DAFM FIRM 2011 Call Projects

DAFM 2011 Research CALL – 2011 Projects funded under the FIRM Programme

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F001	Formulation and Design for Food Structure and Stability	UCC (Teagasc)	€649,600
Project Coordinator: Prof Yrjo H. Roos			
Project Abstract			
This project will investigate structure formation in dairy and food ingredients with effects on formulation needs and stability, protection of sensitive components and shelf life. Characterisation and modification of glass forming properties of solids are based on fluidness characterisation of typical carbohydrate and protein components to improve ingredient manufacturing processes and product stability. Fluidness characterisation is based on changes in relaxation times of structure-forming components in formulations and interaction of dispersed and continuous phases. There will also be investigations on structure formation in nanoscale particles to obtain dispersed particles for transparent food liquids. The project involves fundamental investigations and specific research on industrial relevance for the support of the Irish dairy and food ingredient and infant formula manufacturers for using knowledge-based materials science data in process control and product formulation. The project will satisfy the Irish Government targets and responses to the research needs outlined by the DAFM. Industry relevant IP issues are monitored and appropriate actions taken to protect new IP besides normal scientific dissemination activities of the project outcomes. The project will be carried out in collaboration of Principal investigators at UCC and Teagasc MFRC and is coordinated by UCC.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F008	Translating fundamental research on Listeria monocytogenes for the benefit of a multi-sectoral ready-to-eat food industry.	Teagasc (UCC, UL, NUIG, UCD)	€1,278,307
Project Coordinator: Dr. Kieran Jordan			
Project Abstract			
The agri-food industry in Ireland is worth €24 billion to the Irish economy and the ready-to-eat (RTE) food sector (which frequently covers the farm-to-fork continuum) represents a substantial proportion of this market. The single biggest challenge for this sector is to maintain its reputation for high quality and safety. Listeria monocytogenes is a particular risk for the RTE food sector because it is extraordinarily well adapted to the harsh conditions employed for food preservation. Not alone does Listeria contamination pose a significant public health threat in terms of its high mortality rate, but there are also enormous actual and potential economic consequences for food businesses. In medicine, the concept of translational research is well established, where fundamental researchers convert their findings into practical healthcare solutions. In this project, we will design a translational research programme which will harness existing research capabilities to address the issue of Listeria contamination in RTE food processing facilities and apply the outputs to benefit the industry. The project will coordinate the collection and analysis of contaminating Listeria strains from 4 RTE food areas in Ireland; meat, dairy, fish and fresh cut vegetables. It will identify the sources of contamination and assess strain persistence in foods and food processing plants. It will establish protocols for establishing the risk of Listeria growth/survival within specific food groups and the disease potential associated with strains. Significantly, the project will develop innovative strategies for controlling the growth and survival of this pathogen. In summary, the project is aimed at minimising the potential risk Listeria poses to the RTE food industry and the Irish food supply chain.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F009	The use of marine derived antibacterial agents to combat the prevalence of Salmonella in pork products.	UCC (Teagasc)	€490,393
Project Coordinator: Prof Alan Dobson			
Project Abstract			
Infections caused by food borne pathogens, such as Salmonella spp. are a major public health problem worldwide and the consumption of pork products containing salmonellae continues to be a major source of food poisoning. There is a clear need to identify novel products to control the threat both to human health and the pig industry in Ireland. Marine sponge-derived Pseudovibrio species were previously identified (in FIRM project FS067) as a novel source of anti-Salmonella activities but the isolation and charactorisation of these anti-Salmonella activities has proved difficult using standard approaches. This new project will build upon these results, using an approach combining genomics, molecular microbiology and natural product chemistry, to fully charactorise anti-Salmonella compounds from these Pseudovibrio isolates. Draft genome sequences of three selected bioactive Pseudovibrio species will be determined. These genomes will be analysed for the presence of genes involved in tyhe biosynthesis of known families of antibiotics. Newly identified antibiotic biosynthesis gene clusters will then be over-expressed leading to increased production of antibiotics and enabling their purification and full characterisation. In a parallel approach a media/fermentation optimisation strategy will be employed to increase antibiotic production levels in the native hosts. Anti-Salmonella activities will be purified using a bioassay-guided strategy with novel compounds being rapidly identified using mass spectrometry approach. Novel compounds will be fully characterised by NMR. This novel approach will result in the identification of 3-15 compounds with anti-Salmonella activity and an improved means to produce then for commercialisation and field applications.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F015	Smart packaging systems containing novel optochemical O_2 and CO_2 sensors for the food industry	UCC (QUB)	€444,493
Project Coordinator: Prof. Dmitri Papkovsky			
Project Abstract			
Development of a new generation of smart packaging materials with built-in optochemical sensors for O2 and CO2 is proposed, which will allow non-destructive control, traceability, quality and safety assurance of packaged foods. Colourimetric CO2 sensors comprising extrudable intelligent plastics as well O2 sensors based on extrudable polymeric microparticles and nanostructured polymeric fibres impregnated with the phosphorescent dyes will be designed, optimised and characterised. Subsequently, these smart plastics will be integrated in state of the art packaging materials, including sustainable and biodegradable polymers, to produce advanced multi-functional packaging materials with smart features in the form of packaging films, laminates and product enclosures. These prototype smart packaging materials will be investigated in detail with respect to their sensing and packaging characteristics, stability and safety. These smart sensors and packaging materials will be tested in trials with different types of meat samples and packaging conditions currently used by the industry (MAP). Operational performance of these packaging systems will be assessed, headspace O2 and CO2 levels in individual packs monitored non-destructively and correlated with shelf life and quality of packaged products and processes. These studies will provide demonstration, optimisation and initial validation of the new smart packaging materials and systems and prepare them for up-scaling and rapid commercialisation.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F021	Irish meat and eggs: their fundamental role in promoting vitamin D nutrition and contribution to health and wellbeing	UCC (UCD)	€484,562
Project Coordinator: Prof Kevin Cashman			
Project Abstract			
Vitamin D inadequacy is common and problematic in Northern latitude countries including Ireland. Vitamin D supplementation will not be effective at a population level because the uptake is low (e.g., only 17% of Irish adults take a vitamin D-containing supplement). Thus, creative food-based solutions to counteract vitamin D inadequacy in Ireland and elsewhere are needed. Recent evidence from our research suggests fortification of foods with vitamin D will not be effective at a population level unless several foods are fortified. Meat and eggs are important sources of vitamin D in the Irish diet due to their content of native vitamin D but also and its major metabolite [25-hydroxyvitamin D]. We have recently shown in a human dietary intervention study that 25-hydroxyvitamin D is five-times more effective at raising serum 25(OH)D (indicator of vitamin D status) than vitamin D per se in healthy Irish older adults, The concentration of these vitamin D compounds in meat and eggs can be enhanced by bio-fortification (addition to animal feeds) and/or by minimizing the significant decline in their concentration post-slaughter. Low-grade meat and organs, rich in both compounds, can also be used in consumer meat products. The current project will provide extremely strong evidence in the form of human dietary intervention data that consumption of Irish beef and pork as well as eggs, as significant sources of vitamin D and its major metabolite [25-hydroxyvitamin D], can help improve vitamin D status of Irish individuals. In this way it will help provide the scientific data to underpin and support positive messages on meat consumption, its fundamental role in the diet as well as its contribution to health and well-being.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F023	Novel prebiotics from plant-derived sugars using bifidobacterial enzymes	UCC (Teagasc)	€234,250
Project Coordinator: Prof Douwe van Sinderen			
Project Abstract			
Prebiotics such as trans-galacto-oligosaccharides (TOS) are generated using □-galactosidase enzymes of yeast or bacterial origin, and the disaccharide lactose as the feeding material for (ga)lactose oligomerization. Based on the same oligomerization principle we propose to develop novel prebiotic ingredients based on plant-derived soluble sugars as building blocks and the enzymatic capabilities of selected bifidobacterial enzymes. The □-galactosidases and □- and □-glucosidases to be used in the current project have been identified from the genome sequence of the probiotic Bifidobacterium breve strain UCC2003, which will be used as a model system by the applicants. Specifically, this project will employ bifidobacterial □-galactosidases in conjunction with □- and □-glucosidases to produce oligosaccharides (OS) from simple sugars from vegetables and cereals as starting materials. These OS will be characterized and successful OS-production processes will be optimized and scaled up. It is proposed to scientifically validate their prebiotic efficacy initially in in vitro models and subsequently in an in vivo murine model. In particular, the effect of prebiotic ingestion on the composition of the intestine microbiota will be assessed by pyrosequencing and quantitative PCR.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F026	Development of consumer accepted low salt and low fat Irish traditional processed meats.	UCC (Teagasc)	€499,721
Project Coordinator: Dr Maurice O'Sullivan			
Project Abstract			
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. The mean industry fat and salt levels in TPMs will be identified in order to benchmark values as well as identified FSAI target levels. Our approach principally uses consumer optimisation coupled with multivariate data analysis to reduce the levels of salt and fat, in TPMs in a clean label fashion as well as reducing these components by utilising traditional and new ingredient technologies that can be used to replace additives in parallel. By targeting the consumer, the sensory drivers, collected in a comprehensive, holistic and objective manner using state of the art sensory and multivariate data analytical technologies allows bespoke products to be created. These sensory methods are effective, repeatable and reliable but are also cheaper, faster and more innovative than current methods employed by the food industry.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F033	Packaging and Chilling Technologies to Enhance Meat Quality and Safety	Teagasc (UCC, UCD)	€565,722
Project Coordinator: Dr. Declan J. Bolton			
Project Abstract			
Hot/warm boning offers significant cost saving opportunities for the Irish beef industry. While the improvements in meat quality and yield have been scientifically proven, information on the microbiological aspects of this technology is lacking. In theory the elevated storage temperatures encountered during hot/warm boning could support the growth of spoilage and pathogenic bacteria resulting in reduced shelf-life and increased risk to the consumer. Blown pack spoilage (BPS), already a significant issue for the Irish beef industry, is of particular concern as hot/warm boning could further exacerbate an already serious issue. This project will study the microbiology of hot/warm boned meat using internationally accepted methodologies. Active and smart packaging solutions to reduce and/or prevent BPS will be developed and validated. Rapid cooling with slurry will be investigated as a technology to improve both the physiochemical and microbiological quality and safety of hot/warm boned beef including an assessment of the suitability of this technology for use with meat intended for further processing. For the first time, the genome of a BPS Clostridial species (C. estertheticum, the most common and most rapid cause of BPS in Ireland and elsewhere) will be mapped using state-of-the-art sequencing and bioinformatic methods. Finally a multiplex real time PCR assay will be developed to detect C. estertheticum, C. gasigenes and C. ruminantium, providing the Irish beef industry with a technology that is more rapid, detects a broader range of BPS causing species and, most significantly, is at least 100-fold more sensitive (and therefore suitable for sanitation and decontamination validation checks) than that currently available. Overall, this project will increase the competitiveness, profit margins and overall value of the Irish beef industry through the provision of significant cost savings achieved through reduced processing and spoilage costs.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F035	Delivering processed meat products with health benefits.	UCD (Teagasc, UCC)	€598,950
Project Coordinator: Prof. Frank Monahan			
Project Abstract			
The overall aim of the project is to reduce "unhealthy" constituents while simultaneously increasing the level of desirable bioactive constituents in processed meat products thereby increase their "healthiness" and counteracting some of the negative associations that have emerged between processed meat products and consumer health. Meat is not generally thought of as a functional food despite its potential for delivery of functional ingredients in the diet of humans. Furthermore, all processed meats tend to get branded unfavourably despite the fact that they can be formulated to be healthy (e.g. low fat, low salt, minimal additives) and there are untapped opportunities to increase the level of ingredients with health promoting properties in processed meats. The research will initially adopt a tripartite approach of (i) evaluating consumer attitudes to processed meats containing health promoting bio-actives, (ii) technically evaluating the potential to "match" healthy processed meat formulations with selected European Food Safety Authority (EFSA)-approved bio-actives and (iii) conferring with industry partners on the economic feasibility of different product formulations. A process of distilling the findings of the three approaches to identify products that are potentially viable and acceptable to consumers will follow. The food processing and analytical capabilities of the research institutions involved will then be applied to the development of prototype processed meat products with a healthy nutritional profile, containing EFSA-approved bio-actives that remain bio-accessible post processing.		

