Research projects funded by DAFM Call 2010 onwards

Call 2021				
Coordinator/Lead Institute + Collaborating Institutions funded	**National / TransNational**	**Project Title and Summary**	**Total DAFM Award** (* denotes project co-funded by DAERA	**Reference No & Final Report**
Agriculture				
James Gaffey Munster Technological University james.gaffey@staff.ittralee.ie **Lead Institute:** Munster Technological University **Collaborating Institutions:** Teagasc, University of Limerick	DAFM National Call 2021	**INtegrated Framework fOR Mapping, Modelling and Monitoring Ireland's BIOeconomy.** Led by MTU, in collaboration with Teagasc, UL and the CSO, INFORMBIO will support preparations for a bioeconomy observatory for a sustainable and circular bioeconomy. The project will deliver a Bioeconomy Foresight Analysis providing a clear roadmap for Ireland towards a sustainable bioeconomy, along with the tools to rigorously measure progress towards this objective. INFORMBIO combines data-driven research, analysis and modelling with input from expert thematic groups, ensuring robust and informed outcomes for industry, policy makers and other relevant groups. By integrating biomass mapping, value-chain analysis, life-cycle assessment and scenario modelling, the project, for the first time, attempts to quantify the potential of the bioeconomy to contribute to Ireland's climate and sustainability targets. Moreover, the projects positions Ireland as a front-runner among EU member states, by developing a prototype national bioeconomy monitoring system, enabling Ireland to track the development and progress of the	€996,429.91	2021R423 **Final Report not yet available.**

		bioeconomy against key bioeconomy indicators.		
Declan Bolton Teagasc Declan.bolton@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin, Technological University Dublin, National University of Ireland Galway	DAFM National Call 2021	**Assuring the Chemical and Microbial Safety of Organic Waste Spread on Land in Ireland.**This project will provide data on the concentration of veterinary drug residues, biocide residues, and metals (cadmium, chromium, copper, iron, mercury, molybdenum, nickel, lead, antimony, selenium, tin, and zinc) in animal waste and wastewater treatment sludge used for land spreading in Ireland. The numbers, prevalence and survival of Salmonella spp., STEC/E. coli O157, Listeria monocytogenes, Campylobacter spp., Clostridium spp., Cryptosporidium and norovirus will also be investigated. A risk ranking exercise will inform targeted mitigation by identifying the most relevant waste-hazard combinations requiring control. Mitigation studies on the most relevant hazards will then be undertaken, including storage, anaerobic digestion (AD), composting, thermal and chemical treatments. The outputs will inform farmers, AD operators, regulators, and other relevant stakeholders about the chemical and biological hazards in organic wastes intended for land spreading in Ireland as well as best practice and policy for their control.	€1,234,349.42	2021R453 **Final Report not yet available.**
Dr. Pat Tuohy Teagasc Patrick.tuohy@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** National University of Ireland Galway	DAFM National Call 2021	**Facilitating water table management on carbon rich soils.** There is an estimated 300,000 ha of grassland on drained carbon-rich soils. Plans to restore these soils and prevent additional carbon release will rely on manipulating the water table by removing and blocking existing artificial drainage features in a process described as “rewetting”. The main objective of REWET is to assess the application and impact of water table management on carbon-rich grassland soils. The project will focus on hydrological impacts. The sensitivity of water table depth to external manipulation will vary by site, as will corresponding costs and the magnitude of benefits accrued. The refinement of water table control methodologies will allow for imposed land use changes to yield maximal benefits on a per hectare basis. The project will inform strategies for the sustainable management of land resources,	€595,218.91	2021R454 **Final Report not yet available**

		reduce the impact of greenhouse gas emissions on the environment, promote improved soil health and support sustainable habitats at all scales.		
Annetta Zintl UCD Annetta.zintl@ucd.ie **Lead Institute:** UCD **Collaborating Institutions:** Waterford Institute of Technology	DAFM National Call 2021	**Network for insect vectors in Ireland.**Blood feeding insects are important vectors of pathogens affecting humans and animals. With the combined effects of climate change, widespread establishment of exotic vector-borne pathogens in continental Europe, and increased trade in livestock and goods between Ireland and the continent, Ireland is at increased risk from invasive arthropod vectors and vector-borne disease. This project aims to establish a national network of expertise in arthropod vectors and vector-borne diseases including academics, public sector, and community representatives. The current distribution of biting midges and mosquitoes and vector-borne pathogens, identified using standard conventional and newly developed cutting-edge technologies, will be determined, and analysed against previous data to identify trends and assess the likely effects of climate change. By enhancing the understanding and vigilance of the population with regard to vectors and vector-borne disease, this study will help to improve Ireland's preparedness and reduce the threat of vector-borne disease to human and animal health.	€531,003.80	2021R467 **Final Report not yet available**
Dr. Michael Dineen Teagasc Michael.dineen@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Cork, University College Dublin	**DAFM National Call 2021**	**PASTURE-NUE A multidisciplinary approach to increasing the nitrogen use efficiency of pasture-based systems.** This project will cultivate critical knowledge on how the agricultural industry can improve management practices to mitigate the current trade-offs among the production of agricultural goods and environmental sustainability (i.e., climate change, water and air quality, biodiversity). Despite the positive effect of nitrogen fertilizer use on agriculture production, the efficiency with which this nitrogen is used can be poor. This can result in unwanted emissions of nitrogen into the environment. The overall objective of this project is to increase the efficiency of nitrogen use in pasture-based systems. The project is designed to integrate novel approaches to grazing management, feed chemistry analysis, supplementary feed formulation, ruminant digestive sampling and environmental emissions monitoring to achieve its objectives. Ultimately, the project will increase	€1,237,187.55	2021R482 **Final Report not yet available.**

		the efficiency of nitrogen utilisation in pasture-based systems, thus preventing or diminishing environmental challenges such as ammonia and nitrous oxide emissions, as well as nitrate leaching to groundwater.		
Michael Gaffney Teagasc Michael.gaffney@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Technological University of the Shannon, University of Limerick, University College Dublin, Agri-Food & Biosciences Institute, University College Cork	DAFM National Call 2021	**Utilising organic bio-resources and novel technologies to develop specifically designed and sustainable peat replacements for professional horticultural crop production.** Peat has become an essential component in the production of plants and mushrooms in professional horticulture, due to its favourable physical, chemical, and biological characteristics. However, there is a pressing need to evaluate and develop alternatives which have a favourable environmental profile while also maintaining crop yield and quality. 'Beyond Peat' will assess current, available alternative growth and casing materials across five key sub-sectors of horticulture while also developing advanced growth media utilising new technologies to transform organic wastes into materials with favourable physical characteristics for plant and mushroom performance. To underpin the materials assessed and developed, life cycle assessments of the proposed peat alternatives will be conducted to ensure they have the necessary favourable environmental characteristics. Independent assessment of the agronomic and economic implications of alternative growing and casing materials will inform national policy while supporting the professional horticultural sector transition from peat, where achievable in a sustainable manner.	€1,453,996.70 *	2021R499 **Final Report not yet available.**
Dr Siobhán O'Connor DCU Siobhan.oconnor@dcu.ie **Lead Institute:** DCU **Collaborating Institutions:**		**Mental health Help-seeking in Irish Farmers.**Mental health is a major societal issue in Ireland, with research finding that farmers can be particularly at risk. While supports are available, unless farmers reach out and engage with these services, they are ineffective. However, barriers can prevent help-seeking including a lack of awareness of mental health symptoms and available supports, stigma, poor social support etc. This research firstly aims to identify how common mental health issues are in Irish farmers. Focus groups with farmers and key stakeholders will also investigate the barriers and facilitators to mental health help-seeking. Based on this, a bespoke, evidence-based mental health education programme to improve Irish farmers'	€210,569.33	2021R510 **Final Report not yet available.**

