SAM protein determinants reveals multiple sactibiotic-like gene clusters. PLoS One 6:e20852. Epub 2011 Jul 8.
4. Dobson A, Crispie F, Rea MC, O'Sullivan O, Casey PG, Lawlor PG, Cotter PD, Ross P, Gardiner GE, Hill C (2011) Fate and efficacy of lacticin 3147-producing Lactococcus lactis in the mammalian gastrointestinal tract.FEMS Microbiol Ecol.76:602–14.
5. Field, D., Quigley, L., O'Connor, P., M.C. Rea,, Daly, K., Cotter, P., Hill, C. and Ross, R.P. (2010). Studies with Bioengineered Nisin peptides highlight the broad-spectrum potency of Nisin V. Microbial Biotechnology 3: 4, 473–486
6. M.C. Rea, CS. Sit, E. Clayton, PM. O'Connor, RM. Whittal, J. Zheng, JC. Vederas, R P. Ross and C Hill (2010). Thuricin CD, a novel post-translationally modified bacteriocin with a narrow spectrum of activity against *Clostridium difficile*. Proc. Natl. Acad. Sci. USA, 107: 9352–9357

Technology

PROFILE

Dr Diarmuid Sheehan

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Education

Ph.D. Food Science and Technology (Food Chemistry).

M.Sc. Food Science and Technology (Food Technology).

B.Sc. Food Science and Technology.

Career

2011–Present: Programme Manager – Cheese, Dairy Innovation Centre.

2001–Present: Research Officer, Teagasc.

1995–2001: Cheese Technologist, M.T.L. /Teagasc.

Expertise

Diarmuid's research programme is focused on technological and biochemical aspects of cheese manufacture and ripening. This is key to enabling diversification of a predominantly Cheddar based Irish cheese industry. He also focuses on investigation of factors influencing cheese quality and consistency. His research seeks to determine the relationships between manipulation of cheese manufacture parameters associated with novel hybrid cheese-types (e.g. high thermal profiles, milling, dry salting of curd) and their influence on localised variability in curd microstructure, compositional profile, physicochemical parameters and on bacterial microflora and activity. This serves to underpin development of novel hybrid cheeses, combining characteristics of diverse cheese types but capable of manufacture on Cheddar-type process plants. In addition his programme is focused on determining the influence of underlying biochemical and microbial factors on specific quality issues (e.g. pink defect, eye quality and split defects) of continental and Mediterranean-type cheeses manufactured from a seasonal milk supply.

Selected Publications

1. Daly, D.F.M., McSweeney, P.L.H. and Sheehan, J.J. (2012). Pink discolouration defect in commercial cheese: a review, Dairy Science and Technology, 92, In Press.
2. Daly, D.F.M., McSweeney, P.L.H. and Sheehan, J.J. (2010). Split defect and secondary fermentation in Swiss-type cheeses – a review. Dairy Science and Technology, 90, 3–26.
3. Sheehan, J.J., Patel, A.D., Drake, M.A. and P.L.H. McSweeney. (2009). Effect of partial or total substitution of bovine for caprine milk on the compositional, volatile, non-volatile and sensory characteristics of semi-hard cheeses. International Dairy Journal, 19, 498–509.
4. Kelly, A.L., Huppertz, T. and Sheehan, J.J. (2008). Pre-treatment of cheese milk: principles and developments. Dairy Science and Technology, 88, 549–572.
5. Sheehan, J.J., Wilkinson, M.G. and P.L.H. Mc Sweeney (2008). Influence of processing and ripening parameters on starter, non-starter and propionic acid bacteria and on the ripening characteristics of semi-hard cheeses. International Dairy Journal, 18, 905–917.
6. Sheehan, J.J., Fenelon, M.A., Wilkinson and P.L.H. Mc Sweeney. (2007). Effect of cook temperature on starter and non-starter lactic acid bacteria viability, cheese composition and ripening indices of a semi-hard cheese manufactured using thermophillic cultures. International Dairy Journal, 17, 704–716.

Technology

PROFILE

Dr Paul James Simpson

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Education

Hull University 1983–1986, B.Sc. (Hons) Biology, Second Class, Division One.

University College Cork, 1986–1988, M.Sc. Biotechnology.

Antibiotic inhibition of fungal pathogens by root colonizing fluorescent Pseudomonas species.

University College Cork, 2002–2005, Ph.D. Microbiology.

Pediococci and Bifidobacteria: Isolation, Genomic Characterisation and Evaluation for Probiotic Applications in Humans and Animal.

Career

1999–Present: Research Officer, Teagasc Food Research Centre, Moorepark, Fermoy, Co. Cork.

1995–1999: Higher Scientific Officer, Medical Research Council, Radiation and Genome Stability Unit, Harwell, Oxon, England.

1988–1995: Scientific Officer, Medical Research Council, Radiation and Genome Stability Unit, Harwell, Oxon, England.

Expertise

My principle areas of expertise include the manipulation of bacteria, yeast and mammalian cell-lines and molecular genetic techniques involving DNA and proteins, fluorescent in situ hybridization, pulsed-field-gel-electrophoresis, polymerase chain reaction, denaturing gradient gel electrophoresis, 2-D gel electrophoresis, 16S sequencing, HPLC and Gas Chromatography.

Selected Publications

1. Casey, P. G, Butler, D., Gardiner, G. E., Tangney, M., Simpson, P., Lawlor, P. G., Stanton, C., Ross, R. P., Hill, C., and Fitzgerald, G. F. Salmonella Carriage in an Irish Pig Herd: Correlation between Serological and Bacteriological Detection Methods. J. Food Prot., 67:2797–2800, 2004
2. Simpson, P. J., C. Stanton, G. F. Fitzgerald, and R. P. Ross. Intrinsic tolerance of Bifidobacterium species to heat and oxygen and survival following spray drying and storage. J. Appl. Micro. 99:493–501, 2005.
3. Simpson, P. J., C. Stanton, G. F. Fitzgerald, and R. P. Ross. Enumeration and identification of pediococci in power-based products using selective media and rapid PFGE. Journal of Microbiological Methods, 64:120–125, 2006
4. Danielsen, M., Simpson, P., O'Connor, E.B., Ross, R.P., Stanton, C. Susceptibility of Pedicoccus spp. to antimicrobial agents. Journal of Applied Microbiology 102: 384–389, 2007.
5. O'Connor, E.B., O'Sullivan, O., Stanton, C., Danielsen, M., Simpson, P. J., Callanan, M. J., Ross, R.P., and Hill, C. pEOC01: A plasmid from *Pediococcus acidilactici* which encodes an identical streptomycin resistance *(aadE)* gene to that found in *Campylobacter jejuni*. Plasmid, 58:115–126, 2007.

Technology

PROFILE

Dr Catherine Stanton

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Education

B.Sc (Hons, 2.1) Nutrition/Food Chemistry, (1983) University College Cork (Awarding Body: NUI).

M.Sc Nutrition (1986) University College Cork (NUI) (Awarding Body: NUI).

Ph.D Biochemistry (1988) Bournemouth University, UK (Awarding Body: Council for National Academic Awards, CNAA, UK).

D.Sc. (2008) National University of Ireland (Awarding Body: NUI).

Career

Teagasc Principal Research Officer.

Senior Research Officer, Teagasc Moorepark.

Research Officer, Teagasc, Moorepark, Fermoy, Co. Cork.

1991–1994: Post-doc/Research Associate, Wake Forest Univ. Medical Center, USA.

1990–1991: Senior Research Scientist, Johnson & Johnson UK, Glasgow, Scotland.

Expertise

- Nutritional aspects of dairy foods, functional foods.
- Probiotic cultures: health benefits, bioactive metabolite production and host health.
- Infant gut microbiota: Influence of Dietary and Environmental Factors.
- Probiotics: technological aspects, development of functional foods.
- Bioactive lipids: Microbial production of bioactive FA, CLAs, SCFA, n-3 FA, lipids and health benefits.
- Bioactive peptides.

Selected Publications

1. Stanton, C., Ross, R. P., Fitzgerald, G. F and Van Sinderen, D. (2005). Fermented functional foods based on probiotics and their biogenic metabolites. Current Opinion in Biotechnology, 16: 198–203.
2. Coakley, M., Johnson, M. C., McGrath, E., Rahman, S., Ross, R. P., Fitzgerald, G. F., Devery, R. and Stanton C. (2006). Intestinal bifidobacteria that produce trans-9, trans-11 conjugated linoleic acid: a fatty acid with antiproliferative activity against human colon SW480 and HT-29 cancer cells. Nutrition and Cancer, 56: 95–102.
3. Wall, R., Ross, R.P., Ryan C.A., Hussey, S., Murphy, B., Fitzgerald G.F and Stanton C., (2009). Role of Gut Microbiota in Early Infant Development. Clinical Medicine: Pediatrics, 3, 45–54.
4. Wall, R, Ross, R.P, Shanahan, F, O'Mahony, L, O'Mahony, C, Coakley, M, Hart, O, Lawlor, P, Quigley, E.M, Kiely, B, Fitzgerald, G.F and Stanton, C. (2009). The metabolic activity of the enteric microbiota influences the fatty acid composition of murine and porcine liver and adipose tissues. Am. J. Clin. Nutr. 89: 1393–1401.
5. Rosberg-Cody, E., Liavonchanka, A., Göbel, C., Ross, R.P., Fitzgerald, G.F., Feussner, I. and Stanton, C. (2011) Myosin reactive protein from *Bifidobacterium breve* is a FAD dependent fatty acid hydratase which has a function in stress protection BMC Biochem, 2011 Feb 17;12:9.
6. Wall, R., Marques, T.M., O'Sullivan, O., Ross, R.P., Shanahan, F., Quigley, E.M., Dinan, T.G., Kiely, B. Fitzgerald, G.F., Cotter, P.D., Fouhy, F. and Stanton, C. (2012). Contrasting effects of *Bifidobacterium breve* NCIMB 702258 and *Bifidobacterium breve* DPC 6330 on the composition of murine brain fatty acids and gut microbiota. Am J Clin Nutr, 95: 1278–1287.

Technology

PROFILE

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Education

M.Sc. Education & Training Management, Dublin City University 2002.

M.Sc. Agricultural Chemistry, University College Dublin 1990.

B.Sc. Industrial Microbiology, University College Dublin 1986.

Career

2011–Present: Food Industry Development, Teagasc Food Research Centre, Ashtown.

2004–2010: European Commission Food & Veterinary Office.

1998–2004: Food Safety & Quality Consultant & Trainer, Teagasc Food Research Centre, Ashtown.

1994–1998: Quality/ Regulatory Affairs Manager, Medical Devices Industry.

1991–1994: Medical Devices Directorate, Department of Health (UK).

1990–1991: Irish Sea Fisheries Board (BIM).

Expertise

- Delivery of consultancy, auditing and training projects to food industry clients
- Design & delivery of specialised training and events including microbiology, hygiene, HACCP, food standards development, auditing, food law, and labelling
- Providing training to support change management and delivery to multi-cultural groups
- Establishing and updating quality management systems
- Auditing and developing internal audit procedures and systems
- Addressing varied client queries in the area of food safety & quality including legislative compliance, standards requirements and product development
- Initiating and organising multi-agency projects to better serve the food industry
- Developing industry standards

Selected Publications

1. White, I. (2014) Food Labelling & Allergen Awareness, T-Research Volume 9: Number 1, Spring 2014 pp30-31
2. White, I, (2013) Tips for Producers & Suppliers of Packaging to the Food Industry, The Irish Packaging Directory
3. White, I, (2012) Facing the Future for Food Labelling Laws, The Irish Packaging Directory, pp18-21
4. White, I. (2011) Package Your Way to New Markets, T Research Volume 6: Number 4, Winter 2011, pp 14-15
5. European Commission Decisions (2008/654/EC) (2007/363/EC) (2006/677/EC) relating to auditing, developing and reporting on multi-annual national control plans within Member States' Competent Authorities.

Technology

PROFILE

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Education

1989 B.Sc. Biotechnology, Dublin City University, Dublin, Ireland

1995 Ph.D. Microbiology Dept., University College Cork, Cork, Ireland

Career

2002-present: Senior Researcher Teagasc Food Research Centre, Moorepark, Fermoy, Cork, Ireland.

1999–2002: Research/Senior Scientist R&D, XANTHON Inc. (start-up biotech company), Research Triangle Park, North Carolina, U.S.A.

1997–1999: Post-doctoral Scientist, Institute of Molecular BioSciences, Massey University, New Zealand.