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F037	Decoupling pH and Ionic Effect in Protein Super-Concentrates	Teagasc (NUIG, TCD)	€401,700
Project Coordinator: Dr Mark Fenelon			
Project Abstract			
The dairy industry faces a new challenge of how to utilise an increasing milk pool and transfer resulting dairy produce to foreign markets. The aim of this project is to engineer concentrated protein systems 'super concentrates' by manipulation of protein charge density using novel anions to make exportable and more sustainable dairy ingredients. The term 'super-concentrate' is used in the current proposal to describe a protein system which has been concentrated, in a stable state, beyond a critical point at which colloidal stability would normally be compromised. Three approaches will be taken for conditioning casein and whey proteins for super-concentration: 1. Structuring proteins for colloidal stability during super-concentration by decoupling the roles of pH and salt; 2. Thermodynamic manipulation of binding sites on casein micelles for deposition of calcium phosphate nano-clusters; 3. Use of novel amino acids and calcium salts to alter protein charge distribution during concentration. Successful mechanisms from laboratory trials will be subjected to pilot scale protocols for concentration of dairy proteins using evaporation. The scope of the work centres on decoupling pH and ionic effect (addition a salt and/or amino acid) to elucidate aggregation effects during concentration and subsequent reconstitution after spray drying. Both pH and the distribution of proteins between micellar and serum phases prior to thermal treatment strongly influence aggregate formation on heating. The aim is to identify optimal / new mechanisms to control this aggregation to produce high concentration dairy protein systems for use in liquid and/or dehydrated form.		