N/A		knowledge of mental health issues and help-seeking will be designed and its effectiveness examined. To maximise the impact of this intervention, the farmers voice will be central at all stages of this research, and they will direct the ultimate mental health help-seeking educational content and format.		
Niamh Harbourne UCD Niamh.harbourne@ucd.ie **Lead Institute:** UCD **Collaborating Institutions:** Teagasc	DAFM National Call 2021	**Rapid demonstration model of a sustainable food systems approach in Horticulture.** RapidHort is a circular demonstration model based on Irish grown microgreens that will enhance the economic and environmental sustainability of horticultural food production. These microgreens display rapid growth and rapid deterioration, which compounds the challenges faced in commercial horticulture. The project will bring together key stakeholders including academics, growers, processors, and consumers. Using a food systems approach, the project aims to characterise the impact of variation and interactions within the model on nutritional, microbial, sensory, growing and processing properties of the microgreens. In addition, it will explore the potential of using waste heat from data centres to power vertical farming to reduce waste and achieve greater environmental sustainability. The goal of the project is to provide growers and processors with the tools to develop and deliver horticultural products with increased sustainability, nutritional value, and competitiveness.	€522,085.00	2021R523 **Final Report not yet available.**
Karl Richards Teagasc karl.richards@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Agri-Food & Biosciences Institute, University College	DAFM National Call 2021	**Land-Use, Agriculture and Bioenergy Measures for the Abatement of Climate Change and inclusion in Marginal Abatement Cost Curve analyses.** The LABMACC project will quantify mitigation associated with a range of new measures that reduce greenhouse gas emissions, enhance land carbon sinks, and displace fossil fuel emissions via closed farm nutrient loops and the production of bio-based products. This project will refine national emission factors so that mitigation measures can be incorporated into national inventories, enabling farmers to receive credit for emissions reduction. It will evaluate the socio-economic consequences and mitigation potential of the incorporation of measures into production systems. This will allow for the estimation of marginal abatement costs and help develop farmer decision support tools. The project will focus on knowledge transfer and the timely delivery of messaging and demonstration to farmers using the Signpost farms	€1,449,256.39 *	2021R550 **Final Report not yet available.**

Dublin, National University of Ireland Galway, Queens University Belfast		programme. The impact will be the identification of new measures to reduce agricultural emissions to help achieve the national greenhouse gas reduction targets of -51% by 2030 and climate neutrality by 2050.		
Keelin O'Driscoll Teagasc Keelin.odriscoll@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Queens University Belfast, Agri-Food & Biosciences Institute, University College Dublin	DAFM National Call 2021	**Using a 'One Welfare' framework to develop alternative high welfare pig production systems**. In Ireland, pigs are raised in commercial systems that pose welfare challenges. The OneWelPig project will investigate alternative pig production systems not widely used in Ireland, to identify practices associated with better welfare for pigs, humans and the environment. We will liaise with small-scale outdoor producers, establish pigs within a forestry setting (i.e. agroforestry), and evaluate new materials (e.g. hemp) and building designs to improve pig welfare indoors. As well as assessing pig welfare, we will observe the pigs' behaviour to understand how they affect the soil, flora and fauna in their environment. We will also determine the overall economic, environmental and social effects of the various systems, including evaluating the implications of changing land use to outdoor systems of production. Ultimately, the project will provide the knowledge for individual producers to improve pig welfare, and potentially a portion of the industry to transition to higher welfare systems.	€653,070.35*	2021R600 **Final Report not yet available.**
Kieran Kilcawley Teagasc Kieran.kilcawley@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2021	**Flavoromics of Grass-Fed Beef and Lamb.** This project brings together expertise in meat (beef and lamb) science, flavour chemistry, phytochemistry, product authenticity and sensory science to substantiate claims about the impact of diet on the eating quality of Irish grass-fed beef and lamb. The objective of the project is to identify components of the diet that confer a "signature" to meat that could then be used to authenticate the dietary history of the meat and provide scientific support to "grass-fed", region-specific production labels within Ireland, and for existing or future Protected Geographical Indication certification. The outcomes of this project will provide producers, and processors with information to support and enhance the marketability of Irish grass-fed beef and lamb through highlighting its unique provenance and sensory quality. The findings of this project will also enhance consumer confidence in Irish grass-fed beef and lamb by providing mechanisms for	€500,668.00	2021R616 **Final Report not yet available.**

		authentication and traceability thereby enhancing transparency in the food chain.		
Dr. Michael Hayden National University of Ireland Maynooth Michael.hayden@mu.ie **Lead Institute:** National University of Ireland Maynooth **Collaborating Institutions:** Teagasc Athenry	DAFM National Call 2021	**Sustainable Transition of the Rural Economy through Generational Renewal.** Sustainable Transition of the Rural Economy through Generational Renewal, Collaboration between Michael Hayden, and Bridget McNally (Maynooth University) and Anne Kinsella (Teagasc). Business continuity and succession planning are challenges and of major concern to the sustainability of rural Ireland. Therefore, it is important for generational renewal programmes in agriculture to have the dual focus of providing adequate retirement income for retiring farmers, within a framework that enables farm successors and new entrants a formal route to farm ownership. This project will conduct a comprehensive review of (1) retirement income provisioning for farmers and (2) collaborative farming and alternative farm business structures, to explore generational renewal within Irish agriculture. It is envisaged that this project will have an economic, policy, environmental and social impact, by recommending initiatives to incentivise the smooth and sustainable transitioning of farm assets and land to younger farmers, whilst securing financial stability for older farmers in retirement.	€147,820.31	2021R561 **Final Report not yet available.**
Dr. Nóirín McHugh Teagasc Noirin.mchugh@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Irish Cattle Breeding Federation	DAFM National Call 2021	**Developing genetic parameters for resistance to gastrointestinal nematode infections in lambs and their incorporation into the Irish national breeding programme**. Over-reliance and inappropriate use of drugs such as anthelmintics in the sheep sector, both nationally and internationally, has resulted in the evolution of drug resistant worms. This has led to compromised health in sheep, which is not only a major welfare concern but also reduces productivity resulting in a greater carbon hoofprint per lamb. To mitigate the effect of the drug resistance worms, an alternative sustainable approach is required. The development of a genetic tool to identify sheep that are less susceptible to high worm burdens is one alternative method. This project will involve the sampling of a large cohort of informative lambs for worm burdens, with the aim of developing a new genetic tool for ranking animals based on their susceptibility to high worm burdens. The resultant genetic tool will be available to all Irish sheep farmers and will enable farmers to make more informed	€199,658.00	2021R635 **Final Report not yet available.**