1994–1997: Wellcome Post-doctoral Research Scientist, Biochemistry Dept., U.C.C, Cork, Ireland.

Expertise

- Life stage Nutrition: Designing foods for pregnant women and their child *in utero*
- Foods for weight management
- Food Bioavailability & Bioaccessibility
- Food Bioactives
- Genotype-phenotype interactions
- Large animal trials: Bovine mammary challenge studies, Porcine post-prandial studies, Porcine models for Infant programming
- Bovine DNA depository

Selected Publications

1. Giblin, L., C. Darimont, P. Leone, L.B. McNamara, F. Blancher, D. Berry, E. Castaneda-Gutierrez, and P.G. Lawlor. 2015. Offspring subcutaneous adipose markers are sensitive to the timing of maternal gestational weight gain. Reprod Biol Endocrinol. 13(1):16
2. O'Sullivan, D.J., P.D. Cotter, O. O'Sullivan, L. Giblin, P.L. McSweeney, J.J. Sheehan. 2015. Temporal and spatial differences in microbial composition during the manufacture of a continental-type cheese. Appl Environ Microbiol.;81(7):2525–33.
3. H. Schellekens, P.N. De Francesco, D. Kandil, W.F. Theeuwes, T. McCarthy, W.E. van Oeffelen, M. Perello, **L. Giblin**, T. G. Dinan and J. F. Cryan. **2015** (in press). Ghrelin's Orexigenic Effect Is Modulated via a Serotonin 2C Receptor Interaction. ACS Chem Neurosci. 2015
4. Amdi ,C., **L. Giblin,** T. Ryan, N.C. Stickland and P.G. Lawlor, **2014.** Maternal backfat depth in gestating sows has a greater influence on offspring growth and carcass lean yield than maternal feed allocation during gestation. Animal 8(2):236–44.
5. Le Maux, S., A. Brodkorb, T. Croguennec, A. A. Hennessy, S. Bouhallab, and **L. Giblin**. **2013**. beta-Lactoglobulin-linoleate complexes: In vitro digestion and the role of protein in fatty acid uptake. J Dairy Sci 96:4258–68.
6. Hand, K. V., C. M. Bruen, F. O'Halloran, H. Panwar, D. Calderwood, **L. Giblin**, and B. D. Green. **2013**. Examining acute and chronic effects of short- and long-chain fatty acids on peptide YY (PYY) gene expression, cellular storage and secretion in STC-1 cells. Eur J Nutr 52:1303–13.
7. Beecher, C., M. Daly, R. P. Ross, J. Flynn, T. V. McCarthy, and **L. Giblin. 2012**. Characterization of the bovine innate immune response in milk somatic cells following intramammary infection with Streptococcus dysgalactiae subspecies dysgalactiae. J Dairy Sci 95:5720–9.

Technology

PROFILE

Dr Gerard Barry

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Education

- Ph.D Factors Affecting Milk Protein Composition 1980
- B.Sc. Biochemistry with Microbiology 1977

Career

1986–Present: Food Industry Development, Teagasc Food Research Centre, Ashtown

1982–1986: Technical & operations Management Meat Processing Sector

1980–1982: Teagasc Dairy Research Centre, Moorepark

Expertise

- Design, development and delivery of training courses.
- Food Safety Systems / HACCP
- Implementation of Quality Management Systems in Food, Feed & Laboratory areas.
- Auditing of Food Safety & Quality Management
- Regulatory Compliance/ Food Law
- Standards Development
- Projects include:
- Development of Certified Training Programmes
- Design & delivery of specialised training to regulatory bodies and development agencies
- Delivery of training across a range of food safety related topics including microbiology, hygiene, HACCP and food standards auditing, laboratory accreditation etc
- Organisation and delivery of a range of seminars on topics of interest to the food industry including shelf life
- Addressing varied client queries in the area of food safety & quality, including legislative and standards requirements (e.g. BRC, Bord Bia, ISO 22000)
- Problem solving and shelf-life extension

Selected Publications

1. Barry G, Clancy M (1998) Food Catering, A Serious Business. Hotel and Catering Times October/ November Ed. P 4–7.
2. Doyle T, Barry G (1994). Food Safety The Systematic Approach. Food Ireland, June Edition, P17–20.
3. Barry. G, (2010). Ensuring Good Food Standards, T Research, Volume 5, Number 1, Spring 2010 Pages 20–21 (ISSN 1649–8917)
4. Barry G (2012). Shelf-life of Food, T Research, Volume , Number 1, Spring 2012 Pages 20–21 (ISSN 1649–8917)

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PROFILE

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Education

BSc. Agricultural National University, La Molina, Lima, Peru. 1992

Eng. Agricultural National University, La Molina, Lima, Peru. 1996.

MSc. University College, Cork, Ireland, 2002

PhD. University College, Cork, Ireland. 2006

Career

1995–1996: Lecturer, Universidad Nacional de Ancash Santiago Antunez de Mayolo, Faculty of Engineering and Food Industries, Huaraz, Peru.

1996–2000: Teaching assistant and Lecturer, Universidad Agraria La Molina, Faculty of Food industries, Lima, Peru

2006–2009: Post Doctoral Research Scientist, University College Cork

2009–2012: Senior Post Doctoral Research Scientist, University College Cork

2012–present: Senior Research Support Officer

Expertise

My primary research interests relate to aspects of novel processing technologies (e.g. High pressure treatment), development of smart packaging systems and nanotechnologies. In particular, food packaging, microbiological and physicochemical changes of processed meat products, rheological and textural properties of foods, food quality enhancement, material science aspects of foods, particularly how process conditions, including novel processing technologies, affect structure and resulting properties. A particular focus of my current research relates to nanotechnology focused on producing and utilizing metal and food-derived nanoparticles for use in smart packaging materials and the use of nanoparticles in various food applications, e.g. marinades, sauces. Applications of polymer processing techniques to food systems and development/use of bio-based plastics as alternatives to petroleum-based plastics. Value added processing of muscle foods for quality, stability and performance. In addition, I have a strong scientific background in biochemical, physicochemical and microbiological quality aspects of muscle foods and shelf- life evaluation of foods.

Selected Publications

1. Azlin-Hasim, S., Cruz-Romero, M., Ghoshal, T., Morris, M., Cummins, E., Kerry J. (2015) Application of silver nanodots for potential use in antimicrobial packaging applications. *Innovative Food Science & Emerging Technologies* 27, 136–143
2. O'Flynn, C.C., Cruz-Romero, M.C., Troy, D.J., Mullen. A.M., Kerry, J.P. (2014) The application of high-pressure treatment in the reduction of salt levels in reduced-phosphate breakfast sausages. *Meat Science* 96, 1266–1274.
3. O'Flynn, C.C., Cruz-Romero, M.C., Troy, D.J., Mullen. A.M., Kerry, J.P. (2014) The application of high-pressure treatment in the reduction of phosphate levels in breakfast sausages. *Meat Science* 96, 633–639.
4. Cruz-Romero, M.C, Murphy, T., Morris, M., Cummins, E. and Kerry, J.P. (2013) Antimicrobial activity of chitosan, organic acids and nano-sized solubilisates for potential use in smart antimicrobially-active packaging for potential food applications. *Food Control* 34, 393–397.
5. Rodríguez-Calleja, J.M, Cruz-Romero, M.C, O'Sullivan, M.G, García-López, M.L, Kerry, J.P (2012) High-pressure-based hurdle strategy to extend the shelf-life of fresh chicken breast fillets. *Food Control,* 25, 516–524.
6. Cushen, M., Kerry, J., Morris, M., Cruz-Romero, M., Cummins, E. (2014) Evaluation and simulation of silver and copper nanoparticle migration from polyethylene nanocomposites to food and an associated exposure assessment. *Journal of Agricultural and food Chemistry*, 62, 1403–1411.

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PROFILE

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Education

BSc. National University of Ireland, Galway, 1989

PhD. National University of Ireland, Galway, 1995

Diploma from the Institute of Packaging, 2001

Career

1994–1999: Post-Doctoral Research Scientist, University College Cork

1999–2001: Temporary-Full-Time College Lecturer, University College Cork

2001–2006: College Lecturer, University College Cork

2006–Present: Senior College Lecturer, University College Cork

Expertise

I work on various aspects of food packaging, shelf-life stability, food composition and numerous aspects of food quality, particularly in relation to muscle-based foods (meat, poultry and seafood). I have strong links with industry and my research team assists companies in relation to new food product development. I have 220^{+} publications in peer-reviewed international journals, 300^{+} presentations at major international conferences, along with several other significant publications. My expertise includes use and manipulation of modified atmosphere packaging systems for use with foods, use of extrusion technology for the manufacture of food products/ packaging materials, applications, sensor and new technology developments within the area of food packaging, especially, smart packaging materials and technologies.

Selected Publications

1. Kerry, J.P., O'Grady, M.N. and Hogan, S.A. (2006). Past, current and potential utilisation of active and intelligent packaging systems for meat and muscle-based products: a review. *Meat Science*, 74, 113–130.
2. Troy, D.J. and Kerry, J.P. (2010). Consumer perception and the role of science in the meat industry – a review. *Meat Science*, 86, 214–226
3. Hempel, A., Papkovsky, D.B. and Kerry, J.P. (2013). Use of optical oxygen sensors in non-destructively determining the levels of oxygen present in combined vacuum and modified atmosphere packaged pre-cooked, convenience-style foods and the use of ethanol emitters to extend product shelf-life. *Foods*, 2, 507–520.
4. Hempel, A., O'Sullivan, M.G., Papkovsky, D.B. and Kerry, J.P. (2013). Use of smart packaging technologies for monitoring and extending the shelf-life quality of modified atmosphere packaged (MAP) bread: application of intelligent oxygen sensors and active ethanol emitters. *European Food Research and Technology*, 237, 117–124.
5. Tobin, B.D., O'Sullivan, M.G., Hamill, R.M. and Kerry, J.P. (2013). The impact of salt and fat level variation on the physiochemical properties and sensory quality of pork breakfast sausages. *Meat Science*, 93, 145–152.
6. O'Flynn, C.C., Cruz-Romero, M.C., Troy, D., Mullen A.M. and Kerry, J.P. (2014). The application of high-pressure treatment in the reduction of salt levels in reduced-phosphate breakfast sausages. *Meat Science*, 96, 1266–1274.

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PROFILE

Prof. Dmitri Papkovsky

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Education

MSc. Moscow State University, Russia. 1982

PhD. Institute of Biochemistry, Moscow, Russia. 1986

Career

1985–1991 - Research Scientist, Institute of Biochemistry, Russian Acad Sci, Moscow, Russia

1991–1995 - Senior Research Scientist, Research Center of Molecular Diagnostics, Moscow, RUSSIA;

1995–1996 - Research Fellow, Institute of Organic Chemistry, Karl-Franzens University, Graz, Austria

1996–1997 - Research Scientist, Chemistry Department, University College Cork,

1997–2003 - College Lecturer, Biochemistry Department, University College Cork,

2003–2006 - Statutory Lecturer, Biochemistry Department, University College Cork,

2006–present: Professor (Scale 2), School of Biochemistry and Cell Biology, UCC

Expertise

My primary research interests relate to development of phosphorescence based oxygen sensors and their application in food and packaging industry for non-destructive monitoring of residual oxygen in sealed containers. Another group of applications of optical oxygen sensor technology is rapid high-throughput testing of growth and presence of microorganisms in complex matrices such as food products, via their respiration. These sensor technologies have long-ranging applications in food industry, food quality control and safety assurance, and clear commercial benefits for food producers .

Selected Publications

1. Papkovsky DB, Dmitriev RI, Biological detection by optical oxygen sensing, *Chem Soc Rev*, 2013, 42: 8700.
2. Hempel AW, Gillanders R, Papkovsky DB, Kerry JP, Detection of cheese packaging containment failures using reversible optical oxygen sensors, *Int J Dairy Technol*., 2012, 65:456.
3. Borchert NB, Cruz-Romero M, Mahajan PV, Rena M, Papkovsky DB, Kerry JP, Application of gas sensing technologies for non-destructive monitoring of headspace gases (O2 and CO2) during chilled storage of packaged mushrooms (Agaricus bisporus) and their correlation with product quality parameters, *Food Packaging Shelf Life*, 2014, 2:17.
4. Hempel A, Papkovsky DB, O'Sullivan M, Kerry JP, Nondestructive and continuous monitoring of oxygen levels in modified atmosphere packaged ready-to-eat mixed salad products using optical oxygen sensors, and Its effects on sensory and microbiological counts during storage, *J Food Sci.,* 2013, 78:S1057.
5. Jasionek G, Ogurtsov VI, Papkovsky DB, Rapid detection and respirometric profiling of aerobic bacteria on panels of selective media, *J Appl Microbiol*. 2013;114:423.