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F038	Manufacture, application and assessment of smart packaging concepts consisting of novel nanoparticle technologies (metal- and non-metal-based) in conventional food packaging systems	UCC (UCD)	€499,978
Project Coordinator: Dr Malco Cruz Romera			
Project Abstract			
SMARTPACK2 builds on the FIRM SMARTPACK project which assisted in the development of a core competence in nanoparticle (NP) research in the food/food packaging area within UCC/UCD. SMARTPACK has been a successful project and has led to significant technological developments in nanoparticles (NPs) which have been incorporated into polymeric materials and assessed for antimicrobial action, mechanical properties and particle migration. Data generated from SMARTPACK are progressing through IP protection processes currently. However, a number of issues arose out of SMARTPACK. It became evident that material surface chemistries required improvement so that stable surface coating of polymers using NPs might be achieved. Additionally, the development of food-derived-NPs for food packaging applications would offer a more attractive route to commercialization and application than metal-derived-NPs. SMARTPACK2 is a completely new project and designed to address these issues. This will be accomplished by investigating methodologies which could alter the surface chemistries of both packaging materials/NPs so that surface coating/attachment of antimicrobial-NPs to packaging surfaces is achieved. SMARTPACK2 will investigate the possibility of producing novel forms of NPs created from food ingredients possessing antimicrobial properties. SMARTPACK2 will also access NP-treated packaging materials (both metal-based- and non-metal-based-NPs) for application to both internal/external surfaces of packaging materials and these assessed for contamination potential. Additionally, all nano-films will be assessed in terms of their effects on food quality, shelf-life extension and toxicology. As in SMARTPACK, NP migration to food surfaces will be assessed by exposing food samples to different contact times/temperatures. Samples will subsequently be examined for attachment/migration of NPs onto various food products using a combination of imaging and analytical techniques as previously described in SMARTPACK. Potential human exposure levels to NPs will be assessed.		

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F042	Translation of pharmaceutical drug delivery to nutraceutical delivery using in-vitro and in-vivo techniques.	DIT (UCD)	€477,815

Project Coordinator: Dr Jesus Frias

Project Abstract

Meat and milk derived peptides have recently been shown to exhibit antihypertensive effects leading to a growing commercial interest in their potential health benefits. The bioactive peptides Ile-Pro-Pro (IPP) and Leu-Lys-Pro (LKP) could be taken orally to treat hypertension however their bioavailability is limited because of the stomach‟s acidic pH, metabolism by luminal, brush border and cytosolic peptidases, and poor permeability across the intestinal epithelium. Establishing an oral delivery system for IPP and LKP would be significant for these peptides and other naturally-occurring bioactive peptides. One solution is to formulate the peptide into a nanoparticle drug delivery system and this will be the focus of this research project.

The nanoparticles will be based on the formation of polyelectrolyte complexes using the stabiliser chitosan and alginate. Key considerations for oral delivery are 1. the nanoparticle must be biocompatible and biodegradable using food-grade materials, 2. degradation products must also be biocompatible and non-toxic; 3. high drug loading capacity and 4. sustained controlled release of the drug. [1].

The physico-chemical characteristics of the formulations will be assessed. The team will perform controlled release studies using standard dissolution tests; stability analysis using gastrointestinal enzymes; cytotoxicity studies using intestinal and liver cell models and blood (target site).

In-vitro transport studies using epithelial monolayer models simulating the intestine will give an initial indication of the transport mechanisms, and possible inhibitions or active efflux transport mechanisms. Ex-vivo transport studies using rat intestinal tissue Ussing chambers and oral administration and analysis using the spontaneously hypertensive rat model will offer proof of concept.

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F043	Exploration of Irish meat processing streams for Recovery of high Value Protein based ingredients for food and non-food uses.	Teagasc (UCC, UCD, NUIG, ITT)	€1,433,532

Project Coordinator: Dr Anne Maria Mullen

Project Abstract

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 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.

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

While this is an ambitious project it is taking advantage of the facts that these streams are protein-rich and hold strong potential for extracting value and that it is well supported by a team of 17 PIs (with the specific expertise), technical staff, researchers and post-graduate students. A successful outcome will result in meat processors accessing higher value export markets with subsequent reduction in waste. While many of the source materials may currently have markets (Asian, Eastern EU) these tend to be lower value and also have a high carbon footprint associated with them. Short and medium/long term strategies are presented.

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F045	Enhancement of texture, flavour and nutritional value of meat products for older people	Teagasc (UCC)	€491,306

Project Coordinator: Dr Ruth Hamill

Project Abstract

Healthy ageing is a grand challenge of growing international importance. Red meat is intrinsically a source of certain nutrients which are particularly important for healthy ageing. These include protein for growth and repair, fatty acids such as conjugated linoleic acid and Omega-3 for cognitive function, as well as vitamins and micronutrients such as heme iron, calcium, selenium and zinc. According to the recent National Adult Nutrition Survey, meat is a staple food of older people in Ireland (NANS, 2011). As well as their intrinsic nutritional content, meat products thus offer further potential as vehicles for fortification with added nutrients targeting deficiencies common in older adults, but little work has been done in this area. While increased consumption of meat by older people is desirable, meat is a challenging food matrix, in terms of texture and food intakes generally decrease in older adults with reported consequences for health, wellbeing and vitality. This project aims to optimise meat processing, formulation and packaging technologies in relation to food structure, flavour, nutritional content and consequently functional performance with a view to providing case studies and tools that will enhance the ability of Irish meat processors to tailor meat products to the requirements of older people. If meat products can be made more appealing to older adults by modifying their texture, while retaining or enhancing their nutritive value, this could be a valuable step forward to enhance the quality of life of this growing sector of the population.