		breeding decisions.		
Gerald Barry University College Dublin Gerald.barry@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** N/A	DAFM National Call 2021	**Development of a vaccine against bovine coronavirus variants that cause respiratory disease in cattle.**Maintaining good animal health is a priority in the agricultural sector and vaccines can help to do that by training the immune system to defend the body against infections. As a result of the COVID-19 pandemic, new vaccine technology, centred on mRNA, has emerged. We propose to harness that technology to protect cattle, focussing on a virus called Bovine Coronavirus. This virus causes problems in the lungs of cattle and can also causes life threatening diarrhoea in young calves. In collaboration with partners in DAFM, Teagasc and Waterford IT, we will firstly survey cattle in Ireland to identify the common variant that circulates here. We will then use that information to build a variant specific mRNA vaccine that will express the Spike protein of the virus. This project aims to address a problem that impacts cattle, not just in Ireland but across the world.	€198,176.23	2021R664 **Final Report not yet available**
Stephen Butler Teagasc Stephen.butler@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2021	**Accelerating genetic gain and improving beef output from dairy herds.** In this project, we will use Assisted Reproductive Technologies (in vitro produced embryos, sex-sorted semen) to accelerate genetic improvement in dairy cattle and beef breed cattle suitable for crossing with the dairy herd. We will also develop low-cost embryos with at least 75% beef breed genetics, using semen from bulls that are suitable for use on the dairy herd, and these embryos will be transferred to lactating dairy cows that are not suitable for generating replacement heifers. The objective of these studies is to harness the potential of new technologies to improve the sustainability of the dairy and beef sectors in Ireland. The expected benefits include accelerated genetic gain for milk and beef production, and transformation of the dairy herd calf crop to a combination of high genetic merit dairy female calves and premium quality beef calves.	€599,500.00	2021R665 **Final Report not yet available.**
Food				
Malco Cruz-Romero University College Cork m.cruz@ucc.ie		**New Active Sustainable Packaging with Natural Antimicrobials for Shelf-Life extension of Fish Products.** Plastic pollution and food waste are two major issues worldwide and sustainable packaging development and application is currently the		

Lead Institute: University College Cork **Collaborating Institutions:** Trinity College Dublin	DAFM National Call 2021	dominant trend across the food industry. ACTIPACK4FISH will develop and demonstrate use of new generation, sustainably active antimicrobial/antioxidant packaging materials (AAPM) for seafood shelf-life extension, enhanced safety, and reduced food and packaging waste, thus addressing environmental concerns associated with such packaging materials and formats. Natural antimicrobial/antioxidant substances will be screened, optimised, characterised, and subsequently integrated into novel packaging materials, including sustainable, recyclable, and biodegradable polymers, to produce advanced multi-functional packaging materials with active features. Whilst potentially suitable for a wide range of food packaging applications, ACTIPACK4FISH will apply and validate these AAPM technologies at laboratory- and industrial-scale for modified atmosphere packaging formats of selected fresh pelagic and demersal fish. ACTIPACK4FISH will help the Irish seafood industry meet the economic, regulatory, and social pressures to be more sustainable.	€599,177.00	2021R412 **Final Report not yet available.**
Fiona Doohan University College Dublin Fiona.doohan@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** Teagasc, National University of Ireland Maynooth, Queens University Belfast, Agri-Food and Biosciences	DAFM National Call 2021	**Mycotox-I: field to fork assessment and mitigation of mycotoxin exposure risk on the Island of Ireland.** Mycotoxins are harmful products produced by some fungi in cereals. Mycotox-I will develop and deploy harmonised state-of the art tools to assess and reduce the risk of mycotoxins in Irish cereal grains, from farm to fork. NI and ROI researchers will develop and share tools to detect the producer fungi and mycotoxins. These will be then used to determine the impact of our environment, varieties, and agricultural inputs on fungal and mycotoxin risks in the farm and processed grains. This underpins the development of a new machine-learning-based decision support system tailored to reduce mycotoxin loads in feed and food produce produced on this island, enhancing the safety and quality of Irish grain.	€1,528,768.65 *	2021R460 **Final Report not yet available.**

Institute				
Prof. Lorraine Brennan University College Dublin Lorraine.brennan@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** Teagasc, Queens University Belfast, Ulster University, University College Cork, National University of Ireland Galway	DAFM National Call 2021	**Protein-I: Shared Island Sustainable Healthy Nutrition**. To feed the rapidly expanding global population whilst maintaining the health of the planet we need to transform our current food system. In Ireland there is a need to increase the types of foods that contribute to our populations' protein intake. Our project brings together researchers across the Island of Ireland from a range of disciplines to work together to improve sustainable plant protein production and assess the impact of changes to development of the rural economy. Additionally, we will work with consumers to understand how best to diversify plant protein intake and perform human studies to demonstrate the health benefits. Protein-I will enable us to combine leading expertise to maximise co-benefits across the food system. Overall, our project will be a key step towards future proofing our food system on the Island of Ireland and moving towards protecting planetary and population health, within the context of a just transition.	€1,675,063.28 *	2021R546 **Final Report not yet available.**
Dave Clarke Marine Institute Dave.clarke@marine.ie **Lead Institute:** Marine Institute **Collaborating Institutions:**	DAFM National Call 2021	**Increasing Risk of Paralytic Shellfish Poisoning Events In Ireland.** This project investigates the increasing abundance and distribution of Paralytic Shellfish Toxins, a highly potent group of naturally occurring marine toxins which can occur in shellfish (mussels, oysters, clams, cockles), which, when present, can cause serious illness and fatalities to humans if consumed, posing a serious risk to food safety. A comprehensive sampling and analytical programme targeting these toxins in the water, sediment, and shellfish, will be conducted in aquaculture production areas, to identify the causes, timing, environmental factors, and mechanistic pathways of toxin occurrence. Novel molecular methods, predictive modelling and risk assessment tools will be developed. The outputs and deliverables of the project will allow for risk	€599,580.73	**2021R578** **Final Report not yet available.**