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PROFILE

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Education

M.Sc. University College Cork, Ireland. 2010

Ph.D. University College Dublin, Ireland. 2000

B.Agr.Sc. University College Dublin, Ireland. 1994

Career

2013–present: Research Support Officer, University College Cork.

2009–2013: Senior Research Scientist, UCC.

2006–2009 : Project Co-ordinator/Scientist, UCC.

2004–2006: Research Technologist, UCC.

2001–2004: Post-Doctoral Research Scientist, UCC.

Expertise

Dr O'Grady has extensive research experience in the School of Food and Nutritional Sciences in UCC where he has worked on a variety of national and EU funded research projects including high pressure processing of foods, the manipulation of bovine and porcine diets and effects on meat quality, development of healthier meats and meat products, innovation in fresh beef packaging and marine functional foods research. He has also worked on collaborative research projects in conjunction with the Irish food industry.

Research interests and expertise include:

- Quality and shelf-life evaluation of muscle foods.
- Food processing technologies and ingredients.
- Antioxidants – analysis, functionality and potency.
- Bioactive ingredients from marine sources.
- Stability and activity of bioactive compounds.
- Nutraceuticals and functional foods.
- Animal dietary supplementation studies.

Selected Publications

1. Moroney, N.C., O'Grady, M.N., O'Doherty, J.V., Kerry, J.P. (2013). Effect of a brown seaweed (*Laminaria digitata*) extract containing laminarin and fucoidan on the quality and shelf-life of fresh and cooked minced pork patties. *Meat Science* 94, 304–311.
2. Murphy, K.M., O'Grady, M.N., Kerry, J.P (2013). Effect of varying the gas headspace to meat ratio on the quality and shelf-life of beef steaks packaged in high oxygen modified atmosphere packs. *Meat Science* 94, 447–454.
3. Hayes, J.E., Allen, P., Brunton, N., O'Grady, M.N., Kerry, J.P. (2011). Phenolic composition and *in vitro* antioxidant capacity of four commercial phytochemical products: olive leaf extract (*Olea europaea* L.), lutein, sesamol and ellagic acid. *Food Chemistry* 126, 948–955.
4. O'Grady M.N., Kerry, J.P. (2010). The effect of non-meat ingredients on quality parameters in meat and poultry. In: *Chemical Deterioration and Physical Instability of Food and Beverages*. L.H. Skibsted, J. Risbo and M.L. Andersen, eds., (pp 701–725), Woodhead Publishing Limited, Cambridge, England.
5. O'Grady, M.N., Carpenter, R., Lynch, P.B., O'Brien, N.M., Kerry, J.P. (2008). Addition of grape seed extract and bearberry to porcine diets: influence on quality attributes of raw and cooked pork. *Meat Science* 78, 438–446.
6. Valencia, I., O'Grady, M.N., Ansorena, D., Astiasarán, I., Kerry, J.P. (2008). Enhancement of the nutritional status and quality of fresh pork sausages following the addition of linseed oil, fish oil and natural antioxidants. *Meat Science* 80, 1046–1054.

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PROFILE

Dr Seamus O'Mahony

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Education

BSc. University College, Cork, Ireland. 2001

PhD. University College, Cork, Ireland. 2005

Career

2005–2006: Irish Research Council Postdoctoral Research Fellow, Teagasc, Moorepark

2006–2007: Research Assistant, Wyeth Nutritionals, Askeaton, Co. Limerick

2007–2009: Ingredient Development Technologist, Wyeth Nutritionals, Askeaton, Co. Limerick

2009–2010: Manager, Global Innovation, Wyeth Nutritionals, Askeaton, Co. Limerick

2010-present: Lecturer in Food Science, School of Food and Nutritional Sciences, University College Cork

Expertise

My primary area of expertise is food ingredients, structure, formulation and functionality. Most of my research is focused on dairy science and technology, specifically dairy ingredient manufacture, functionality, interactions, formulation and processing. My current research programme focuses on (1) food ingredients, structure and functionality, (2) isolation, enrichment and purification of food constituents, (3) nutritional product formulation, processing and functionality and (4) protein-carbohydrate interactions in food systems. My team (3 postdocs and 8 postgraduate students) work on a range of publically- and privately-funded projects in these areas, all involving a continuum between laboratory and pilot scale processing in developing and optimising food ingredients for specific applications. Much of my research projects are multi-disciplinary (e.g., linkages with Process & Chemical Engineering, Analytical Chemistry, Pharmacy, Maternity Hospital) and collaborative (e.g., Teagasc Food Research Centre; INRA, France; NIZO, the Netherlands) in nature.

Selected Publications

1. Makinen, O.E., Uniacke-Lowe, T., **O'Mahony, J.A.** and Arendt, E.K. (2015). Physicochemical and acid gelation properties of commercial UHT-treated plant-based milk substitutes and lactose free bovine milk. *Food Chemistry*, 168, 630–638.
2. Crowley, S.V., Megemont, M., Gazi. I., Kelly, A.L., Huppertz, T. and **O'Mahony, J.A.** (2014). Heat stability of reconstituted milk protein concentrate powders. *International Dairy Journal*, 37, 104–110.
3. Nur Hanani, Z.A., **O'Mahony, J.A.**, Roos, Y.H., Oliveira, P.M. and Kerry, J.P. (2014). Extrusion of gelatin-based composite films: Effects of processing temperature and pH of film forming solution on mechanical and barrier properties of manufactured films. *Food Packaging and Shelf Life*, 2, 91–101.
4. Crowley, S.V., Gazi. I., Kelly, A.L., Huppertz, T. and **O'Mahony, J.A.** (2014). Influence of protein concentration on the physical characteristics and flow properties of milk protein concentrate powders. *Journal of Food Engineering*, 135, 31–38.
5. Kelly, G.M., **O'Mahony, J.A.**, Kelly, A.L. and O'Callaghan, D.J. (2014). Physical characteristics of spray-dried dairy powders containing different vegetable oils. *Journal of Food Engineering*, 122, 122–129.
6. McCarthy, N.A., Gee, V.L., Hickey, D.K., Kelly, A.L., **O'Mahony, J.A.** and Fenelon, M.A. (2013). Effect of protein content on the physical stability and microstructure of a model infant formula. *International Dairy Journal*, 29, 53–59.
7. Hanley, K.J., Byrne, E.P. Cronin, K., Oliveira, J.C., **O'Mahony, J.A.** and Fenelon, M.A. (2011). Effect of pneumatic conveying parameters on physical quality characteristics of infant formula. *Journal of Food Engineering*, 106, 236–244.

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PROFILE

Dr Seamus O'Reilly

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Education

BSc. University College, Cork, 1988

MSc. University College, Cork, 1988

PhD. University of Wales. 2003

Career

1990–1992: Assistant Lecturer, University College Cork

1992–2006: Lecturer, University College Cork

2006–present: Senior Lecturer, University College Cork

Expertise

Seamus O'Reilly is a Senior Lecturer in the Department of Food Business & Development, University College Cork, Ireland. He has focused his research activity on supply chain management and teaches on a wide range of undergraduate, postgraduate and executive education/ post-experience programmes. His research on supply chain networks includes: design and management of sustainable supply chain processes and associated metrics; strategy deployment, alignment and performance measurement; business process management and network analysis.

This expertise has been leveraged through both action research projects (e.g. recent work includes five food SME interventions focused on efficient and effective order fulfilment processes) and well established professional education programmes that include Green and Black Belt Lean Supply Chain Management projects. For example, in recent years 136 Lean Black Belt projects have been completed and delivered significant strategic and operational improvements for the companies involved.

Seamus has published a number of articles related to supply chain management and network analysis in journals such as: International Journal of Operations and Production Management, Journal of Production, Planning and Control; International Journal of Retail & Distribution Management; Acta Agriculturae Scandinavica C – Food Economics Journal; Journal of Chain and Network Science; Journal of International Food & Agribusiness Marketing and the British Food Journal.

Selected Publications

1. O'Reilly, S., Kumar, A. and Adam, F. (forthcoming) The role of Hierarchical Production Planning in food manufacturing SMEs, *International Journal of Operations and Production Management*
2. Sammon, D. and O'Reilly, S. (2013) A Conceptual Data Model to enhance SKU Management in Food SMEs, *Journal of Decision Systems,* 22(4).
3. Sloane, A. and O'Reilly, S. (2012) The emergence of supply chain eco-systems: a social network analysis perspective *Production Planning & Control*, 24 (7), 621–639, 2013
4. O'Reilly, S. and Nagle, A. (2012) Supply Chain 'Centres of Excellence' in Multinational Corporations, 4th Joint World Conference on Production & Operations Management (POMS)/ 19th *International Annual European Operations Management Association* (EurOMA) Conference, 1–5 July Amsterdam.
5. Mangan, J., O'Reilly, S. and Jackson, L. (2011) Indentifying logistics channels to market for Irish SME food exporters, Logistics Research Network Conference CILT (UK), Southampton

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PROFILE

Dr Mary McCarthy

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Education

BSc. University College Cork, Ireland. 1989

MBA, St Joseph's University Philadelphia, USA. 1991

PhD, Reading University, UK. 2003

Career

1989–1991: Retail Manager, WAWA, USA

1990–1991: Market Researcher, WAWA, USA

1992–1997: Research Assistant, University College Cork

1997–2005: Lecturer, University College Cork

2005–present: Senior Lecturer, University College Cork

Expertise

My primary research interests relate to aspects of consumer food behaviour, in particular, the influence of individual, social and market forces on behaviour. My research activities can be broken into two key themes: 1) consumer food behaviour and health and 2) consumer food behaviour and the market. Applying both quantitative and qualitative approaches I have explored the determinants of consumption across a number of food categories including fresh and processed meats, dairy, convenience foods and organic foods. I also research consumer acceptance of novel food technologies and the impact of consumer innovativeness on diffusion of innovations. Investigation of food patterns and practices of individuals across their life course is of particular interest. This research has focused on the consequences of transitions and turning points on dietary behaviours and is concerned with identifying approaches to enhancing dietary patterns within the Irish population. Current research projects are in the areas of: healthy eating - consumer cognitive responses to food; consumer acceptance of novel technologies (risk communication) and the determinant of food choice.

Selected Publications

1. Cronin, J., McCarthy, M., Brennan, M. and McCarthy, S. (2014). The bigger society: considering lived consumption experiences in managing social change around obesity. European Journal of Marketing.
2. Delaney, M. and McCarthy, M. (2014). Saints, Sinners and Non-believers: The moral space of food. A qualitative exploration of beliefs and perspectives on healthy eating of Irish adults aged. Appetite.
3. Henchion, M,McCarthy, M,Resconi, VC,Troy, D. (2014). Meat consumption: Trends and quality matters. Meat Science.
4. Greehy, G., McCarthy, M., Henchion, M. McCarthy, S. and Dillion, E. (2013). Complexity and Conundrums: Citizens' evaluations of potentially contentious novel food technologies using a deliberative discourse approach. Appetite.
5. Newcombe, M., McCarthy, M., Cronin, J. and McCarthy, S. (2012). Eat like a man. A social constructionist analysis of the role of food in men's lives. Appetite, 59 (2):391–398.
6. McCarthy, M. and Brennan, M. (2009). Food risk communication: Some of the problems and issues faced by communicators on the Island of Ireland (IOI). Food Policy.
7. Wycherley, A., McCarthy, M. amd Cowan, C. (2008). Speciality food orientation of food related lifestyle (FRL) segments in Great Britain. Food Quality and Preference.

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PROFILE

Dr Alan Collins

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Education

BA. University College Cork, Ireland. 1986

MA (Economics), University College Cork. 1988

PhD (Marketing), University of Stirling, Scotland. 2000

Career

1988–89: Assistant Lecturer, University College Cork.

1989–1992: Marketing Services, Tesco, UK.

1992–1993: Buyer, Tesco, UK.