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F050	Technologies for the enrichment and recovery of novel bioactive ingredients from plant food processing wastes	Teagasc (UCD, DIT)	€781,483

Project Coordinator: Dr Dilip Rai

Project Abstract

Several plant food processors produce high levels of by-products (waste) in Europe and globally. Disposal of this waste incurs considerable costs to processors and represents a significant environmental hazard. Added to this, processors are now legally required to put in place systems to reduce waste. However there is a growing awareness that this material could represent a valuable resource if correctly treated. In fact the commercial value of plant food processing waste has been demonstrated in recently FIRM funded projects: glycoalkaloids in potato-peels (Ref No. 08/R&D/TAFRC/673), □-glucans in barley (Ref. No. 06/R&D/C462) and waste/by-products of fruit and vegetable processing (Ref No. 06RDTAFRC518). These projects served to highlight that some plant food processors produce high volumes of uniform waste that contains substances with market value in the food-ingredient and pharmaceutical sectors. To date however industry friendly, low energy sustainable techniques for recovery of these components are not available. The proposed project will seek to develop optimal methods for recovery of these compounds in enriched or purified forms with a view to providing recommendations to processors for maximizing the unrealized value of this waste raw material. A multidisciplinary team will explore the use of conventional (UCD/Teagasc), novel (UCD) and biological (DIT) extraction techniques to recover (1) glycoalkaloids from potato waste-streams (2) □-glucans from brewer's spent grains and (3) Chitins from mushroom stalks. Combinations of these methods will also be explored and detailed characterization of the recovered compounds will be performed at Teagasc Ashtown. Due consideration will be given to the safety of the extracted material and the impact of novel extraction methods on the integrity of the compounds extracted.

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F051	An investigation of Verocytotoxigenic E. coli super-shedding in beef and dairy cattle and the factors underpinning human virulence potential and strain emergence as a result of vt phage transduction	Teagasc (UCD, Cork Co Concil)	€943,566
Project Coordinator: Dr Geraldine Duffy			
Project Abstract			
Verocytotoxigenic E.coli (VTEC) is a serious food borne pathogen which can be shed in cattle faeces, providing a source of farm and food contamination. Much knowledge has been generated on this pathogen, but major gaps remain which hamper the development and implementation of effective control measures. Some cattle are reportedly "super-shedders" excreting exceptionally high numbers of VTEC, >10,000 CFU/g faeces, but the frequency and causes of this phenomenon are unknown. Such cattle have a disproportionately high impact on VTEC transmission into the beef and dairy chain and would be a key target for risk reduction measures. A further question in light of last years E. coli O104 outbreak strain is how to assess the human virulence potential of a VTEC isolated from animals or food. A set of virulence markers are needed which can be used to make a decision on the risk posed. The E. coli O104 outbreak strain had a unique virulence combination of Enteroaggregative E.coli (EAggEC) adherence genes and vt toxin instead on the usual vt and eae gene combination. It is vital to understand how vt genes, which are encoded on mobile genetic elements called bacteriophage, are persisting and transferring between VTEC and other bacteria in the farm environment leading to the potential emergence of another unusual and highly virulent VTEC. The proposed project will thus investigate three hot topics, (i) VTEC super-shedding in beef and dairy cattle and its impact on raw milk contamination; (ii) assessment of genetic markers which constitute a human virulent VTEC and (iii) the potential for emergence of new strains of VTEC as a result of phage transduction. This project addresses key issues related to VTEC along the complete chain (primary production, food and public health) and brings together researchers and stakeholders ensuring maximum impact for the project.		

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11F052	Innovative solutions for quality and safety improvement in dairy ingredient manufacture for infant formula	Teagasc (UCD)	€488,376
Project Coordinator: Dr Donal O'Callaghan			
Project Abstract			
With the impending ending of milk quotas in EU member states, it is a priority that a large proportion of Irish produced dairy output is linked to added value product, such as infant formulation. Successful capture of a greatly-expanded milk pool in this way is predicated upon the achievement of best-in-class performance by milk producers and processors who will face strong international competition in obtaining markets for their products. A critical capability for milk processors will be the ability to implement rapid, effective and transparent systems which demonstrate control of and confidence in the specifications and properties of the powdered products required by the infant formula industry. Methods must be rapid to facilitate fast (eventually on-line) collection of product-specific information, effective in order to achieve real control over raw material and end-product quality & safety, and transparent in order to develop confidence in their utility by prospective customers. In short, this requires the Irish dairy industry to prepare to operate under pharmaceutical-type specifications with the overall goal of becoming a favoured supplier for high value-added foods and growing export markets in the face of tough international competition. This proposal sets out to develop innovative applications of several vibrational spectroscopic tools (mid-infrared, near infrared, Raman and fluorescence) along with optical technology for monitoring particles (in air or in liquid dispersions) with which to demonstrate product compliance with the highest quality and safety standards for a number of powdered milk products. A number of specific features of powder products known to be problematic from a quality perspective (e.g. surface free fat, protein denaturation) will be the subject of specific studies aimed at the development of in-process monitoring systems.		

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F053	Novel food ingredients for the elderly consumer	UCC (Teagasc)	€500,098
Project Coordinator: Prof Paul O'Toole			
Project Abstract			
It has recently become clear that the intestinal microbiota is critical for general health and wellbeing. Moreover it is now clear that diet has a significant role in shaping the microbiota which in turn is associated with a wide range of health parameters. The ELDERMET project (finishes 12/2013), recently showed that this variation in gut microbiota between individuals was driven by the diet. Significantly, we showed the existence of a strong diet-microbiota-health axis, whereby people with particular diets had greatest microbiota diversity, and healthiest scores in a range of clinical parameters including inflammation and measures of frailty (Claesson et al., 2012). We established a unique ELDERMET database from over 420 subjects, comprising interconnected data for dietary intake, microbiota composition, and extensive health measures. Thus we have a unique atlas for linking dietary intake to health via the microbiota. This project will focus on the effect of dairy carbohydrate, and milk glycomacropeptide (GMP) on programming the gut microbiota, and how this will impact on consumer health. Specifically, the project will initially compare lactose-free milk to whole milk to assess the influence of each in shaping the microbiota and the consequences thereof in terms of clinical readouts. The project will also look at the prebiotic effects of GMP-enriched fractions on the microbiota of the elderly. As such, the project will assess two rapidly growing economic areas i) the lactose-free dairy sector and ii) the functional food market, with a view to their inclusion in targeted nutrition regimes for elderly subjects.		