University College Dublin, Galway Mayo Institute of Technology		management strategies and predictive forecasting tools to be implemented as an early warning system for the aquaculture industry and regulatory competent authorities, thus providing increased assurances to consumer safety and supporting the integrity, quality and commercial reputation of Irish shellfish.		
Prof. Sarah Culloty University College Cork s.culloty@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:** Marine Institute	DAFM National Call 2021	**Bridging Research & Practice to Improve the Future Sustainability and Growth of the Irish Bivalve Industry.** Shellfish have a significant socio-economic and ecological role to play in Irish marine coastal communities and environments. Mussels, oysters, and cockles contribute to at least 65% of marine aquaculture volume and play a substantial role in water quality improvement, sediment stabilisation, and biodiversity enhancement. Disease and climate change represent a serious threat to the maintenance and sustainable growth of this sector. This project will adopt an all-island grassroots approach to identify the key drivers contributing to and inhibiting growth in this sector currently and into the future. The socio-economic and ecosystem services provided by this industry will also be evaluated. Knowledge transfer will be a crucial output. Mitigation strategies, guidelines and recommendations will be provided to stakeholder communities, including policy/regulatory end-users, to reduce the impact of risks that the Irish shellfish sector faces currently and into the future.	€599,444.92	2021R609 **Final Report not yet available.**
Forest				
Aine Ni Dhubhain University College Dublin Aine.nidhubhain@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:**	**DAFM National Call 2021**	**Transformation to Continuous Cover Forestry: Synergies and Trade-off's.** Continuous Cover Forestry (CCF) involves the use of silvicultural systems whereby the forest canopy is maintained at all times. In Ireland, an increasing number of forest owners have started the long-term process of transforming their forests to CCF. This project aims to estimate the total area of forest in Ireland that is suitable for transformation to CCF. Current drivers and barriers to CCF adoption in Ireland will also be identified. Different approaches to CCF transformation and their likely impact on forest-related ecosystem services will be assessed. To address an existing knowledge gap, current growth models will be evaluated and calibrated for use in	€840,103.98	2021R489 **Final Report not yet available.**

Teagasc Ashtown, National University of Ireland Maynooth		modelling tree growth in CCF stands. Ultimately, this project will provide a realistic evaluation of how and where CCF transformation can be implemented in Ireland over the coming decades, and the consequences for forest ecosystem service delivery.		
Patrick McGetrick National University of Ireland Galway Patrick.mcgetrick@nuigalway.ie **Lead Institute:** National University of Ireland Galway **Collaborating Institutions:** University of Limerick, Technological University Dublin	DAFM National Call 2021	**Sustainable construction and Assessment Of the full Lifecycle impact of Irish harvested Wood products**. This project addresses the challenge of minimising the carbon footprint of construction projects, promoting greater use of sustainable timber solutions in place of high embodied carbon materials. The overall objective is to deliver comprehensive whole lifecycle assessment quantifying the environmental, economic, and social impacts of the use of locally sourced Irish wood products in the built environment, including creation of a new national lifecycle database for these products. This will enable key stakeholders and policymakers to make informed decisions in promoting the use of Irish timber in enhanced solutions optimised for the whole building lifecycle, from raw material extraction to design, construction, and deconstruction. This supports current housing demands, growth of the circular bioeconomy, job creation and increased afforestation. For the first time, construction demand and land-use for forestry will be linked in lifecycle assessment to optimise returns to forest owners and identify novel uses of wood for sustainable construction.	€997,259.71	**2021R543** **Final Report not yet available.**
Professor Jane Stout Trinity College Dublin stoutj@tcd.ie **Lead Institute:** Trinity College Dublin **Collaborating Institutions:**	**DAFM National Call 2021**	**Accounting for Forest Ecosystem Services in Ireland.** Irish forests provide timber, along with arrange of other public benefits, including climate regulation and biodiversity. To provide a sustainable supply of multiple benefits from Irish forests, this collaborative project will co-develop tools for foresters to enable robust and transparent management decision-making. A Natural Capital Accounting approach will be used to quantify of forestry stocks, and flows of benefits, at site level. By assessing the quantity, quality and location of forest stocks, flows of 'ecosystem services' (including commercial timber production, carbon sequestration, water retention, recreation, habitats and species) will be tracked over time. By combining	€603,363.60	**2021R567** **Final Report not yet available.**

University College Dublin		this information under different land management scenarios, potential trade-offs and outcomes will be modelled. As the first project to combine Natural Capital Accounting with Bayesian Belief Network modelling of ecosystem service supply, it will support forest managers to fulfil multiple objectives at both site and estate level in an Irish context.		
Dr Niall Farrelly Teagasc Niall.farrelly@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin, Agri-Food & Biosciences Institute, University of Limerick, National Botanic Gardens, Trinity College Dublin	DAFM National Call 2021	**Adaptation, mitigation, and protection strategies to increase resilience of Irish forests to address the impacts of climate change**. A new research project called "AdaptForRes" coordinated by Dr Niall Farrelly of Teagasc aims to research measures to increase the resilience of Irish forests to climate change. The research will assess whether the current range of planting stock is suitably diverse and adapted for climate change. The impact of increased afforestation on a range of soils and the potential of forest management to enhance existing carbon stocks while minimising losses from natural disturbances will be examined. A global horizon scanning and pest risk assessment for key forest species will be conducted and measures for enhancing the detection of pests and pathogens will also be assessed. The research is a joint collaboration between Teagasc, AFBI, Univ. Limerick, UCD, Trinity and the National Botanic Gardens. Outcomes of the research have significant potential to contribute to increasing resilience in Irish forests and reducing some of the uncertainties associated with climate change.	€2,217,710.05 *	**2021RI302** **Final Report not yet available**
Call 2019				
Coordinator/Lead Institute + Collaborating Institutions funded	**National / TransNational**	**Project Title and Summary**	**Total DAFM Award** (* denotes project co-funded by DAERA	**Reference No & Final Report**
Agriculture				