1993–2004: Lecturer, University College Cork

2004– Present: Senior Lecturer, University College Cork

Expertise

To date my research interests and publications have extended throughout the food supply chain from food logistics and the supply chain, through retailer-manufacturer relationships with a particular focus on the role of store brands, to consumer and shopper behaviour in food markets. I have used a variety of quantitative and qualitative methods throughout my research activities. My current research projects may be divided into four strands:

1. The determinants and consequences of shoppers' price and deal search behaviours in the grocery market.
2. The use of mobile technology in consumers' food related search and engagement practices.
3. The evolving role of store brands in shaping decision-making throughout the food chain.
4. Consumer food and health related behaviours.

Two of the key findings that emerge from my shopper related research are how identity building knowledge is increasingly shaping search activities and how shoppers' evaluation of time spent in search differs across the online and physical domains.

Engagement with industry is sustained through regular participation as adjudicator in store of the year awards with a variety of retail organisations. I have also served as the academic director for the industry focused Diploma in Food Retailing programme at University College Cork.

Selected Publications

1. Collins, A., Cronin, J., Burt, S., and George, R. (2015) 'From store brands to store brandscapes: The emergence of a time and money saving heuristic'. *European Journal of Marketing*,
2. Collins, A. Kavanagh, E, Cronin J & R. George (2014) 'Money, Mavens, Time and Price Search: Modelling the Joint Creation of Utilitarian and Hedonic Value in Grocery Shopping'. *Journal of Marketing Management*
3. Cronin, J., McCarthy, M., and Collins, A. (2014) 'Covert Distinction: how hipsters practice food-based resistance strategies in the production of identity'. *Consumption, Markets and Culture*
4. Collins, A. Kavanagh, E. and George, R.; (2012) 'Store Deal Prone Shoppers : Motivators and Implications for the Supply Chain in a Distressed Market'. *The International Review of Retail, Distribution and Consumer Research*,
5. O'Sullivan, S., Richardson, B., Collins, A.; (2011) 'How Brand Communities Emerge: The Beamish Conversion Experience'. *Journal of Marketing Management*,
6. Collins A, and Burt, S.L.; (2003) 'Market Sanctions, Power and Monitoring within Retailer-Manufacturer Relationships: The Case of Retail Brand Suppliers'. *European Journal of Marketing*,

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PROFILE

Dr Joe Bogue

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Education

BSc University College Cork, Ireland. 1985.

MSc FST University College Cork, Ireland. 1992.

PhD University of Newcastle-upon-Tyne, UK. 2002.

MA University College Cork, Ireland. 2007.

Career

1985–1989: NPD Management, Mitchelstown Co-op.

1989–1990: Production/Operations Management Ballyvarra Foods.

1992–1997: Research Assistant, University College Cork.

1997–2006: Lecturer, University College Cork.

2006–present: Senior Lecturer, University College Cork.

Expertise

My research agenda focuses on market-oriented new product development (NPD) and this combines three thematic areas: 1. new food product design 2. the NPD process within firms, and 3. market orientation in the Irish Food Sector. I have developed a number of distinct stands of enquiry from this: the design and strategic marketing of new food products, such as reduced-fat/calorie foods, health-enhancing foods and functional foods; factors that impact on food choice, such as: consumer behaviour, sensory and marketing linkages and food trends. This research incorporates market-oriented approaches to the strategic marketing of foods along the life span, such as foods marketed at ageing consumers, or the marketing of free-from foods. My research interests necessitate both qualitative and quantitative approaches and the application of a range of analytical theories.

My current research takes a market-oriented approach to the design and marketing of foods for the ageing population. This involves a research triangulation approach through interviewing key stakeholders (industry and academia) and using a drag and drop design technique with ageing consumers in focus groups to design composite food products that meet their food, nutritional and lifestyle requirements. A conjoint analysis study then examines consumer trade-offs for hypothetical products generated from the focus groups. This study has provoked very strong interest and interaction from the food industry and medical professionals. This is the first Irish research to look at market-oriented design of new foods for ageing consumers and conceptually uses a knowledge management approach to the research. It is hoped to replicate this work internationally, as there is very strong interest in foods for the ageing population, particularly in terms of increasing healthcare costs.

I also have a strong research interest in entrepreneurship and this has evolved from my work over the last eighteen years mentoring food SMEs and student enterprise teams. I have completed, and presented research, on student entrepreneurs and their role as innovation intermediaries in the enterprise process at University level. This research is significant in relation to idea generation, developing student IP and the role of University Technology Transfer Offices dealing with student enterprise.

Selected Publications

1. Collins, O. and Bogue, J. (2015). The Role of Food in Supporting Healthy Ageing: A Stakeholder Perspective, *Journal of Ageing and Society*, 4, (3–4).
2. Bogue, J. and Troy, A.J. (2015) 'Functional beverages: Market trends and market-oriented new product design' In: *Handbook of Functional Beverages and Human Health*. New York: Taylor and Francis CRC Press.
3. Yu, H. and Bogue, J. (2013) 'Concept optimisation of fermented functional cereal beverages'. *British Food Journal*, 115 (4):541–563.
4. Bogue, J, Sorenson, D. and O'Keeffe, M. ; (2009) 'Cross category innovativeness as a source of new product ideas: Consumers' perceptions of over-the-counter pharmacological beverages'. *Food Quality and Preference*, 20: 363–371.

Technology

PROFILE

Dr Norah O'Shea

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Education

BSc. University College, Cork, 2008

MSc. University College, Cork, 2009

PhD. University College, Cork, 2014

Career

2014–present: Post-Doctoral Research Scientist

Teagasc Food Research Centre, Ashtown

Expertise

My primary research interests relate to aspects of cereal science. Presently, I am researching the properties and novel uses of Irish-grown barley and oat varieties. In particular, I am looking at the fractionation of these grains and the application of the fractions in cereal products. Part of this work involves analysing their nutritional properties to identify a nutrient dense fraction that could offer potential health benefits to the consumer. Another aspect of my research involves developing bakery formulations which contain these cereal fractions. I also have experience in dough and batter rheology. Having completed a PhD in gluten-free research, I have a personal interest in the development of gluten-free ingredients and formulations and their texture and sensory properties.

Selected Publications

1. O'Shea, N., Ktenioudaki, A., Smyth, T.P., McLoughlin, P., Doran, L., Auty, M.A.E., Arendt, E.K., Gallagher, E. (2015) Physicochemical assessment of two fruit by-products as functional ingredients: Apple and orange pomace. *Journal of Food Engineering,* 153, 89–95
2. O'Shea, N., Roessle, C., Arendt, E.K., Gallagher, E. (2015) Modelling the effects of orange pomace using response surface design for gluten-free bread baking. *Food Chemistry*, 166, 223–230
3. O'Shea, N., Arendt, E.K., Gallagher, E. (2014) State of the art in gluten-free research. *Journal of Food Science*, 79, 6, R1069
4. O'Shea, N., Arendt, E.K., Gallagher, E. (2014) Enhancing an extruded puffed snack, by optimising die head temperature, screw speed and apple pomace inclusion. *Food Bioprocess Technology*, 7, 1767–1782
5. O'Shea, N., Doran, L., Auty, M.A.E., Arendt, E.K., Gallagher, E. (2013) The rheology, microstructure and sensory characteristics of a gluten-free bread formulation enhanced with orange pomace. *Food & Function* 4, 1856–1863

Technology

PROFILE

Dr Michael Gaffney

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Education

BSc. National University of Ireland, Maynooth, 2002.

PhD. University College Dublin, Ireland. 2012

Career

2002–2006: PhD Candidate, Department of Environmental Resource Management, UCD

2006: Research Assistant, Department of Biological Sciences, University of Wales, Swansea, Wales

2006–2013: Protected Crops Specialist, Horticulture Development Department, Teagasc

2013–present: Research Officer, Horticulture Development Department, Crops, Env & Land Use Programme, Teagasc

Expertise

My primary research interests relate to aspects of vegetable and fruit agronomy, in particular, the influence and impact of agronomic practices on the phytochemical content and quality of edible crops, including the impact of variety selection, fertilisation strategy and crop protection inputs. Phytochemical content can vary greatly depending on variety selection alone, as we have demonstrated for Broccoli, Onion, Carrot, Strawberry and Rocket among others to date. The value and reuse of fruit and vegetable processing waste, either as a food additive or extraction material is also an interest of mine as is the fate of phytochemical's through the food production process. I am also interested in the impact phytochemical's have on insect pests and if increasing the concentration of phytochemical's in a plant, either by variety selection or application of bio stimulants, can suppress the damaging impact of crop pests. A particular focus of my work has been the use of such plant extracts as plant protection products, including the use of Rhubarb and Neem extracts to suppress pest populations. In addition, I am interested in most aspects of horticultural food production.

Selected Publications

1. Reilly, K., Valverde., Finn, L., Gaffney, M., Rai, D & Brunton, N. (2015) A note of the feasibility of selenium supplementation of Irish grown Allium crops. Irish Journal of Agricultural and Food Research. 53(1): 91–99
2. Valcarel, J., Reilly, K., Gaffney, M & O'Brien, N (2015) Total carotenoids and acorbic acid content in sixty varieties of potato (Solanum tuberosum L.) grown in Ireland. Potato Research. DOI:10.1007/s11540–014–9270–4
3. Valverde, J., Reilly, K., Villacreces, S., Gaffney, M., Grant, J & Brunton, N. (2014) Variation in bioactive content in broccoli (Brassica oleracea var. italic) grown under conventional and organic production systems. Journal of the Science of Food and Agriculture. DOI: 10.1002/jsfa.6804
4. Tiwari, U., Sheehy, E., Rai, D., Gaffney, M., Evans. &Cummins, E. (2015) Quantative human exposure model to assess the level of glucosinolates upon thermal processing of cruciferous vegetables. Food Science and Technology Vol 63, p253–261.
5. Lola-Luz, T., Hennequart, F. & Gaffney, M.T. (2013) Enhancement of phenolic and flavonoid compounds in cabbage (Brassica oleraceae) following application of commercial seaweed extracts of the brown seaweed (Ascophyllum nodosum) Agricultural and Food Science Vol 22, p288–295.
6. Reilly, K., Valverde, J. , Finn, L., Brunton, N., Sorensen, J., Sorensen, H., Grant, J., and Gaffney, M. (2013) Potential of cultivar and crop management to optimise phytochemical content in winter-grown sprouting broccoli (Brassica oleracea L. var. italica). Journal of the Science of Food and Agriculture.

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PROFILE

Dr Dilip Rai

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Education

PhD: Karolinska Institute, Stockholm, Sweden. 2003.

BSc: Trinity College Dublin, Ireland, 1998.

Diploma: DIT Kevin Street, Dublin, Ireland, 1998.

Career

2009–present: Senior Research Officer, Teagasc Food Research Centre, Ashtown, Dublin 15.

2013-present: Adjunct Lecturer, School of Chemistry and Chemical Biology, University College Dublin.

2003–2008: Post-Doctoral Research Scientist, Centre for Synthesis and Chemical Biology, University College Dublin.

Expertise

Dr Rai leads a research team in the field of nutraceuticals in recovering and characterising food molecules that possess health-promoting effects. He has published numerous research articles in assessing the effect of various food-processing (domestic, industrial and novel physical) technologies on the levels of health-benefiting plant- molecules with emphasis on Irish grown vegetables such as carrots, broccoli and onions .He currently leads research projects focusing on valorisation of food-processing by-products to generate sustainable source of functional food ingredients (molecules) and bio-fuels.

Selected Publications

1. Reis, S.F.; Rai, D.K.; and Abu-Ghannam, N. (2014). Apple pomace as a potential ingredient for the development of new functional foods. *International Journal of Food Science and Technology*, 49 (7):1743–1750.
2. Aguiló-Aguayo, I.; Hossain, M. B.; Brunton, N.; Lyng, J.G.; Valverde, J.; and Rai, D.K. (2014). Pulsed electric fields pre-treatment of carrot purees to enhance their polyacetylene and sugar contents. Innovative *Food Science & Emerging Technologies*, 23:79–86.
3. Aguiló-Aguayo, I.; Downey, G.; Keenan, D.F.; Lyng, J.G.; Brunton, N.; Rai, D.K. (2014). Observations on the water distribution and extractable sugar content in carrot slices after pulsed electric field treatment. *Food Research International*, 64: 18–24.
4. Hossain, M.B.; Camphuis, G.; Aguiló-Aguayo, I.; Gangopadhyay, N.; and Rai, D.K. (2014). Antioxidant activity guided separation of major polyphenols of marjoram (*Origanum majorana* L.) using flash chromatography and their identification by liquid chromatography coupled with electrospray ionization tandem mass spectrometry. *Journal of Separation Science,* 37(22): 3205–3213.
5. Hossain, M.B.; Tiwari, B.K.; Gangopadhyay, N.; O'Donnell, C.P.; Brunton, N.P.; and Rai, D.K. (2014). Ultrasonic extraction of steroidal alkaloids from potato peel waste. *Ultrasonics Sonochemistry*, 21 (4): 1470–1476.
6. Aguiló-Aguayo, I.; Suarez, M.: Plaza, L.; Hossain, M. B.; Brunton, N.; Lyng, J.G.; and Rai, D.K. (2014). Optimization of pulsed electric field pre-treatments to enhance health-promoting glucosinolates in broccoli flowers and stalk. *Journal of the Science of Food and Agriculture,* DOI: 10.1002/jsfa.6891.