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11F057	Improving the eating quality of Irish pork.	Teagasc (UCC)	€444,908
Project Coordinator: Dr Paul Allen			
Project Abstract			
This project aims to provide the Irish pork processing industry with the technology to produce pork of consistently good eating quality. The industry produces consumer pork products efficiently but the eating quality of pork has suffered due to rapid chilling and lack of ageing. Pigs are also leaner due to breeding for efficient lean growth rate. Pork is therefore less succulent, due to lower intramuscular fat (IMF) and tougher due to more rapid chilling. Increasing IMF can best be achieved through using breeds and lines with a higher IMF content. This aspect will be covered by using carcasses from such lines in the experiments. Improving tenderness through novel processing will be the main emphasis of the work. The effects of electrical stimulation, hot boning, PiVac restraint, hanging methods, ageing, hot processing and enhancement will be determined singly and in combination to devise optimum strategies to produce pork of consistently good eating quality. This will be underpinned by optimising MAP packaging systems for gas mix and headspace to meat ratio to maintain good eating quality during ageing and distribution. The outcome will be a range of novel processing systems that could be adopted by the industry to produce pork of consistently good eating quality.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F059	Accurate prediction of saleable yield.	Teagasc (ICBF)	€308,116
Project Coordinator: Dr Paul Allen			
Project Abstract			
The accuracy and utility of the VBG2000 mechanical grading system will be enhanced so that the Irish beef industry can use this facility with confidence. Accurate prediction of saleable yield will enable the adoption of an improved quality payment system (QPS) based on saleable yield which is closer to market value than conformation and fat class. This will increase efficiency by improving the sorting of carcasses for different markets and by rewarding producers for higher saleable yield. Several approaches will be taken to reach an optimum solution or a selection of solutions. Firstly, the recalibration of the VBS2000 by including heifer and young bull carcasses in addition to steers which was the only gender included in the 1999 calibration. Secondly, saleable yield will be determined for different trimming levels to allow more flexibility in selecting for different markets. Thirdly, the potential of improving the prediction accuracy by combining cut face images after quartering using VBG2000 with carcass images will be investigated. Finally, the potential contribution of other data and measurements such as breed, gender and age from the animal id and fat measurements such as weight of kidney fat, fat depths at various locations will be investigated. E + V will provide a VBG2000 for the trials and generate prediction equations for saleable yield, while ICBF will assist in identifying suitable animals of known parentage, will collect images from the VBS2000 and will develop national genetic equations for the yield of cuts in different value categories. As far as is possible, carcasses from other research trials in Teagasc and elsewhere will be included in the sample in order to derive maximum value from the project.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F060	Novel pre-treatment regime to enhance the value and quality of vacuum packed retail cuts of beef	Teagasc (DIT)	€162,500
Project Coordinator: Dr Paul Allen			
Project Abstract			
An advantage of current high oxygen MAP packaging systems is the production of a healthy red colour to beef. Unfortunately this is also accompanied by a loss of tenderness, off-smells and off tastes due to lipid oxidation and shorter shelf-life due to potential aerobic growth of spoilage microorganisms. Due to the total exclusion of oxygen, vacuum packed beef suffers from none of the above disadvantages, including a longer shelf-life but does produce beef with a very dark purplish colour which consumers do not find attractive. The objective here is to combine the advantages of the vacuum packed products with the "healthy" red colour of oxygenated meat. Carbon monoxide (CO) also induces the same red colour, it is more stable than that induced by oxygen and is also maintained after the gases have been removed and the product vacuum-packed. A primary concern of regulatory authorities is that it might be used to sell meat beyond its sell-by-date as the bright red colour would still be evident. The work proposed here will induce the attractive colour by exposure of the beef to CO prior to vacuum packing. The redness will fade over time so that pre-treated and untreated vacuum packed products are the same darker colour by the use-by-date, thus ensuring the consumer of a reliable visual indication of freshness. A range of pre-treatment regimes (CO gas concentration, time of exposure [30 minutes to 72 hours] and time since slaughter) will be tested primary on Striploin (LD), but also on Fillet (PM), Sirloin (GM), Round (SM) and mince. Analysis will include colour, tenderness, lipid-oxidation, pH, drip-loss, cooking-loss and surface microbial counts.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F061	Dehydration / Rehydration dynamics for development of 'SMART' Dairy ingredients	Teagasc (UCC, UL)	€800,983
Project Coordinator: Dr. Mark Fenelon			
Project Abstract			
A growing world population and increasing middle class is driving demand for high quality powdered nutritional products, particularly in the world's emerging markets. This, coupled with the abolition of quotas in 2015, provides the dairy sector with an opportunity to expand by a predicted 50% (Food harvest 2020) by the year 2020. Consequently, there is an urgent requirement for targeted dairy chemistry / technology based research as the only technically feasible way to deliver Irish milk to emerging markets outside Europe in powdered (dehydrated) format. The aim of the current project is to develop core scientific competency in protein chemistry and dehydration / rehydration dynamics for engineering of 'SMART' protein base powdered ingredients for export with built in cost modelling. The scope of the science will include thermal and ionic manipulation of milk proteins in liquid state to influence new hydration dynamics during subsequent drying and reconstitution. In some instances, these hydration properties will form the basis of a finished food. In order to utilise large volumes of milk, without expensive waste streams, the target functionality of these 'SMART' ingredients is primarily physical, ultimately rehydration mechanics. The new ingredients will be built from a base milk protein concentrate, MPC platform, with advanced design function to increase value, while utilising volume, at two value levels: level 1: targeted ingredients with specific rehydration properties to allow reconstitution into large volume dairy based foods e.g. sports beverages and / or Level 2: nutritional base for beverages including infant formula, dietary products, elderly health beverages, therapeutic and medical products including supplements.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F063	Antioxidant and anti-inflammatory ingredients for health enhancement in the older population	UL (UCC)	€330,066
Project Coordinator: Prof. R.J. (Dick) FitzGerald			
Project Abstract			
Casein represents a valuable dairy ingredient having as yet an essentially untapped range of biologically active sequences encrypted within its primary structures. This project will investigate the ability of casein-derived peptides to beneficially modulate biomarkers associated with antioxidant status and low grade inflammation. A range of human conditions involve deleterious changes in antioxidant status and inflammatory responses, e.g., atherosclerosis, aging, neurodegenerative diseases, rheumatoid arthritis and cancer. Detailed scientific investigations are therefore proposed to develop the data required to unlock and thereby enhance the functional food ingredient potential of casein-derived peptides to act as dietary health enhancing agents for the older population. Initial laboratory-scale studies will assess the antioxidant capability of casein hydrolysates. Additionally, cell culture studies will quantify a range of biomarkers associated with antioxidant and inflammatory responses of selected casein hydrolysate/peptide preparations using different human cell lines. Peptide bioavailability will be assessed using a simulated gastrointestinal digestion model. Selected optimised hydrolysate protocols identified from data generated in the in vitro and cell culture studies will be transferred to semi-pilot scale for prototype ingredient manufacture. Mass spectroscopy analyses will be carried out to identify the peptide composition. Selected hydrolysates will be formulated into model foods for technofunctional and sensory evaluation. Potent antioxidant and anti-inflammatory casein hydrolysate peptide preparations generated at semi-pilot scale will be characterised in an intervention study to quantify relevant biomarkers associated with antioxidant and inflammatory responses in older human volunteers. These studies will provide confirmatory data on the bioavailability of the casein-derived peptide preparations in humans.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11F064	Extraction and validation of antioxidant and anti-inflammatory ingredients from Brewers' Spent Grain	UL (UCC)	€456,586
Project Coordinator: Prof. R.J. (Dick) FitzGerald			
Project Abstract			
While large quantities of brewers' spent grain (BSG) are produced annually (~ 160,000 tons in Ireland) the residual protein and polyphenolic components therein remain an untapped source of functional food ingredients. This project aims to extract protein/peptide and polyphenolic rich extracts from BSG to assess their potential to act as antioxidant (AO) and anti-inflammatory (AI) agents. These bioactivities are implicated in minimising/preventing the consequences of many diseases. Our recent findings demonstrate that significant in vitro AO and AI activity exits in BSG protein hydrolysates and polyphenolic extracts. We propose to expand on these findings to optimise the generation of AO and AI peptides from BSG along with optimising the extraction of polyphenolics. Evidence in the literature demonstrates that phenolics occur in a bound format in barley. Furthermore, it appears that the bioactivity of bound versus free phenolics may be significantly different. We are therefore proposing to use mild enzymatic extraction approaches to release carbohydrate-bound but soluble phenolics from BSG. In addition, we plan to apply alternative direct enzymatic approaches to release bioactive peptides directly from BSG. The comparative in vitro AO activity of the peptide and bound versus free phenolic ingredients will be assessed. Human cell culture approaches will be employed to assess extract effects on biomarkers of oxidative stress and low grade inflammation. The most promising ingredients will be formulated for oral ingestion. A human intervention study will be carried out to access the effects of a combined ingredient blend (phenolics and peptides) on markers of AO and AI activity.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11FP401	Enhancing consumer safety by development of a rapid flow cytometric assay for early detection of coagulase positive Staphylococcus aureus in chilled ready meals.	UL	€92,673