Dr Angela Feechan University College Dublin angela.feechan@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** National University of Ireland Galway, Trinity College Dublin, Teagasc	DAFM National Call 2019	**BioCrop: Biostimulants and Biopesticides for Crop production.** Cereal production is dependent on fossil based fertilisers and pesticides. Biocrop will identify new biostimulants and low risk biopesticides while engaging with industry to test existing biostimulants. The efficacy of these biobased products will be compared to conventional fertiliser applications and the potential for disease control assessed. Any environmental impacts will be considered throughout the bioproduct lifecycle, from production through to use and disposal. Economic modelling will assess the impact of these biobased products on production costs and the profitability for Irish growers. Therefore, BioCrop will find alternatives for farmers in the face of EU regulations to reduce fertiliser use and the ongoing loss of plant protection products. These biostimulants and biopesticides have the potential to reduce the environmental impacts of crop production such as greenhouse gas (GHG) emissions and the loss of biodiversity.	€1,999,570.28	2019PROG705 **Final Report not available**
Prof John O Doherty University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc Waterford Institute of Technology	DAFM National Call 2019	**PigNutriStrat- Novel nutritional and management strategies to reduce antimicrobial reliance and antimicrobial resistance on Irish pig farms.** The objective of PigNutriStrat is to use a multidisciplinary research approach to develop solutions to prevent and manage multifactorial enteric diseases in pigs as a means of reducing the need for antibiotic use. Reducing infection pressure and optimising gut microbiome, immunity and enzyme secretory capacity will be the focus. In Task 2 we will investigate improved internal biosecurity (improved sanitisation with and without bacterial competitive exclusion) and management practices (stocking density and feeder space allowance) in farrowing and weaner houses as a means of increasing lifetime pig health and productivity and reducing antimicrobial use. Until recently, the main focus on finding alternatives to in-feed antibiotics has been dietary manipulations in pigs post-weaning. However, there are also other strategies that enhance the growth and health of the newly weaned pig. One of these is the use of maternal nutrition during gestation and lactation and this will be investigated in Task 3. Task 4 will assess management (split suckling) and nutritional strategies (supplementary milk to suckling pigs with/without gradual introduction of liquid	€1,247,592.57	2019R518 **Final Report not available.**

		starter diet and novel non-antibiotic dietary additives). In Task 5 the feeding of supplementary liquid milk replacer and/or liquid starter diet to newly weaned pigs will also be investigated. We will additionally formulate diets to reduce their acid binding capacity and protein content, to help ensure that an acidic gastric environment is ensured immediately post-weaning, thereby ensuring the first barrier to gastric infection is secure. Specific alternatives to antibiotic feeding approaches will be investigated in Task 6. We will link hygiene and biosecurity, management, sow and piglet nutrition, health and antibiotic use to economic outcomes in Task 7. Transfer of knowledge is assured via direct involvement of the Teagasc specialist advisors, SFI BEACON centre, ARMIE theme network and via collaboration with relevant stakeholders in DAFM, veterinarians, pig producers and processors.		
Prof. Stafford Vigors University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2019	**FESNP- Identifying functional SNPs to strengthen genomic selection for feed efficiency in pigs.** Feed efficiency (FE) is a trait of great economic importance being central to profitable, sustainable and efficient pig production. However, a major constraint to genetic progress is the difficulty and expense of measuring it directly. While genomic selection is utilised in the pig industry, SNP panels are generated with non-specific markers evenly distributed throughout the genome. Previous research as part of DAFM project (IdentiFEED) identified a panel of differentially expressed genes associated with FE in pigs from two different farms of origin. This current proposal will identify SNPs associated with FE with a particular focus on functional SNPs in the promoter region of differentially expressed genes, which are likely to have major impacts on FE. This proposal aims to validate approximately 200 functional SNPs associated with FE in a population of 2000 commercial pigs. DNA-based biomarkers for FE pigs will result, which can then be incorporated into SNP based breeding strategies.	€99,999.50	2019RP337 **Final Report not available.**
Prof Stephen Gordon University College Dublin Bellfield Co. Dublin	DAFM National Call 2019	**BTBGENIE- Development of genomic epidemiology systems for tracking and eradicating Mycobacterium bovis in Ireland.** The Irish control programme for bovine tuberculosis (bTB) currently costs farmers, the exchequer and EU €84M. While progress has been made in reducing bTB prevalence, the current government	€408,403.82	2019R404 **Final Report not**

Lead Institution: University College Dublin **Collaborating Institutions:** Queens University Belfast		strategy to eradicate bTB by 2030 will not be achieved if solely based on existing controls and policy. Bovine TB (bTB) control hinges upon efficient identification of reactor animals and infection sources. Whole genome sequencing (WGS) provides a high resolution molecular characterisation of pathogens allowing their transmission to be efficiently tracked in time and space. Hence, WGS represents a technology that, if integrated with the current bTB control programme, can precisely identify strains of Mycobacterium bovis circulating in herds and associated wildlife and hence greatly improve the efficiency of attributing sources of residual infection. The goal of our project is to integrate M. bovis WGS with the current bTB control and surveillance programme in the Republic of Ireland (RoI) and Northern Ireland (NI) and demonstrate how M. bovis WGS can support bTB eradication. We will compare WGS data from NI and RoI to develop a detailed understanding of the population of M. bovis on the island of Ireland. Our overarching objectives are: to optimise M. bovis WGS to facilitate integration with routine M. bovis culture; to develop the computational tools that summarise the genomic data in the context of existing cattle and wildlife population databases; to use WGS to estimate transmission rates of M. bovis within and between cattle and wildlife populations; and to combine RoI and NI WGS data to define the population of M. bovis on the island of Ireland. Our extensive collaborative national and international network will act as a foundation of expertise to draw upon during the project and provide a broad platform for the dissemination of our outputs.		**available.**
Prof Alan Fahey University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin	DAFM National Call 2019	**GENJUMP- Genetic Improvement of the Sport Horse Population for Show Jumping in Ireland.** The Sport Horse Industry contributes €816 million and over 14,000 full-time equivalent jobs to the Irish economy. The breeding sector is worth 33% of the total value of the Sport Horse Industry and contributes €271 million to Irish economy. The majority of the economic and employment activity occurs in rural Ireland and supporting the Sport Horse industry through innovation in genetic technologies will contribute to the sustainability of the rural economy and provide a risk mitigation strategy for Brexit. In recent years the Irish Sport Horse (ISH) studbook has had a	€235,905.63	2019R588 **Final Report not available.**

Collaborating Institutions:		decline in the WBFSH show jumping rankings moving from 7th place in 2004 to 15th in 2018. Competitor studbooks are surpassing the Irish Sport Horse studbook in the WBFSH show jumping rankings due to their greater uptake of animal breeding selection index methodologies. This scientific method of genetic selection for multiple relevant traits is important for producing a successful show jumper and provides the opportunity for permanent and cumulative genetic improvement over time. Implementation of a scientific breeding programme offers the ISH studbook the opportunity to reverse the decline in WBFSH show jumping rankings. The overall aim of the GENJUMP project is to develop a show jumping selection index using phenotype and pedigree information that are currently available in the Horse Sport Ireland database. GENJUMP will identify the appropriate goal and index traits and determine the heritabilities and estimated breeding values of these traits. Genetic correlations will be estimated between these traits so that they can be included in a multi-trait selection index. As part of the GENJUMP project a road map will be formed to help determine how breeding values can be implemented into the breeding industry and deliver sustainable genetic improvement for traits related to show jumping in the Sport Horse population in Ireland.		