Technology

PROFILE

Dr Paul D. Cotter

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Education

1996 BSc (Hons) 1st class Microbiology, University College Cork (UCC), Ireland (Graduated in 1st position)

2001 PhD Molecular Biology, University College Cork (UCC), Ireland

Career

2009 Principal Research Officer, Teagasc Food Research Centre

2009 Manager of Teagasc Next Gen DNA Sequencing platform

2009 Principal Investigator, Alimentary Pharmabiotic Centre

2013 Adjunct Lecturer, Cork Institute of Technology

2007-09 Lecturer Microbiology Dept., UCC

2002-06 Senior Research Fellow UCC

2000-02 Post-doctoral Researcher National Food Biotechnology Centre, Cork, Ireland

Expertise

- Microbiology of foods and the gastrointestinal tract and the role of these microbes in health, spoilage and disease
- Antimicrobials to control spoilage and disease-causing bacteria
- Next generation DNA sequencing technologies

Selected Publications

1. Marsh, A.J., C. Hill, R.P. Ross and P.D. Cotter. 2014. Traditional fermented beverages with health-promoting potential: current and future perspectives Trends Food Science Technol. 38:113-124
2. Walsh, C.J., C.M. Guinane, P.W. O'Toole and P.D. Cotter. 2014. Beneficial modulation of the gut microbiota. FEBS Letts doi: 10.1016/j. febslet.2014.03.035
3. Clarke, S.F., E.F. Murphy, O. O'Sullivan, A.J. Lucey, M. Humphreys, A. Hogan, P. Hayes, M. O'Reilly, I.B Jeffery, R. Wood-Martin, D.M. Kerins, E. Quigley, R.P. Ross, P.W. O'Toole, M.P. Molloy, E. Falvey, F. Shanahan and P.D. Cotter. 2014. Exercise and associated dietary extremes impact on gut microbial diversity. Gut. 63:1913-20.
4. Quigley, L., O. O'Sullivan, C. Stanton, T.P. Beresford, R.P. Ross, G.F. Fitzgerald, P.D. Cotter. 2013. The complex microbiota of raw milk. FEMS Microbiol Revs. 37:664-98
5. Cotter P.D., R.P. Ross and C. Hill. 2013. Bacteriocins – a viable alternative to antibiotics? Nature Rev Microbiol. 11:95-105

Technology

PROFILE

Mr. Jim Kelly

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Education

Diploma in Chemical Technology, University College, Cork.

Master in Science Degree, University of Limerick

Expertise

Jim Kelly is responsible for leading the experimental programme on spray drying technology as part of the public research programme and industry-commissioned R&D using the Spray drying facilities at Moorepark Technology Ltd. He has played a key role in the development of dairy powder research in Ireland and has a unique knowledge of the industry coupled with his technical contribution to scientific publications in the area within Teagasc.

His knowledge in spray drying technology is internationally recognised and is widely availed of by fellow researchers and industry clients. In addition, he is highly regarded throughout the Irish /UK Dairy processing sector for plant process efficiency audits that he carries out particularly in process technologies associated with cheese production. He lectures on different dairy technologies, mainly on spray drying and evaporation in the widely regarded training courses presented at Moorepark

Equipment/Technologies

Powder Technology, Evaporation and Spray Drying, Membrane Separation technologies, Centrifugal Separation technologies. Formulation and Recombination Technologies. Cheese Making Technology at commercial scale. Fermentation and hydrolysis scale up process design, Process Efficiency Auditing.

Selected Publications

1. Kelly, J., Kelly, P.M., Harrington, D. (2002) - Influence of processing variables on the physicochemical properties of spray dried fat-based milk powders - ISSN 0023-7302
2. Kelly, J , Kelly,P.M (2000) Ingredient development using a Pilot scale Tall form dryer. A database, of process operating conditions and physico-chemical properties of resulting powders. Book of 120 pages
3. Kelly, J., Kelly, P. Desalination of acid casein whey by nanofiltration. International Dairy Journal, Vol. 5 (1995), 227-310.
4. Kelly, J., Kelly, P. Nanofiltration of whey: Quality, environmental and economic aspects. J. of the Soc. Of Dy. Tech., Vol. 48, No. 1, Feb. 1995.
5. Kelly, P.M., Kelly, J., Mehra, R.K., Oldfield, D.J., Raggett, E., O'Kennedy, B.T. (2000). Implementation of integrated membrane processes for pilot scale development of fractionated milk components. Lait 80: 139-153 ISSN 0023-7302

Technology

PROFILE

Dr Phil Kelly

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Education

1973 B.Sc Dairy & Food Science (UCC)

1975 M.Sc Dairy Engineering (UCC)

1982 PhD Dairy Chemistry (UCC)

1994 MBA (UCC)

Career

1975: Dairy Engineer, Westfalia Separator

1976: Research Officer, An Foras Taluntais

1988-2010: Head of Departments (Teagasc)

- Dairy Technology
- Food Ingredients
- Food Processing & Functionality

1993-2003: Principal Research Officer,

2003-to date: Senior Principal Research Scientist

Expertise

Research interests include physico-chemical and functional changes to milk and other milk-derived streams underpinning concentration and spray drying processes . Exploitation of novel processes especially membrane-based technology for novel ingredient innovation e.g. food formulation, infant nutrition and cheesemaking applications.

Characterisation of compositional and biofunctional aspects of milk fat globule membrane (MFGM) enriched material recovered from milk and dairy processes such as buttermaking and cheesemaking.

Roles in the International Dairy Federation include current National Secretary, Irish National Committee; Member of IDF's Commission B – Science, Engineering & Technology (1998-2000); Chair of IDF's Standing Committee for Dairy Science and Technology (2007-2011); Member of IDF's scientific adjudication committee for the annual IDF Award (2010-to date).

Selected Publications

1. I.B. O'Loughlin, B.A. Murray, A. Brodkorb, R.J. FitzGerald, P.M. Kelly (2014), Production of whey protein isolate hydrolysate fractions with enriched ACE-inhibitory activity, International Dairy J. 38, 101-103. DOI: 10.1016/j.idairyj.2013.12.008
2. McCarthy, N. A., Kelly, P.M., Maher, P.G. & Fenelon, M.A. (2014) Dissolution of milk protein concentrate (MPC) powders by ultrasonication. J. Food Eng. 126, 142-148.
3. I.B. O'Loughlin, B.A. Murray, R.J. FitzGerald, A. Brodkorb, P.M. Kelly (2014) Pilot-scale production of hydrolysates with altered bio-functionalities based on thermally-denatured whey protein isolate. Intl. Dairy J. 34:146–152
4. O'Loughlin IB, Murray BA, Brodkorb A, FitzGerald RJ, Robinson AA, Holton TA, Kelly PM (2013) Whey protein isolate polydispersity affects enzymatic hydrolysis outcomes. Food Chem, 141:2334-42 doi: 10.1016/j.foodchem.2013.05.056.
5. Gaudel C, Nongonierma AB, Maher S, Flynn S, Krause M, Murray BA, Kelly PM, Baird AW, FitzGerald RJ, Newsholme P. (2013) A whey protein hydrolysate promotes insulinotropic activity in a clonal pancreatic β-cell line and enhances glycemic function in ob/ob mice. J Nutr. 2013 Jul;143(7):1109-14. doi: 10.3945/jn.113.174912

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PROFILE

Professor Alan Kelly

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Education

Bsc Biotechnology, Dublin City University, Ireland, 1990

PhD Food Technology, University College Cork (UCC), Ireland, 1995

Career

1994 – 1996: Research Scientist, Department of Food Technology, UCC

1996 – 2004: College Lecturer, Department of Food Technology, UCC

2004 –2008: Senior Lecturer, Department of Food and Nutritional Sciences, UCC

2006 –2013: Dean of Graduate Studies, UCC

2008 to date: Professor, Food Science and Technology, School of Food and Nutritional Sciences, UCC

Expertise

Professor Kelly leads an active research group on the chemistry and processing of milk and dairy products and has published over 200 research papers, review articles and book chapters and supervised over 25 MSc and PhD students to completion; his research involves many national and international collaborations and he has presented at numerous international conferences. He has been an Editor of the *International Dairy Journal* since 2005, and sits on the Editorial Boards of *Trends in Food Science and Technology* and *Innovative Food Science and Emerging Technologies*; he referees for most leading international food journals, and several international funding authorities, and has acted as External Examiner in Universities in the UK, France, Sweden, Denmark, Italy, France, the Netherlands, Australia and New Zealand. His H-index is 34 (Web of Science) - 43 (Google Scholar), with a total of over 3500 citations. In July 2009, he received the Danisco International Dairy Science award from the American Dairy Science Association for his contributions to research in dairy science and technology. He has also won awards in UCC for Excellence in Teaching (2004) and Leadership (2011). He is currently Director of Training of the Agri-Food Graduate Development Programme, funded by the Department of Agriculture and Food, in partnership with UCD and Teagasc. His teaching responsibilities include food processing and preservation, dairy product technology and new food product development. From 2006-2013, Professor Kelly was Dean of Graduate Studies of UCC, with responsibility for institutional graduate education strategy.

Selected publications

1. Heffernan, S.P., Kelly, A.L., Mulvihill, D.M., Lambrich, U. and Schuchmann, H.P. (2011) Efficiency of a range of homogenisation technologies in the emulsification and stabilization of cream liqueurs Innovative. *Food Science and Emerging Technologies* 12 628-634
2. Voigt, D.D., Chevalier, F., Donaghy, J.A., Patterson, M.F., Qian, M.C. and Kelly, A.L. (2012) Effect of high-pressure treatment of milk for cheese manufacture on proteolysis, lipolysis, texture and functionality of Cheddar cheese during ripening. *Innovative Food Science and Emerging Technologies* 13 23-30
3. Hinz, K., O'Connor, P.M., O'Brien, B., Huppertz, T., Ross, R.P. and Kelly, A.L. (2012) Proteomic study of proteolysis during ripening of Cheddar cheese made from milk over a lactation cycle. *Journal of Dairy Research* 79 176-184.
4. Hinz, K., Larsen, L.B., Wellnitz, O., Bruckmaier, R.M. and Kelly, A.L. (2012) Proteolytic and proteomic changes in milk at quarter level following infusion with Escherichia coil lipopolysaccharide. *Journal of Dairy Science* 95 1655-1666.
5. McCarthy, N.A., Kelly, A.L., O'Mahony, J.A., Hickey, D.K., Chaurin, V. and Fenelon, M.A. (2012) Effect of protein content on emulsion stability of a model infant formula. *International Dairy Journal* 25 80 – 86

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PROFILE

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Education

B.Sc. Biotechnology (Hons), National University of Ireland (Galway), Galway, 1996

Ph.D. University of Edinburgh, Edinburgh, 2002

Career

2003–2005: Post-doctoral Research Scientist, The University of Glasgow, Glasgow

2005–2007: Post-doctoral Research Scientist, The University of Oxford, Oxford

2007–2014: Intellectual Property Manager, Alimentary Pharmabiotic Centre, University College Cork

2014–Present: Commercialisation Manager, Teagasc TTO

Role and Responsibilities

In 2013, Teagasc, UCC and Cork IT TTOs formed the UCT Consortium, supported by Enterprise Ireland through the Technology Transfer Strengthening Initiative (TTSI), whereby Teagasc TTO benefits from the close partnership and experience of its partners to increase efficiencies in technology and knowledge transfer. My role as Commercialisation Case Manager under this Consortium is to facilitate the commercialisation of Intellectual Property developed by Teagasc. This involves identifying and creating opportunities to develop and protect novel IP and innovations, the goal being to maximise exploitation of research outputs. This is becoming an increasingly important part of National policy, to optimise return on investment in publicly-funded research, to develop benefits of economic and social importance, and to improve competitiveness in industry.