Project Coordinator: Dr Martin Wilkinson

Project Abstract

Currently, coagulase positive S. aureus are enumerated and identified by plate counting on Baird Parker selective agar using the standard method EN ISO 6888-1 which takes 48 h for a result. Thereafter, colonies are subjected to further identification procedures such as growth in BHI medium and plasma coagulation which may take a further 4-5 days. The initial "plate and wait" methodology to detect the presence of potential coagulase positive S. aureus colonies is completely unsuited to provision of rapid information to the producer for early process intervention to ensure consumer safety. This 48 h step also places a constraint on the optimal release time for the product to the market with implications for shorter shelf life and limitations on export market exploitation. This project seeks to exploit novel fluorescent activated cell sorting (FACS) based methods for microbiological enumeration of S. aureus using methodology developed in a previously funded DAFF project, 06RDUL413. The new assay will allow enhanced total time to result (TTR) of ~ 4h compared with the selective agar plating method enabling food producers to rapidly identify the presence of potential coagulase positive S. aureus in samples originating from the production process, personnel and in the final product. Thus the proposal will significantly enhance consumer safety and provide an extra degree of security for the producer. In the FIRM project, FACS with immunological tagging enabled detection of S. aureus in foods at levels > 103 within an analytical window of ~4 hours including time for sample preparation and data analysis. The assay featured: (a) selective labelling of S. aureus in a mixture of bacteria using commercial antibodies, (b) simultaneous enumeration and calculation of the labelled S. aureus cells using fluorescent bead standards, and (c) confirmatory testing by sorting of labelled cells by FACS onto traditional selective Baird-Parker media. These outputs represented a potentially significant advance in time saving and analytical labour costs for the food industry especially the chilled ready meals sector where shelf life ranges from 10 – 14 days. This proposal now seeks to improve the sensitivity of the antibody labelling technique, ensuring that it only labels "live" coagulase positive Staphylococcus aureus cells and validate its performance in comparison with ISO/EN plate count methodology with a leading Public Health Microbiology Laboratory, (PHML, Cork) and an industry partner Dawn Fresh Foods. Currently, the prototype method is operated on expensive FACS technology and a key part of this proposal will be to translate and simplify the assay methodology onto affordable and operator friendly benchtop laboratory cytometers suitable for routine quality control analysis in the food and process industries.