Dr Noirin McHugh Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Irish Cattle Breeding Federation Cork Institute of Technology Agri-Food and Biosciences Institute	DAFM National Call 2019	**Dairy4Beef- Optimised breeding program for efficient and quality beef from dairy herds.** The expanding Irish dairy herd, coupled with improving reproductive performance, is resulting in a greater proportion of slaughtered cattle originating from dairy herds; these include both purebred dairy animals but also beef-sired germplasm from dairy dams. Although breeding programs are already in place for both dairy and beef cattle, these breeding programs have heretofore operated in isolation. The objective of Dairy4Beef is to develop an optimum dairy-beef breeding program by: 1) developing further the new dairy-beef index just launched nationally by the project team, 2) establish production blueprints for dairy-beef cattle divergent in genetic potential for age at slaughter, 3) understanding, and where necessary and feasible, rectifying the impact of the national dairy cow breeding program on the carcass merit of dairy-beef animals, 4) using genomic technologies to enhance the dairy-beef breeding program, 5) designing the optimal breeding scheme to produce genetically elite beef sires for the dairy herd, and 6) generating and deploying management aids to support more informed value-creating decisions. The objectives will be achieved through a combination of data analytical techniques of the national phenotypic and genomic database, coupled with a globally novel controlled experimental study comparing animals genetically similar on carcass merit but divergent in genetic merit for age at slaughter. Tangible outcomes includes a clear roadmap for the expanding dairy-beef population based on a combination of optimized production systems coupled with an efficient and effective national breeding scheme underpinning a bespoke national breeding index designed to provide a balance between the desires of the dairy and beef farmers. A 0.22 standard deviation change in the dairy-beef index is worth €25.6m annually which is cumulative and permanent indicating a 25:1 return on investment based on just one year of genetic gain.	€993,689.53	2019R553 **Final Report not available.**
Dr Karl Richards Teagasc Johnston Castle Co. Wexford	DAFM National Call 2019	**AGGRIC- Towards an Agricultural Greenhouse Gas Research & Innovation Centre.** The Food Wise 2025 and Origin Green initiatives aim to increase agricultural production and value, whilst reducing the carbon footprint and enhancing	€70,998.88	2019R474 **Final Report**

Lead Institution: Teagasc **Collaborating Institutions:**		sustainability. Conversely EU Climate and Energy Framework targets require large reductions (30%) in absolute emissions. The Marginal Abatement Cost Curve for Irish Agriculture has identified a maximum potential abatement of 3 Mt CO2e yr-1 by 2030 (Lanigan et al. 2018). In order to achieve this target, there is an urgent need to incorporate these measures into production systems and encourage uptake measures at a farm level. This requires improved co-ordination between research, advisory and farmers. Many of these measures require the collection of activity data or research to refine the emission factor associated with a given measure in order to incorporate GHG reductions into national inventories. While most measures improve efficiency and directly address nitrous oxide and soil carbon, there is an absence of measures to directly de-couple methane emissions from production. Methane comprises two-thirds of agricultural emissions, with the majority of these emissions associated with the enteric fermentation of carbohydrate in the rumen of bovines and ovines. While there is a large body of research in terms of reducing methane in confinement systems, there is an urgent need to more fully develop mitigation strategies for reducing enteric methane emissions associated with grazed livestock systems and to rapidly incorporate these measures into systems on the ground. This desk study seeks to a) assess current methane mitigation measures associated with enteric fermentation and manure management, b) horizon scan for future avenues of GHG mitigation research, c) compare the approaches of other countries in terms of the co-ordination and funding of agricultural GHG research/outreach and National GHG Centres of Excellence and d) make recommendations in terms of the structure, focus and funding of an Irish Centre of Excellence.		**not available.**
Dr David Wall Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc	DAFM National Call 2019	**FaSTEN- Farm Sustainability Tools for Efficient Nutrient management.** Low soil fertility levels on Irish farms pose a real threat to meeting environmental sustainability targets in agriculture and achieving resource use efficiency in food production systems. When applied to grassland and crops with suboptimal nutrition, nitrogen (N) fertiliser recovery is usually low (<50%) and can be a major source of nitrous oxide and ammonia gas emissions, and nitrate losses to water. While the	€1,199,737.10	2019R501 **Final Report not available.**

Collaborating Institutions: University College Dublin Waterford Institute of Technology		input and management of fertilisers and nutrients to agricultural soils is a key driver of productive and economical farming systems these nutrient inputs to soils, especially nitrogen (N), need to be carefully managed to ensure they are not lost to the surrounding environment. Losses of nutrients from soil, particularly N, but also phosphorus (P), present challenges for Ireland as over one-third of national greenhouse gas (GHG) emissions, and a significant proportion of losses to water are attributed to this sector. Both Food Wise 2025 and Origin Green initiatives aim to simultaneously increase agricultural production, whilst also reducing the carbon footprint and enhancing sustainability associated with food production. Conversely EU Climate and Energy Framework targets require a 30% reduction in emissions. Nitrogen losses from managed agricultural soils have been identified as a key area to achieve these emissions reductions, and offers an opportunity for farmers and the agricultural industry to achiever these sustainability goals The FaSTEN project will develop new knowledge to improve N use efficiency on farms thus reducing the potential for N losses and emissions to the environment. FaSTEN will build new understanding of soils and key technologies for efficient nutrient management and will identify best knowledge transfer methods for primary stakeholders. In addition nutrient management support tools tailored to specific soils, environments and farming systems will be developed to aid farmers and advisory personnel to make sustainable nutrient management decisions and benchmark future success.		
Dr Karen Daly Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc **Collaborating Institutions:** Dublin City University	DAFM National Call 2019	**SENSUS- Sensing Nutrients for Agronomic Advice and Sustainability Measures.** Agriculture is a pressure on water quality and assessing the right location for mitigation measures on farms without rapid access to biogeochemical and hydro-chemical data will be challenging for sustainability advisors. Likewise, improving nutrient use efficiency across the whole farm requires higher spatial and temporal resolution soil information than our current methods allow. SENSUS will optimize a number of sensor technologies that can be deployed in Irish agricultural landscapes to provide rapid assessment and diagnostic tools for agricultural and sustainability advisors to help them make decisions on the ground. Applications in passive	€599,700.25	2019R456 **Final Report not available.**