Responsibilities include performing invention, technology, patentability and commercial evaluations, prior art and market analysis, drafting and negotiation of agreements for research collaborations, technology licensing, confidential disclosures, and material transfers, as well as providing grant application support. This requires extensive interaction and communication across a broad spectrum of researchers, funding agencies, industry representatives, technology transfer professionals, and patent attorneys, to deliver impact in the area of agri-food.

Selected Publications

1. Jansson, M., Durant, S.T., Cho, E.C., Sheahan, S., Edelmann, M., Kessler, B., La Thangue, N.B. (2008). Arginine methylation regulates the p53 response. *Nat. Cell. Biol.* **12,** 1431
2. Sheahan, S., Bellamy, C.O., Harland, S.N., Harrison, D.J., Prost, S. TGF-β induces apoptosis and EMT in primary hepatocytes independently of p53, p21Cip1 or Rb status. (2008). *BMC Cancer* **8,** 191
3. Sheahan, S., Bellamy, C.O., Dunbar, D.R., Harrison, D. J., Prost, S. (2007). Deficiency of G1 regulators P53, P21Cip1 and/or PRb decreases hepatocyte sensitivity to TGF-β cell cycle arrest. *BMC Cancer* **7,** 215
4. Sheahan, S., Bellamy, C.O.C., Treanor, L., Harrison, D.J., Prost, S. (2004). Additive effect of p53, p21 and Rb deletion in triple knockout primary hepatocytes. *Oncogene* **23**, 1489
5. Prost, S., Sheahan, S., Rannie, D., Harrison, D. J. (2001). Adenovirus-mediated Cre deletion of floxed sequences in primary mouse cells is an efficient alternative for studies of gene deletion. *Nucleic Acids Res.* **29,** E80
6. Prost, S., Sheahan, S., Rannie, D. (2000). Induced deletion of the retinoblastoma gene (Rb) from mouse hepatocytes rapidly changes p53, cell cycle and polyploidy regulation. Journal of Pathology, **190**, 63A

Technology

PROFILE

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Education

B.Sc. University of Westminster, UK 1994. Ph.D. University College Cork, 2002.

Career

2008–Present: Principle Research Officer. 2004–2008: Senior Research Officer.

1996–2004: Research Officer, Teagasc Food Research Centre, Moorepark.

1990–1996: Research Technician, Imperial Biotechnology Ltd., London, UK.

Expertise

Kieran's research is primarily focused on the impact of volatile compounds on sensory perception in foods. He manages both the Flavour chemistry and Fermentation facilities at Moorepark which is used for research and as a resource for industry. He is actively involved in developing novel methods to elucidate aromatic flavour compounds by gas chromatography mass spectrometry and mass spectrometry. Areas of major interest include harnessing and exploiting the natural enzymatic and metabolic activities of lactic acid bacteria and yeasts in the development of flavour.in dairy products. Kieran was actively involved in the organization of the Eighth and Ninth International Cheese Symposiums held in Cork in 2011 & 2014 in association with INRA and UCC. He has coordinated Food Institutional Research Measure projects and is participating in a number of nationally and internationally funded projects. He is actively involved with national and international companies. He has over 30 peer reviewed publications and 8 book chapters, and is a regular reviewer for a number of international food science journals.

Selected Publications

1. Cavanagh, D., Kilcawley, K.N., O'Sullivan, M.G., Fitzgerald, G.F and McAuliffe, O. (2014). Assessement of wild non-dairy lactococcal strains for flavour diversification in a mini Gouda-type cheese model. *Food Research International*, 62, 432-440.
2. Yarlagadda, A.B., Wilkinson, M.G., O'Sullivan, M.G.and Kilcawley, K.N. (2014). Utilisation of microfluidization to enhance enzymatic and metabolic potential of lactococcal strains as adjuncts in Gouda type cheese, *International Dairy Journal*, 38, 124-132.
3. Ktenioudaki, A., Crofton, E., Scannell, A.G.M., Hannon, J.A., Kilcawley, K.N and Gallagher, E. (2013). Sensory properties and aromatic composition of baked snacks containing brewer's spent grain. *Journal of Cereal Science*, 57, 384-390.
4. Rulikowska, A., Kilcawley, K.N., Doolan, I.A., Alonso-Gomez, M., Nongonierma, A.B., Hannon, J.A. and Wilkinson, M.G. (2013). The impact of reduced sodium chloride content on Cheddar cheese quality. *International Dairy Journal,* 28, 45-55.
5. Kilcawley, K.N., Nongonierma, A.B., Hannon, J.A., Doolan, I.A. and Wilkinson, M.G. (2012). Evaluation of commercial enzyme systems to accelerate Cheddar cheese ripening. *International Dairy Journal*, 26, 50–57

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PROFILE

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Education

BSc. (Dairy Science), University College Cork, Ireland. 1981

MS. (Human Nutrition), University of Minnesota, USA. 1983

PhD. (Nutritional Biochemistry), Cornell University, USA. 1987

Career

1988–1989: Postdoctoral Research Fellow, Institute of Cellular and Molecular Pathology, University of Louvain, Belgium

1989–1999: Lecturer in Nutrition, Department of Nutrition, University College Cork.

1999–2005: Senior Lecturer, Department of Food and Nutritional Sciences, University College Cork.

2005–present: Professor of Nutrition, School of Food and Nutritional Sciences, University College Cork.

Expertise

Professor O'Brien has longstanding research interest in the broad area of the relationships between diet and nutrition and health. Her research output has encompassed studies conducted in in vitro systems, animal models and human subjects. She is particularly interested in dietary effects on biomarkers relevant to the chronic non-communicable diseases that are responsible for the bulk of mortality in Western populations and increasingly among more affluent sections of society in the Developing World. She has published extensively on biomarkers of oxidative stress, antioxidant status and genotoxicity as well as dietary effects on apoptosis. Following granting of an SFI Investigator Award, Professor O'Brien developed a novel cell culture methodology to investigate bioavailability of nutrients/phytochemicals from foods. The model system is now widely used for this purpose world-wide. Professor O'Brien has over 25 years of experience as a human nutritionist. While the majority of her research efforts have focused on cell culture models, Professor O'Brien also has extensive experience of participation in studies with human subjects. These include involvement in a human intervention trial investigating the efficacy of probiotic cultures in reducing faecal mutagen content in humans fed the probiotic. She was the PI on a Safefood funded project involving nearly 200 Irish school-going adolescents as subjects from 2004 – 2008. More recently, Professor O'Brien is a co-PI on an Irish Aid funded project (AGRIDIET) which will involve evaluation of nutritional status, including clinical assessment of blood samples, in selected Ethiopian population groups.

Selected Publications

1. McCarthy, A.L., O'Callaghan, Y.C., Connolly, A., Piggott, C.O., FitzGerald, R.J. and O'Brien, N.M. (2014). Phenolic-enriched fractions from brewers' spent grain possess cellular antioxidant and immunomodulatory effects in cell culture model systems *Journal of the Science of Food and Agriculture* 94, 1373–1379.
2. McCarthy, A.L., O'Callaghan, Y.C., Connolly, A., Piggott, C.O., FitzGerald, R.J. and O'Brien, N.M. (2013). *In vitro* antioxidant and anti-inflammatory effects of brewers' spent grain protein rich isolate and its associated hydrolysates. *Food Research International* 50, 205–212.
3. O'Callaghan, Y.C., Kenny, O., O'Connell, N.M., Maguire, A.R., McCarthy, F.O. and O'Brien, N.M. (2013). Synthesis and assessment of the relative toxicity of the oxidised derivatives of campesterol and dihydrobrassicasterol in the U937 and HepG2 cell lines. *Biochimie* 95, 496–503
4. Daly, T., Ryan, E., Aherne, S.A., O'Grady, M.N., Hayes, J.E., Allen, P., Kerry, J.P. and O'Brien, N.M. (2010) Bioactivity of ellagic acid-, lutein- or sesamol-enriched pork and beef patties assessed using an *in vitro* digestion and Caco-2 cell model system. *Food Research International* 43, 753–760.
5. Hayes, J.E., Stepanyan, V., Allen, P., O'Grady, M.N., O'Brien, N.M. and Kerry, J.P. (2009). The effect of lutein, sesamol, ellagic acid and olive leaf extract on lipid oxidation and oxymyoglobin oxidation in bovine and porcine muscle model systems. *Meat Science* 83, 201–208.

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PROFILE

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Education

BSc. University College, Cork, Ireland. 1983

PhD. University College, Cork, Ireland. 1990

Career

1990- 2000: College lecturer in Department of Food Chemistry, University College Cork.

2000-Present: University Lecturer in School of Food AND Nutritional Sciences, University College Cork.

Expertise

My primary research interests are focussed in three main areas (i) the impact of post-mortem treatment on the eating quality of muscle based foods with particular emphasis on the impact of these treatments on the protein based structural elements of meat (ii) the intrinsic functional properties of muscle proteins and how they can be exploited in the manufacture of new and improved meat products and (iii) in the recovery of protein rich preparations from waste streams which have techno-functional and /or potential health promoting properties.

Selected Publications

1. Walsh, H, Martins, S. O' Neill, E.E. Kerry, J.P., Kenny, T. and Ward, P.(2010).The effects of different cooking regimes on the cook yield and tenderness of non-injected and injection enhanced forequarter beef muscles *Meat Science*, Volume 84, 444–448
2. Walsh, H, Martins, S. O' Neill, E.E. Kerry, J.P., Kenny, T. and Ward, P.(2010).The effect of sodium lactate, potassium lactate, carrageenan, whey protein concentrate, yeast extract and fungal proteinases on the cook yield and tenderness of bovine chuck muscles *Meat Science*, Volume 85, 230–234.
3. Di Bernardini, R, Rai, D.K., Bolton, D., Kerry, J., O'Neill, E., Mullen, A., Harnedy, P., Hayes, M. (2011). Peptides 32, 388–400.Isolation, purification and characterization of antioxidant peptidic fractions froma bovine liver sarcoplasmic protein thermolysin hydrolyzate
4. Roberta Di Bernardini, Anne Maria Mullen, Declan Bolton, Joseph Kerry, Eileen O'Neill, Maria Hayes (2012)Assessment of the angiotensin-I-converting enzyme (ACE-I) inhibitory and antioxidant activities of hydrolysates of bovine brisket sarcoplasmic proteins produced by papain and characterisation of associated bioactive peptidic fractions *Meat Science* 90, 226–235.
5. P.I. Zakrys-Waliwander , M.G. O'Sullivan , E.E. O'Neill , J.P. Kerry (2012)The effects of high oxygen modified atmosphere packaging on protein oxidationof bovine M. longissimus dorsi muscle during chilled storage*Food Chemistry* 131 527–532.

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PROFILE

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Education

1990 BSc (Hons) Nutrition, University College Cork

1993 PhD Nutrition, University College Cork

Career

2000 – Present Professor of Food and Health, Department of Food & Nutritional Sciences, and Department of Medicine, University College Cork.

2010 – 2013 Head of School, School of Food & Nutritional Sciences, University College Cork

2008 – 2010 Head of Department, Department of Food & Nutritional Sciences, University College Cork

1995 – 1996 Visiting Research Fellow, USDA Human Nutrition Centre on Aging, Tufts University, US.

1993 – 2000 Lecturer, Department of Nutrition, University College Cork.

Expertise

My primary research interests relate to vitamin D and health, vitamin K and health, the role of diet in bone health. My research has a strong human nutrition research focus and includes conduct of human dietary intervention studies which aim to establish the dietary requirement of vitamin D and K, the effect of increasing intakes of these nutrients on skeletal health outcomes, and the role of food-based strategies in preventing deficiencies of these nutrients in the population.