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11FP403	Marine Compounds to enhance Productivity and health in pigs	UCD	€99,387
Project Coordinator: Prof John O'Doherty			
Project Abstract			
The use of antibiotic growth-promoters was banned in EU member states from 1st January 2006 and alternative systems to maintain efficient animal production must be sought. The outcome of this ban has been the growth in the use of large amounts of therapeutic and prescription antibiotics. The overall objective of this project is to investigate the strategic use of nutraceuticals (patented natural components from seaweed discovered in RSF 06 326) to produce a wide variety of health maintenance and disease avoidance measures which will contribute to an improved and more acceptable system of animal production without the use of antibiotics. Our approach to improved animal health is to enhance the immune system of the young via maternal colostrum and milk. It is expected that maternal supplementation with sea weed extracts to sows in late gestation until weaning will enhance growth performance of pigs and improve aspects of gastrointestinal health and maturity when experimentally challenged with enterotoxigenic E. coli and Salmonella. The specific objectives of this project are to investigate (1) the effects of maternally derived laminarin and fucoidan extracts on the immune response and performance of newly weaned piglets experimentally challenged with enterotoxigenic E. coli. (2) the effects of maternally derived sea weed extracts on the immune response and performance of newly weaned piglets experimentally challenged with salmonella. This could replace the need for dietary antibiotic supplementation of pigs during the starter and grower-finisher periods and become a very inexpensive method of controlling salmonella in pig herds. The final outcome of the project is to achieve both good health status in pigs and good growth performance using feed formulation and ingredients that satisfy modern legislative and consumer demands. It will be a major advantage if pig producers are able to claim that their diets are devoid of antibiotic input.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11FP404	Expanding the potential for whey protein based encapsulation	Teagasc	€99,780
Project Coordinator: Dr André Brodkorb			
Project Abstract			
Encapsulation of bioactive ingredients, organisms, flavours or bio-medical compound is of interest to the food and biotech industries, as the ability to protect such compounds during processing, storage and gastric passage to deliver them to the target site intact is essential for incorporation in foods. A method for producing whey protein-based microbeads for encapsulation was developed at Teagasc, leading to a patented application (Brodkorb & Doherty WO2010119041 (A2)). The concept of protection of probiotic bacteria was proven for storage and targeted delivery past the stomach to the small intestine in vivo. Recently, many positive discussions have taken place with Irish food companies who expressed an interest in evaluating the technology, while also highlighting issues of critical importance. Three such priority areas identified will be addressed by this project: (1) Cost of encapsulation materials (2) Tolerance of beads to processing (drying) (3) Diversification of bioactives encapsulated (1) By reformulating the encapsulation matrix of the beads using mixtures of lower cost dairy protein ingredients and other gelling agents, the cost of manufacturing the beads can be substantially reduced while retaining the integrity and functionality of the beads (2) Microbeads will be dried using a variety of methods and rehydrated in different media. The integrity of the beads, retention of bioactive ingredients and the activity of the encapsulated bioactives will be determined after processing. (3) There has been particular interest in using emulsions to form beads where there is a bioactive ingredient in the oil-phase of the emulsion. A formulation will be tailored to deliver the required dose of bioactive to the target site intact after processing and passage through the stomach. The overall objective of this project is to deliver a number of protocols which by adapting the existing technology to the needs of the food industry should broaden the encapsulation platform.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11FP405	Smartfone delivered anti-tamper food traceability system based on direct onfood Data Matrix (DM) printing and chain integrity sensors	UCD	€98,749
Project Coordinator: Prof Shane Ward			
Project Abstract			
CyberBar© provides tamper-proof traceability from poultry processing plant to consumer, using Smartfone technology, smart RFIDs and cloud-computing based decision support systems. CyberBar© emerged from the FIRM project Avian BioTrack; it laser-etches Data Matrix (DM) barcodes directly onto chicken fillets, combined with batch tracking and monitoring (temperature, geo-location) of containers (batches) using smart RFIDs to ensure the chain of custody from processing plant to consumer. CyberBar© reads the DM barcodes on the fillets using a DM reader (retail) or Smartfone (App). Complementing this at batch level is a smart RFID system monitoring geo-location and temperature: these data are continuously uploaded onto cloud server (viz. back end system). The Smartfone App interrogates the cloud thus providing immediate information1 (e.g. origin, best-before-date, retail outlet, nutrition, food miles, etc). The issue of IP has been fully explored by the partners in consultation with the TTO in UCD, and an MOU has been signed. The CyberBar© laser-etching technology (for direct DM printing on to chicken fillets) will be installed initially in the Carton Group processing plant. The smart RFIDs offer remote environmental monitoring and diagnostic capability, and will be assembled and developed at the Smart Sensing Unit in Belfield and plans to test scale-up capabilities are currently under discussion with the RFID Centre for Applied Research at the University of South Florida. The data enquiry protocol (between Smartfone/reader and database) includes novel anti-fraud data encryption and interrogation methodologies (HP Galway) - reducing the potential for rogue suppliers duplicating the barcode. CyberBar© will provide a powerful technique to facilitate product withdrawal, and customer profiling. This is a world-first which will confer market advantage on the Irish food industry by enabling verifiable traceability in real time extending right down to the consumer level, via Smartfone delivery. It also provides product integrity to all supply chain actors.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11FP406	Seaweed extracts to reduce Campylobacter in chickens	UCD	€95,195
Project Coordinator: Prof Torres Sweeney			
Project Abstract			
Campylobacter is an acute, notifiable, zoonotic bacterial disease prevalent in chicken production systems across the world. A recent retail survey has identified that the overall prevalence of Campylobacter spp. in Irish produced raw chicken was 84.3% (Madden et al., 2010). Following the 2006 ban on infeed antibiotics, there is a distinct need for poultry producers to introduce interventions to reduce the prevalence of Campylobacter on farm. A novel bioactive derived from seaweed has recently been developed in UCD and ownership assigned to an Irish indigenous company (http://www.bioatlantis.com/). This bioactive consists of a laminarin/fucoidan combination, which biologically, is a fibre that acts as a prebiotic. It suppresses the proliferation of gram-negative bacteria such as E.coli spp and Salmonella spp. in pig. We have subsequently identified a purified laminarin extract, which has a more powerful immune enhancing action in the gut than the laminarin/fucoidan combination. Like pigs, poultry have a monogastric system, hence, the objective of this study is to determine if nutritional supplementation with either the laminarin/fucoidan combination or the purified laminarin extract can suppress Campylobacter colonisation in the chicken gastrointestinal tract. Two experimental models will be explored. The first model is where the chick is exposed to the bioactive from day of hatch and is challenged with Campylobacter on day 3 post-hatch. The second model is where the laying hen is fed the bioactive for two weeks and the associated 3 day-old chicks are challenged with Campylobacter. This project will determine if a seaweed-derived bioactive can influence Campylobacter colonisation of the chick and whether a direct route or a maternal route of application would be the most successful method of application.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11SF311	Genetic selection for improved milk and meat product quality in dairy, beef and sheep	Teagasc	€1,160,654
Project Coordinator: Dr. Donagh Berry			
Project Abstract			
Despite its fundamental importance for adding value to the Irish food industry, product quality is a suite of traits missing from the Irish national dairy, beef and sheep breeding objectives. International research shows that genetic variation in product quality exists; however the inclusion of product quality in Irish breeding objectives is hampered by a lack of the required tools. The objective here is to provide all the necessary tools to commence breeding for product quality in dairy cows, beef cattle, and sheep in Ireland. These tools include 1) identification of the quality traits with greatest potential to add value, 2) methods to routinely acquire phenotypic information at a low cost, 3) estimates of the genetic parameters necessary to identify genetically elite animals, 4) identification of genomic regions putatively associated with product quality for improving the accuracy of selection in the long term, 5) derivation of the relative importance of traits necessary for optimally including product quality in the national breeding goals, and 6) product differentiation based on the rapid phenotypic measurements. We will achieve these objectives through collaboration between animal production scientists, geneticists, and milk and meat processing scientists. The substantial budget requested will ensure that this study is sufficiently statistically powered. Results are “close-to-implementation” but also contribute substantially to the knowledge-based-bioeconomy. The outcomes from this study are all the required tools and information to facilitate the inclusion of product quality in national breeding objectives for dairy, beef and sheep thereby increasing profitability in the Irish Agri-Food sector.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11SF317	Exploitation of the nutritive properties of safe Irish-grown milled oat and barley varieties as functional ingredients in new healthy food formulations.	Teagasc	€732,354
Project Coordinator: Dr. Eimear Gallagher			
Project Abstract			
The agri-food sector is a key part of Ireland's economy, and agricultural research is vital to keep our industry competitive. Ireland is excellently placed as a crop-producing nation, with our cereal yields being amongst the highest in the world. This project will focus on harvesting, milling and utilisation of Irish-grown varieties of oat and barley as novel functional ingredients. These cereal crops are now known to contain significant levels of soluble fibre (beta glucan), phenolics and essential amino acids. However, their use in Ireland is predominantly limited to livestock feed and minor food applications (such as bulking agents or a limited supply of oat-based baked products such as flapjacks). The project team, which fosters new relationships between crop breeders, crop specialists, cereal scientists, natural product chemists and microbiologists, will initially focus on quantifying and isolating bioactive components from Irish-grown oat and barley milled varieties. The technological functionality of these cereals will also be characterised. Chemistry and food formulation trials will then be undertaken, whereby the bioactive components, either in isolated form, or as a constituent in the milled cereal fractions will be used to create novel products with added health and wellness benefits. Ingredient interactions and structure-function relationships of the new formulations will also be detailed. A further aspect of the project which will be investigated is bioprotection. Fusarium headblight is a disease of oats and barley. Recently, Fusarium strains have shown a high resistance to fungicides in Ireland, thereby threatening the cultivation of these cereals. The project aims to develop antifungal lactic acid bacteria strains as effective protectants, by virtue of their demonstrable antifungal activity against cultures of Fusarium species. The effectiveness of these strains will be proven using glasshouse and possibly field trials. The overall project aims to build upon the strengths of the Irish agri-food sector. Through a multi-institutional and multi-disciplinary approach, the project will bring together a new and diverse team of experts, who plan to exploit the high-yielding natural cereal resources which Ireland currently has, while at the same time protecting these resources for the future. Through science-based innovation, the team will develop new, innovative and healthy cereal-based ingredients and food products from Irish-grown barley and oats, targeting new market opportunities such as functional foods and beverages, and health-enhanced processed foods. This project, we believe, will significantly help play a role in the sustainable development and competitiveness of the Irish cereals sector.		