		sampling, portable lab-on-a-disk and handheld spectroscopy will be deployed for in situ analysis of soils, sediments and surface waters, in fields and surface drainage networks. Nutrient loss from fields and farm yards can reach small streams and rivers via a network of connecting surface ditches and subsurface drains. SENSUS will map the connectivity to identify the right location for in-ditch mitigation options and deployment of sensor technologies. Connectivity mapping and portable phosphate (lab-on-a-disk) sensors will inform locations for in-ditch mitigation measures and deployment of passive samplers to monitor their effectiveness. Handheld X-Ray Fluorescence spectrometry and mid Infra-red spectroscopy will be optimized for soils and sediments to capture nutrient dynamics and soil fertility parameters for agronomic advice. Developing field applications for spectroscopy will be used to collect high spatial and temporal soil and sediment data across the whole farm to improve nutrient use efficiency. Chemometric calibrations for pH, organic matter, particle size and phosphorus sorption properties, will be uploaded onto hand-held spectrometers for agronomic advisors to capture a holistic view of soils and sediment across the farm. Integrating connectivity mapping with rapid diagnostic tools for soil, sediment and water will advance our ability to support nutrient use efficiency and water quality protection.		
Dr Sinead Waters Teagasc Grange Dunsany Co. Meath **Lead Institution:** Teagasc **Collaborating Institutions:** National University of Ireland Galway	DAFM National Call 2019	**METH-ABATE- Development and validation of novel technologies to reduce methane emissions from pasture based Irish agricultural systems.** Agriculture is the single largest contributor (~30%) to overall Greenhouse Gas (GHG) emissions in both the Republic of Ireland and Northern Ireland accounting for the majority of methane emissions produced in both jurisdictions primarily due to ruminant livestock production. Methane, a GHG 28 times more potent than carbon dioxide, is released as a by-product of rumen microbial fermentation and from stored manure and slurry on farm. Under EU legislation, the Republic of Ireland has committed to reduce GHG emissions by 40% by 2030, compared to 2005 levels and in the UK, a reduction of 34% by 2020 and 80% by 2050 has been targeted. Hence there is an urgent requirement for innovative strategies to reduce methane emissions from agriculture on the entire	€1,248,221.65	2019R479 **Final Report not available.**

Queen's University Belfast Agri-Food and Biosciences Institute		island of Ireland. The aim of this cross-institutional, cross-jurisdictional, multidisciplinary proposal is to develop novel farm-ready technologies to reduce methane emissions from ruminant fermentation and stored manure and slurry. Specifically, we will investigate a number of promising feed additives to mitigate methane emissions from sheep, dairy and beef production, while simultaneously monitoring their effects on animal productivity, and novel technologies to reduce methane losses from stored manures. For pasture-based delivery, technologies for encapsulation to ensure slow release and early-life supplementation strategies will be developed. The effect of these technologies on the nutritional and toxicological composition of meat and milk will be investigated to confirm consumer safety of ruminant products. Sequencing and bioinformatics technologies will allow a fundamental understanding of mechanism of action of these interventions in the rumen and manure. To ensure appropriate implementation, we will develop a new methane additive component for the existing Teagasc Life Cycle (LC) Analysis models to quantify the LC effect of developed technologies on overall methane and GHG emissions. Finally, farm level cost effectiveness will be evaluated through the national farm survey.		
Dr Dominika Krol Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Agri-Food and Biosciences Institute	DAFM National Call 2019	**Triple A- Abating Ammonia in Agriculture.** The National Emissions Ceilings (NEC) Directive (2001/81/EC) and Gothenburg Protocol (UNECE, 1999) places limits on ammonia emissions, with agriculture comprising 98% of national emissions. The majority of these emissions (>80%) arise from animal housing/storage and the land-spreading of animal manures. Revisions to the NEC Directive under the EU Clean Air Package will require Ireland to limit ammonia to 112kT per annum between 2020 and 2030 and 107.6kT per annum post-2030. However, the Food Wise 2025 initiative, combined with the abolishment of milk quotas has resulted in the rapid expansion of the dairy sector and this has resulted in Ireland breaching NEC Directive limits since 2016 (EPA 2018). In the absence of abatement strategies, ammonia emissions are forecast to increase which may result either in substantial fines or the imposition of a de-facto quota based on emission levels. Furthermore, large point-sources of	€784,186.71	2019R554 **Final Report not available.**

		ammonia are a threat to adjacent to vulnerable peatland and heathland habitats. Increases in ammonia-N deposition may result in critical load exceedance in contravention of the Habitats Directive. As a result, the abatement of these emissions is of vital sectoral and national importance. This project seeks to quantify the abatement potential of a range of measures associated with the storage and land-spreading of bovine slurry and generate the associated national emission factors for each option for inclusion in Ireland's national ammonia inventories. These measures will include the chemical amendment of slurries as well as a range of low-emission spreading technologies. The regional impact of sectoral expansion on critical N loading to vulnerable ecosystems as well as the potential impact of abatement measures will be also assessed. Ultimately, the objective of this project is to quantify a low ammonia emissions trajectory for agriculture and decouple as far as possible ammonia losses from agricultural production.		
Dr. James Moran Galway Mayo institute of Technology Old Dublin Road Co. Galway **Lead Institution:** Galway Mayo Institute of Technology **Collaborating Institutions:** Teagasc University College Dublin	DAFM National Call 2019	**HNV_FarmForBio- High Nature Value Farmland and Forestry Systems for Biodiversity.** Conservation of natural resources, halting the loss of biodiversity and the degradation of ecosystem services are key environmental objectives of the European Union. High Nature Value farmland and forest (HNVFF) areas are associated with high biodiversity and other public goods. HNVFF areas are thus headline indicators in the Rural Development Programme and EU legislation requires that High Nature Value farmland and forests are identified, monitored and targeted for agri-environment payments. The HNV_FarmForBio project will develop a (geo-spatial) methodology to identify, characterise and map the national extent of HNV farmland and forest areas (Tasks 1 & 2). For the first time, we will investigate an approach towards assessing the quality (in terms of biodiversity and ecosystem service provision) of HNV farmland and forests (Task 1 & 3), using national scale indicators of HNV quality. This approach will build on experiences and guidance from existing quality assessment of forest areas (i.e. National Forest Inventory). We will model incentives for the maintenance and enhancement of HNV farmland and forest areas, not only for biodiversity, but also for associated ecosystem services (including carbon	€449,166.56	2019R425 **Final Report not available.**