Selected Publications

1. Cashman KD, Hayes A, O'Donovan SM, Zhang JY, Kinsella M, Galvin K, Kiely M, Seamans KM. Dietary calcium does not interact with vitamin D3 in terms of determining the response and catabolism of serum 25-hydroxyvitamin D during winter in older adults. *Am J Clin Nutr.* 2014 Apr 2. [Epub ahead of print]
2. Cashman KD, Kiely M. Recommended dietary intakes for vitamin D: where do they come from, what do they achieve and how can we meet them? *J Hum Nutr Diet.* 2014 Mar 1. doi:
3. Cashman KD. The vitamin D RDA for African American adults: higher than that for white persons? *Am J Clin Nutr.* 2014;99:427–8.
4. Cashman KD. A review of vitamin D status and CVD. *Proc Nutr Soc.* 2014;73:65–72.
5. Cashman KD, Kiely M, Kinsella M, Durazo-Arvizu RA, Tian L, Zhang Y, Lucey A, Flynn A, Gibney MJ, Vesper HW, Phinney KW, Coates PM, Picciano MF, Sempos CT. Evaluation of Vitamin D Standardization Program protocols for standardizing serum 25-hydroxyvitamin D data: a case study of the program's potential for national nutrition and health surveys. *Am J Clin Nutr.* 2013 97:1235–42.
6. Cashman KD, Seamans KM, Lucey AJ, Stöcklin E, Weber P, Kiely M, Hill TR. Relative effectiveness of oral 25-hydroxyvitamin D3 and vitamin D3 in raising wintertime serum 25-hydroxyvitamin D in older adults. *Am J Clin Nutr.* 2012 95:1350–6.

Technology

PROFILE

Dr Anne Maria Mullen

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Education

BSc Biochemistry (1991), University College Galway
PhD (1995) Pharmacology, University College Galway

Career

Current: Principal Research Officer, Teagasc Food Research Centre, Ashtown
1996–1998: Contract Research Officer, Teagasc Food Research Centre, Ashtown

Expertise

Anne Maria Mullen (PhD) is overseeing the research programme for recovery of value from meat processing streams for the Irish meat sector. Her research interests have also addressed issues relating to various aspects of meat processing (post slaughter interventions) and meat quality (technological, eating etc.). In particular she has focused on biochemical and molecular factors underpinning variability in meat quality and the impact of post-mortem process interventions on product quality. She has co-ordinated and collaborated on projects funded through EU Framework, FIRM and EI. In addition Dr Mullen served as Head of Department (2005–2010) leading a staff of up to 20 comprising permanent and contract researchers, technical personnel and students. Publications relate to molecular basis of meat quality, bioactive elements in offal and low value meat, and general meat quality. She has presented her research on many occasions at international and national conferences; she is a member of the EI – Global Skills Team (Pet Food) and is an editor with Frontiers Genetics. She regularly contributes to proposal evaluations at national and international levels, PhD evaluations and is also involved with training and information programmes in meat technology for the Irish meat industry and relevant agencies.

Selected Publications

1. Aslan, O, Sweeney, T, Mullen, AM and Hamill, RM (2010). Regulatory polymorphisms in the bovine Ankyrin 1 gene promoter are associated with tenderness and intra-muscular fat content. BMC Genetics. 11, 111
2. di Bernardini, R., Mullen, A.M., Bolton, D., Kerry, J., O'Neill, E., and Hayes, M. (2011) Assessment of the angiotensin-I-converting enzyme (ACE-I) inhibitory and antioxidant activities of hydrolysates of bovine brisket sarcoplasmic proteins produced by papain and characterisation of associated bioactive peptidic fractions. Meat Science, Volume 90, Issue 1, January 2012, Pages 226–235
3. Alessio Di Luca, Giuliano Elia, Ruth Hamill and Anne Maria Mullen (2013) 2D DIGE proteomic analysis of early post mortem muscle exudate highlights the importance of the stress response for improved water-holding capacity of fresh pork meat. Proteomics 2013, 13, 1528–1544
4. Di Luca, A, Mullen, AM, Elia, G, Davey, G and Hamill, RM (2011). Centrifugal drip is an accessible source for protein indicators of pork ageing and water-holding capacity. Meat Science, 88, 2, 261–270
5. Begonya Marcos, Joseph P. Kerry, Anne Maria Mullen (2010) High pressure induced changes on sarcoplasmic protein fraction and quality indicators. Meat Science 85 (2010) 115–120
6. Begonya Marcos, Anne Maria Mullen (2014) High pressure induced changes in beef muscle proteome: Correlation with quality parameters, Meat Science, Volume 97, Issue 1, Pages 11–20
7. Mullen, A.M., Corcoran, D., Hughes, L., Hamill, R., Cairns, M., and Sweeney, T., (2007). Development in genome technologies for improvements in quality of meat. Meat Science 48, 1–2, p. 16–28

Technology

PROFILE

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Education

BSc. University of Rio de Janeiro, Brazil. 1991

MSc. South Bank University, London, UK. 1997

PhD. University College Dublin, Ireland. 2008

Career

1991–1992: Project Engineer, Rio de Janeiro, Brazil

2001–2002: Research Assistant - Delft University of Technology, The Netherlands

2010–2012: Post Doctoral Research Scientist, FP7 – COOLMEAT Project, University College Dublin

2012–2014: Post Doctoral Research Scientist, FP7 – MILDDRY Project, University College Dublin

2014–present: Research Officer, Food Chemistry and Technology Department

Expertise

My research interests relate to food processing in general and meat products in particular. I hold a BSc in Chemical Engineering and an MSc Food Safety and Control. Previous research work included the development of a rapid cooling technology for cooked meat products and the applications of microwave-vacuum drying to heat sensitive food ingredients. Currently a Project Manager for ReValueProtein project which aims to establish and optimise protocols to extract, characterise and test proteins and peptides from beef and pork fifth quarter products. The project brings together a multidisciplinary team to generate technical know-how, develop and optimize processing conditions for protein extraction, followed by isolation, characterisation and investigation of various applications in food, beverage, health and biomedical engineering.

Selected Publications

1. Feng, C. H., Drummond, L., Sun, D.-W. and Zhang, Z. (2014) Evaluation of Natural Hog Casings Modified by Surfactant Solutions Combined with Lactic Acid by Response Surface Methodology. LWT - Food Science and Technology 58(2), 427–438.
2. Zhang, Z., Drummond, L. and Sun, D.-W. (2013). Vacuum cooling in bulk of beef pieces of different sizes and shape – Evaluation and comparison to conventional cooling methods. Journal of Food Engineering 116 (2) 581–587.
3. Drummond, L. and Sun, D.-W. (2012) Evaluation of the immersion vacuum cooling of cooked beef joints – mathematical simulation of variations in beef size and porosity and pressure reduction rates. Innovative Food Science and Emerging Technologies 16, 205-210.
4. Drummond, L., Sun, D.-W., Vila, C.T. and Scannell, A.G.M. (2009). Application of immersion vacuum cooling to water-cooked beef joints – quality and safety assessment. LWT - Food Science and Technology 42(1), 332-337.
5. Drummond, L. and Sun, D.-W. (2008). Temperature evolution and mass losses during immersion vacuum cooling of cooked beef joints – a finite difference model. Meat Science 80(3), 885-891.
6. Drummond, L. and Sun, D.-W. (2008). Immersion vacuum cooling of cooked beef – safety and process considerations regarding beef joint size. Meat Science 80(3), 738-743.

Technology

PROFILE

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Education

BSc. University College, Cork, Ireland. 1993

MSc. University College, Cork, Ireland. 1995

PhD. University of Copenhagen, Denmark.2002

Career

1995–1997: Research Officer

1997-1999: Process Technologist, International Meat Ingredients, Naas, Co. Kildare.

2002–2003: Post-Doctoral Research Scientist University of Copenhagen, Denmark.

2003–2006: Flavour Chemist- Diageo, Ireland

2006–2007: Global Regulatory Affairs Manager- Diageo

2007–present: Research Project Coordinator, UCC

Expertise

Currently I am working in the School of Food and Nutritional Sciences, University College Cork as a Sensory and Consumer Scientist. My primary research area includes all methods of sensory and consumer science for both academic and commercial research. I work with a broad spectrum of consumer food products including: processed meats, dairy, confectionary, bakery, ready meals, soups, seafood as well as packaging. I have co-supervised to completion 4 Ph.D students which involved extensive consumer and sensory science research work with consumer foods. Currently I supervise 5 Ph.D students and also work on commercial food and beverage projects within UCC. Some of the current consumer food focused research areas include; the sensory optimization of salt and fat reduced processed meats, development of consumer-optimised low carbohydrate confectionary products and alternative ingredient and packaging optimisation strategies. I have published over 60 research papers in the area of sensory and consumer science as well as 41 conference presentations and 11 book chapters.

Selected Publications

1. Fellendorf, S., O'Sullivan, M.G. and Kerry J.P. (2015). Impact of varying salt and fat levels on the physiochemical properties and sensory quality of white pudding sausages. Meat Science, 103, 75-82.
2. O'Sullivan, M.G., Le Floch, S and Kerry, J.P. (2015). Resting of MAP (modified atmosphere packed) beef steaks prior to cooking and effects on consumer quality. Meat Science, 101, 13-18.
3. O'Sullivan, M.G., Cruz, M. and Kerry, J.P. (2011). Evaluation of carbon dioxide flavour taint in modified atmosphere packed beef steaks. LWT-Food Science and Technology 44, 2193-2198.
4. Michon, C., O'Sullivan , M.G., Delahunty C.M. and Kerry, J.P. (2010). Study on the influence of age, gender and familiarity with the product on the acceptance of vegetable soups. Food Quality and Preference, 21, 478-488.
5. Michon, C., O'Sullivan , M.G., Sheehan, E., Delahunty, C.M. and Kerry, J.P (2010). Investigation of the influence of age, gender and consumption habits on the liking for jam-filled cakes. Food Quality and Preference, 21, 553-561.
6. Tobin, B.D., O'Sullivan, M. G., Hamill, R.M. and J. P. Kerry (2012a). Effect of varying salt and fat levels on the sensory quality of beef patties. *Meat Science*, 4, 460-465.
7. Tobin, B.D., O'Sullivan, M. G., Hamill, R.M. and Kerry, J.P. (2012b). Effect of varying salt and fat levels on the sensory and physiochemical quality of frankfurters. *Meat Science,* 92, 659 -666.
8. Tobin, B.D., O'Sullivan, M. G., Hamill, R.M. and J. P. Kerry (2013). The impact of salt and fat level variation on the physiochemical properties and sensory quality of pork breakfast sausages. *Meat Science*, 93, 145-152.

UCC / Teagasc
Food Innovation Alliance

Offers

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OFFER

Novel Enriched Fat Replacers

Teagasc is seeking partners within the food ingredient space to optimise and validate a novel energy-efficient process to produce quality protein-based fat replacers for a range of low fat foods for commercialisation purposes.

Summary

Teagasc researchers have developed an energy-efficient method to produce novel, protein based, calcium enriched fat replacers. This process is based on the self-separation properties of proteins, careful process control and the use of basic liquid processing equipment to generate consistently sized, high quality calcium-enriched fat replacers. This energy-efficient, environmentally sustainable method is relevant to companies wishing to produce high quality low fat food products more cost effectively.

Value Proposition

Reduce energy costs - most existing fat replacers are based on microparticulated whey proteins (MWPs) produced by extensive mechanical processes that require high levels of energy. This technology is relevant to MWP producers who wish to reduce their manufacturing costs as the technology is based on a gentler processing approach.

Produce high quality low-fat, functional foods - there is an urgent need to reduce fat in people's diets (>300m obese adults worldwide) and market studies show that consumers want foods that are nutritious and healthy but retain great taste and flavour. The high quality fat replacers produced with this technology have added health benefits as they are naturally enriched with absorbable calcium and soluble dietary fibre.

The Technology

This novel technology produces a calcium enriched MWP fat replacer through a process called "kinetic trapping" which involves the natural separation tendencies of certain proteins and polysaccharides. This produces separated spherical calcium enriched MWPs, in the size range 0.1 – 3mm, dispersed in a konjac gum-rich solution. The liquid can be spray dried and added as a weight for weight fat replacer to yoghurt, low fat spreads, mayonnaise and ice cream products. Preliminary informal sensory analysis indicated a creamy mouth feel to all resulting products, particularly ice cream, with comparable sensory properties to current market leading fat replacers. Significantly, the novel enriched fat replacer can be produced using basic liquid processing equipment, e.g. steam-jacketed vessels, low-pressure pumps and gentle paddle mixers.

Competitive Advantage of Technology

1. Easily transferable to industry as it only requires basic and readily available liquid processing equipment.
2. An energy-efficient process that could significantly reduce manufacturing costs.
3. The size of the spherical particles produced can be controlled (100nm - 5μm), adding to product consistency.

Opportunity

This technology would be relevant to food ingredient companies wishing to manufacture high quality protein-based fat replacers, at reduced costs, for incorporation into a range of low fat food products.

Intellectual Property Status

Teagasc recently filed a preliminary patent application.