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11SF322	Profitable production of bull beef to market specification while ensuring optimum quality for the consumer	Teagasc	€1,328,701
Project Coordinator: Dr. Aidan Moloney			
Project Abstract			
This multidisciplinary proposal addresses the Food Harvest 2020 recommendation that "market-led production systems for young bulls from both the beef and dairy herd should be encouraged through enhanced research with clear price incentives that result in animals being finished to market specifications". The over-arching tasks concern the modification of production systems for bull beef to increase profitability and the assessment of the resulting bull beef for market-relevant quality characteristics. Underpinning research tasks will focus on elements within the pathway from farm to fork that limit achievement of market specifications. The impact of slaughter age, a key requirement of the UK market, on eating quality and its interaction with carcass intervention strategies to enhance the eating quality will be examined. Insufficient fat cover is a limitation in several markets so the potential to enhance fat deposition in bulls by nutritional intervention at various phases in the life cycle will be examined. Rumen metabolism and health during transition to high energy finishing rations together with the influence of pre-slaughter ration composition per se on fat deposition and meat quality will be examined. A suite of instrumental and sensory measurements, in particular of colour and tenderness will be made. The underlying basis of these traits will be investigated. Deliverables from this project will be 1. Blueprints for farmers for producing bull carcasses of defined weight and classification, 2. Information for the meat industry on the associated quality characteristics of bulls produced in a range of systems and 3. A contribution to a database on bull carcass composition from which a future quality payment system for bulls could be derived.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11SF327	Mining And Modelling ; Animal Rotavirus Epidemiology	CIT	€99,868
Project Coordinator: Dr Helen O'Shea			
Project Abstract			
Group A rotaviruses (RVs) are an important cause of gastroenteritis, in the young of both human and animals. Rotaviruses are non-enveloped, triple layered viruses, with a segmented genome (like influenza virus). Also, like influenza viruses, rotaviruses can exchange genes during co-infections (reassortment), resulting in novel virus strains, capable of infecting both humans and animals. There is a lot of data on the genes encoding the surface proteins of RVs, namely VP7; G-type and VP4; P-type, however, little is known about the genetic make-up of the remaining 9 gene segments of emerging and endemic RV strains. The amount of gene reassortment occurring in nature is not known, as few RV genomes have been sequenced, so an understanding of the zoonotic risk is hampered by limited information on the strains implicated in disease in various species. An earlier FIRM project (led by our group) provided detailed analysis of the molecular epidemiology of RV in humans and food animals in Ireland. There is now a large body of data accumulated, over a long period of time and it would be efficient and beneficial to carry out deep genome sequencing and molecular modeling in these and other, more recently gathered data. We propose establishing a large scale genomic project and sequencing the genomes of selected archived and recent isolates from this data, in collaboration with Dr Jelle Matthijnssens, who is a leader in this area. Large-scale RV genomics projects provide insight into how RVs evolve during their spread through the human population and are of huge potential utility for development and improvement of both diagnostic tests and vaccines, in human and veterinary medicine.			

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DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11SF328	Campylobacter Control on Irish Broiler Farms	University College Dublin	€183,300
Project Coordinator: Dr. Paul Whyte			
Project Abstract			
Campylobacteriosis is the most frequent cause of gastroenteritis in Ireland and across the EU. In addition, Campylobacter jejuni has been associated with the development of Guillain-Barre syndrome, a chronic and potentially fatal disorder of the peripheral nervous system. Poultry are the primary source of Campylobacter. The European Food Safety Authority (EFSA) recently reported that Irish poultry carcasses have the second highest levels of Campylobacter contamination in the EU. This represents a serious threat to public health as well as the clean, green image of Irish food. This project will facilitate the application of a risk assessment approach to the development of a Campylobacter control programme for Irish poultry by addressing current knowledge/data gaps as identified by the Food Safety Authority of Ireland (FSAI) Scientific Report (FSAI, 2011). The research will; [1] provide data on the effect of age and thinning on broiler Campylobacter carriage; [2] investigate generation time within the caecum; [3] investigate the link between broiler house heating system and Campylobacter carriage (incidence and levels) and [4] establish which biosecurity measures are the most important for keeping Campylobacter out of Irish broiler houses, with particular emphasis on fly screens.			

DAFM Reference	Project Title	Lead(Collaborating)Institution	Award
11SF329	Targeted low cost solutions for control of *Salmonella* in pig production	Teagasc	€599,845
Project Coordinator: Dr Geraldine Duffy			
Project Abstract			
Salmonella in pigs is a significant food safety issue in Ireland. Ireland had one of the highest carcass contamination rates (20%) in a recent EU baseline study in slaughter pigs. This is a major concern for public health and for home and export pork markets. Although considerable effort has been put into the National Pig Salmonella Control Programme, it has not yet resulted in lower rates of Salmonella carriage or carcass contamination rates. A novel aspect of this project is that it will focus on the implementation and validation of low cost practical solutions to control Salmonella carriage and transmission on Irish commercial pig farms. The strategy will be the targeted use of selected organic acids in feed at three key stages of pig production; breeding sows, first stage weaners and finishers as well as the use of acid in water at lairage in combination with decontamination strategies. In the first part of the study, two commercial pig farms with a recorded high Salmonella sero-prevalence will be selected. At the four stages selected for implementation of control measures, the administration of acids in feed and improved hygiene and disinfection will be investigated. In the second part of the project the optimum interventions from each stage will be selected and trialled in a full cycle of production from breeding sows through to slaughter on one farm. A cost benefit analysis of these intervention measures will also be conducted. This project will generate sound science to validate the potential value of low cost interventions through the application of tightly controlled field studies. Transfer of knowledge is assured via direct involvement of the Teagasc specialist advisors and via collaboration with relevant stakeholders in DAFM, the pig producers and processors.			