Funding

ENTERPRISE IRELAND

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Technology

OFFER

LABocol: Cholesterol Lowering Probiotic Yoghurt

Teagasc and UCC researchers have developed an invention which allows a novel Lactic acid bacterial (LAB) strain, Lactobacillus mucosae, to be used in a nutritional approach to lowering cholesterol, e.g. in a probiotic yoghurt. Teagasc and UCC seek a commercial partner in the functional food space to further develop this technology with a view to commercialisation and further validation of the supporting health claims.

Summary

Globally, a third of ischemic heart disease is attributable to high cholesterol, with raised cholesterol estimated to cause 2.6 million deaths annually.

Teagasc and UCC researchers have produced scientific data showing that a novel probiotic yoghurt containing novel exopolysaccharide (EPS) producing *Lactobacillus mucosae* DPC6426 can lower blood cholesterol, a risk factor in the development of coronary heart disease, by 53% in 12 weeks.

Problem Addressed

The invention broadly relates to a LAB strain that has been found to express an EPS and confers cardio-protective properties when consumed. It provides for the use of DPC 6426 as a possible nutritional approach to lowering cholesterol.

LAB strains are widely added as starter cultures in the dairy industry and have a long history of safe use. The presence of EPS in dairy products improves texture, decreases the risk of syneresis (whey separation) and improves the techno-functional properties of the products. It has been suggested that EPS produced by LAB interacts with cholesterol in a manner like dietary fibre.

Significantly increased cholesterol excretion was found for the probiotic yoghurt fed group.

Competitive Advantage of Technology

1. LAB are generally regarded as safe (GRAS) according to the FDA.
2. In-situ production of EPS throughout storage resulted in higher quality yoghurt with improved textural and rheological qualities compared to other yoghurts.
3. Blood cholesterol reduced by 53% in 12 weeks.

Opportunity

There is an opportunity to partner with Teagasc/UCC in developing and commercialising a cholesterol lowering probiotic yoghurt, including:

- Establishing the efficacy of the cholesterol lowering properties and effects on plaque stability of the probiotic in animal studies.
- Determining the mechanism of action and benchmarking against plant sterol esters and oat beta-glucan.
- Conducting a human intervention trial to compile a dossier to support a health claim application.

Intellectual Property Status

A patent application was filed by Teagasc and UCC in 2012.

Partners

UCC
Coláiste na hOllscoile Corcaigh, Éire
University College Cork, Ireland

Funding

Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara

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Technology

OFFER

Whey-less Cheese Manufacture Based on Novel Cheese Technology Platform (NCTP)

Teagasc is seeking industrial partners within the ingredient and retail cheese industry to assist in refinement of NCTP for innovative cheese ingredient solutions and health cheeses tailored to specific customer requirements.

Summary

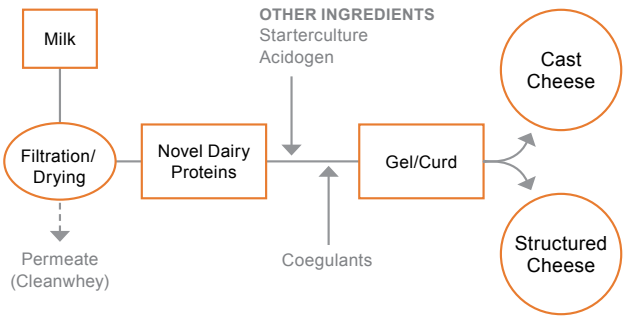
The rapidly growing market for ingredient cheese is currently being served by sourcing traditionally-manufactured table cheeses. Teagasc has developed a dedicated 2-step process for direct manufacture of ingredient cheese tailored to customer requirements. Without the need for whey expulsion it lends itself to the development of new generation health cheeses and increased control of cheese characteristics.

Problem Addressed

Conventional manufacture of natural cheese is quite limited in terms of cost-competitive, customised ingredient solutions, reliance on a source of fresh milk and a large volume of 'unclean' whey, i.e. loss of added materials (e.g., prebiotic materials). Until now, it has not been possible, due to technological constraints and functional limitations, to reconstitute available dairy ingredients in the concentrated form that corresponds to the final compositional specification of targeted cheese types, thereby allowing increased control of ingredient cheese solutions.

Solution

This NCTP provides a platform for design and manufacture of cheeses with varying dry matter content and customised properties using three basic steps. The concept relies on customising the functionality of a milk protein-based ingredient and its subsequent transformation into cheese according to demand. Resultant cheeses may be either cast cheese (<48% dry matter, DM) formed by rennet/acid treatment of re-assembled milk in final package and/or structured cheese (up-to 60% DM) formed by further curd treatment (see figure below).



Competitive Advantage of Technology

1. NCTP capable of making cheese without fresh milk source.
2. No (or very limited) whey expulsion (cast cheeses)
3. Complete retention of any added materials, with potential for development of new generation health cheeses.
4. Greater opportunity to design/control cheese characteristics of ingredient cheeses.

Opportunity

This technology allows the development of a novel range of prototype, functional, casein-based ingredients whereby the pH, buffering capacity and casein-to-whey protein ratio of the resultant cheese can be targeted.

The aim is to link up with relevant cheese ingredient manufacturers to prepare and evaluate prototype cheeses (at moisture levels > 53% with functionality suitable for ingredient cheese applications) with a view to licensing this technology.

Intellectual Property Status

PCT patent Application WO 2009/1 50183.

Funding

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UCC / Teagasc
Food Innovation Alliance

Teagasc
Agriculture and Food Development Authority

Technology

OFFER

Probiotic Cocktail as Animal Feed Additive ("Live5")

Teagasc and UCC researchers are seeking a commercial partner within the animal feeds industry to exploit a new technology. Based on a natural probiotic mix, for growth and good health promotion in animals (specifically pigs), the objective is to develop stable and commercially relevant probiotic product prototypes ready for market.

Summary

The microbial feed additive (or direct-fed microbial), is based on a five strain mix "Live5". It is a natural probiotic mix that can be used as an alternative to chemicals and antibiotics in pig husbandry, both as a means of controlling pathogen carriage and improving growth rate and feed conversion. The five live beneficial bacteria help maintain a healthy intestinal balance for optimum animal performance.

Problem Addressed

Antibiotic growth promoters are currently being phased out of use because they impose a selection pressure for bacteria that are resistant to antibiotics. There is a need for alternative solutions that do not depend on antibiotic usage.

Subclinical salmonellosis is a relatively common problem in pigs, usually causing no obvious animal health problems. Affected pigs are carriers of *Salmonella*, and can excrete large numbers of *Salmonella* organisms intermittently, and particularly when stressed. *Salmonella* in pigmeat has long been associated with outbreaks of foodborne illness.

Solution

The mixture (*Lactobacillus murinus* DPC6002 and DPC6003, *Lactobacillus pentosus* DPC6004, *Lactobacillus salivarius* DPC6005 and *Pediococcus pentosaceus* DPC6006) has been shown to be effective in reducing *Salmonella* shedding in pigs, in protecting against the clinical signs associated with *Salmonella* infection, and in improving growth rates. Live5 has also demonstrated the potential to modulate host immunity in pigs.

Competitive Advantage of Technology

Live5 offers huge potential for use in pig production; in enhancing health status, reduction of subclinical carriage of pathogens (gram negative *Salmonella* and *E.coli* in particular) and in acting as an alternative to antibiotic therapy. Furthermore, one of the Live5 microbes, *L. salivarius* DPC6005, produces a heat stable, two-component bacteriocin, Salivaricin P, which is highly active against a number of gram positive bacteria, including *Enterococcus* sp. and *Listeria innocua.*

Opportunity

It is in the interests of both industry and consumers to reduce the significance of *Salmonella Typhimurium* as a pigmeat-associated food borne pathogen.

The potential fields of applications in animal health include:

- Microbial animal feed additive.
- Alternative to antibiotic growth promoters.
- Therapeutic application.

Intellectual Property Status

A patent application was filed by Teagasc and UCC and the patent "Probiotic composition suitable for animals" was recently granted in the US and Europe.

Partners

UCC
Coláiste na hOllscoile Corcaigh, Éire
University College Cork, Ireland

Funding

ENTERPRISE IRELAND

Department of Agriculture, Food and the Marine
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Technology

OFFER

Enhanced Derivatives of Nisin

Teagasc and UCC are seeking commercial partners within the food and pharmaceutical industries to further develop and commercialise superior derivatives of nisin bacteriocins, for applications in the food areas of bio-preservation and medical devices.

Summary

Teagasc and UCC have developed foodgrade derivatives of nisin A, and producers thereof, with greatly enhanced antimicrobial activity. This offers potential in a greater range of food products and other products within medical/ medical device areas, when compared to commercial nisin A.

Problem Addressed

Nisin A is an antimicrobial peptide which is used as a natural food biopreservative in over 50 countries. Nisin and nisin-producing foodgrade *Lactococci* are extensively used in food nisin is the only peptide to have been added to the European food additive list (E234) and approved by the US Food and Drug Agency (FDA) and World Health Organisation. Despite its success, its application is limited in some instances due to its relative inactivity against particular target species and strains and/or its poor activity at non-acidic pHs.

Solution

Recently developed foodgrade derivatives of nisin and its producers have been found to display greatly enhanced antimicrobial activity against problematic pathogenic and spoilage microbes. They are also active at non-acidic pHs and are effective not only against a broader range of gram positive bacteria but also some gram negative bacteria. With the added benefit of being effective at non-acidic pH, this ingredient has the potential to be applied in a greater range of food products. The availability of enhanced forms of nisin could result in the replacement of nisin A and make other applications a reality.

Competitive Advantage of Technology

1. Enhanced antimicrobial activity.
2. Active at non-acidic pHs.
3. Extended applications of nisin.

Opportunity

This technology would be of interest to companies in the fields of food biopreservatives and medical devices and it is currently being evaluated by a company in the animal health field. Companies are invited to discuss this technology with a view to further development in the following areas:

- Demonstration of safety of variants.
- Demonstration of shelflife extension properties.
- Development of foodgrade applications.
- Scale-up manufacturing.

Intellectual Property Status

Patent applications on the various nisin derivatives have been filed by Teagasc and UCC.

Partners

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Funding

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SFI Science Foundation Ireland

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Technology

OFFER

Probiotic-based Treatment of Mastitis

Teagasc and University College Cork researchers are seeking a commercial partner within the animal health industry to exploit a novel technology involving the treatment of bovine mastitis with foodgrade probiotic bacteria – a natural and effective alternative to antibiotic therapy.

Summary

This technology represents a biological approach to mastitis prevention and is based on live foodgrade cultures of probiotic bacteria, specifically a proprietary strain of *Lactococcus lactis*, effective in treating animal and human infectious diseases and proven to be at least as effective as antibiotics, in the treatment of mastitis.

Problem Addressed

Current treatments for mastitis rely heavily on antibiotics, both for prophylaxis and therapy. This strategy is costly and frequently ineffective. Additionally there are concerns regarding the overuse of antibiotics in veterinary medicine, as it may contribute to the increased spread of antibiotic resistance to human and animal pathogens. Recent legislation in the EU curtailing the use of antibiotics in animal feed should lead to greater controls and limitations in their use. Use of antibiotics may be limited to situations where they are deemed critical.

Solution

There are several advantages to this treatment regime. The bacterium can be produced cheaply in large quantities and it is a foodgrade organism with GRAS status and hence should not require significant with-holding periods for the milk produced by recovering animals, as in the case of treatment with antibiotics.

Competitive Advantage of Technology

1. Natural, effective alternative to antibiotic therapy for treatment of both mild and severe mastitis. Effective against mastitis caused by gram positive and negative bacteria.
2. Using live preparation, cure rates of subclinical and clinical infections were comparable to standard antibiotic therapy
3. Based on use of a foodgrade organism, significant withholding periods should not be required for milk produced by recovering animals, thereby reducing milk losses.
4. Could improve milk quality from clinically infected quarters.

Opportunity

Mastitis causes significant economic losses to the dairy industry. Economic loss in Ireland is estimated at €189.56 per cow, in severe cases, and €45.31 in mild cases. Taking the average incidence of mastitis as 25%, a mean economic value per case of mastitis of €71.84 is estimated (EBI 2007). With an Irish dairy herd population of 1.1m, this gives an estimated annual cost of €20m in Ireland alone.

This represents a significant opportunity for an animal health company to validate and commercialise this technology.

Intellectual Property Status

Patent granted in US and in selected European countries, “Use of Probiotic bacteria in treatment of infection”.

Partners

UCC
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Funding

Department of Agriculture, Food and the Marine
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