		storage and water quality) (Task 4). This approach will facilitate the development of an integrated policy framework incorporating a range of innovative agri-environment climate measures and areas of biodiversity enhancement for forests and farmland (Task 4). The results of the project will be disseminated to key stakeholders (Task 5). The HNV_FarmForBio project will provide a methodology that will contribute to the baseline indicator for HNVFF for Ireland, under the Common Monitoring and Evaluation Framework. The outcomes of the project will inform policy, but also benefit broader sections of our society and economy. The project will answer questions in relation to the management of our HNV farming and forest areas, including understanding the existing state and establishing systems for monitoring change.		
Dr James Humphreys Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Waterford Institute of Technology National Institute of Ireland Galway	DAFM National Call 2019	**LoCAM-dairy- Lowering the carbon and ammonia footprints of pasture-based dairy production.** Since phasing out of the milk quota there has been a >50% increase in milk output from dairy farms with a concomitant increase in greenhouse gas (GHG) and ammonia emissions contrary to national emissions reduction targets. More dairy cattle (cows and replacements) mean more methane, from rumen fermentation, and more nitrous oxide (a very potent GHG) and ammonia emissions from their excreta. National Fertilizer N use has increased, increasing national nitrous oxide and ammonia emissions. There are possibilities for lowering emissions from dairy farms. The objective is to evaluate a Low Carbon & Ammonia (LoCAM) System of milk production. The LoCAM system uses a range of best available 'off the shelf' technologies to halve GHG and ammonia emissions while maintaining current levels of milk output per ha and profitability. This project will involve the assessment of productivity, profitability, nutrient losses to aquatic systems, GHG and ammonia emissions from the LoCAM System compared with standard practice (Control System) and national averages. Both systems consist of 24 dairy cows and replacements. Fertilizer N will not be applied to the LoCAM system and soil N supply will be primarily maintained by biologically fixed N (BFN) from pasture legumes, which has much lower GHG and ammonia emissions than applied fertilizer N, and by efficient	€599,820.14	2019R521 **Final Report not available.**

		recycling of slurry. Methane will be lowered by using high economic breeding index (EBI) cows with traits for high output of milk solids and low replacement rate. External inputs to the LoCAM system will be minimised. Ecosystem carbon dioxide emissions and changes in soil carbon will be measured and modelled. Emission factors for nitrous oxide, methane and ammonia from BFN and carbon dioxide and nitrous oxide from reseeding will be determined. The economic and environmental implications of the more widespread adoption of the LoCAM system will be evaluated.		
Dr. David Styles National University of Ireland Galway University Road Co. Galway **Lead Institution:** National University of Ireland Galway **Collaborating Institutions:** Teagasc	EPA CO-FUND 2018	**SeQUEsTER- Scenarios Quantifying land Use & Emissions Transitions towards Equilibrium with Removals.** The SeQUEsTER project combines expertise in bioeconomic modelling (Prof. Cathal O'Donohue, NUIG), GHG accounting and life cycle assessment (LCA) (Dr David Styles, NUIG) and transdisciplinary research (Dr Mary Ryan, Teagasc). We will apply a transdisciplinary approach to co-develop with relevant stakeholders potential pathways towards carbon neutrality by 2050 for Ireland's agriculture, forestry and other land use (AFOLU) sector. Through stakeholder workshops, close collaboration with GHG accounting experts, and exploration of system boundaries applied in GHG accounting, the project will provide a definition of "carbon neutrality" and produce a road map towards this "horizon target". Bioeconomic and land use models developed by Prof. O'Donoghue's research group will be adapted with algorithms for GHG accounting and ammonia emissions used for national inventory reporting, drawing on experience of recent marginal abatement cost curve work undertaken by Teagasc. These models will be expanded, taking an LCA approach to account for, inter alia, possible international carbon leakage and cross-sectoral GHG offsetting via trade in agricultural commodities (e.g. fertilisers and animal feeds) and substitution of fossil fuels with biomass from Ireland's AFOLU sector. The project will provide a uniquely comprehensive evidence base for stakeholders to guide the AFOLU sector towards a sustainable, carbon neutral future.	€174,466.93	2019EPA101 **Final Report not available.**

Dr. Sara Vero Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc **Collaborating Institutions:** University of Limerick	EPA CO-FUND 2018	**Roadrunner- Roadway Runoff and Nutrient-loss Reduction.** Achieving Water Framework Directive goals requires reduction in nutrient losses from point and diffuse sources, and mitigation of pathways delivering those nutrients to surface receptors. Farm roadways, which receive high concentrations of animal deposition and may have significant hydrological connectivity to receptors, have been little investigated relative to field areas with respect to their role in nutrient transport. Under the Nitrates Action Plan all direct runoff from farm roadways to watercourses and dry ditches will be prohibited by 2021. The goal of this project is to evaluate the extent, connectivity and nature of farm roadways and to quantify their role in nutrient transport. The project will devise and test mitigation strategies including best management practices and engineering solutions. Research will be conducted in study sites participating in the Teagasc Agricultural Catchments and Heavy Soils Programs, representing a range of soil drainage classes and land use intensities. The objectives of this project are to quantify phosphorus and nitrate loss from roadways, to devise a system of assessment for determining roadway quality and provide guidance for the mitigation of potential losses. This research will yield peer-reviewed publications, information for policy design and practical solutions for the farming community.	€174,995.00	2019EPA100 **Final Report not available.**
Dr Dominika Krol Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	2019 Trans National ERA-NET Call	**MilKey- Decision support system for sustainable and GHG optimized milk production in key European areas.** European dairy production systems (DPS) face many challenges across the three pillars (3P) of sustainability. European regions are highly diverse and complex, and region-specific concepts for DPS are required. Indeed Ireland has successfully developed a reputation for the production of low emissions, sustainable dairy produce under the banner of Origin Green (Bord Bia 2016). This reputation is acknowledged as vital to achieving FoodWise 2025 targets for increasing the value of the agri-food sector. Indeed, the FoodWise 2025 report states that expansion must be carried out whilst maintaining environmental sustainability and that environmental protection and economic competiveness will be considered as equal and complementary (DAFM 2015). However Ireland also has obligations to limit	€230,658.04	2019EN201 **Final Report not available.**

		GHG emissions under the EU regulation. MilKey develops a whole system concept for 3P sustainability of DPS targeted to key European regions including Ireland. GHG mitigation is a core aim accompanied by other environmental impacts, and analysis of economic and social factors. MilKey applies a multi-actor approach throughout the whole project. Finally, a platform for sustainable 3P concepts for DPS in key European regions and an online barn climate and emission control tool will be available. The MilKey platform will be a long-lasting multi-actor knowledge hub to increase understanding and knowledge of sustainable DPS and to intensify the dialogue between science, farmers, stakeholders and policy, also beyond the project lifetime. MilKey integrates a decision support system to assist making knowledgeable decisions on 3P sustainability.		
Dr Maria Hayes Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** Institute of Technology Sligo	2019 Trans National ERA-NET Call	**SEASOLUTIONS- Seaweeds and seaweed-ingredients to reduce enteric methane emissions from pasture-based sheep, cattle and dairy cows.** The Seasolutions project aims to develop novel, science-based and implementable approaches to reduce enteric emissions from sheep, beef and dairy cows. Seaweed preservation and characterisation, in vitro simulated rumen studies and animal scientific experiments make up the backbone of the project. These experiments will produce the data to: - Process description with regard to the effect of seaweeds on enteric methane emissions - the assessment of management options with respect to enteric methane emission control A fundamental understanding of the microbiome, its relationship with its host animal, micro-organisms and methanogens is essential to ensure feed efficiency, economic production of livestock and reduction of methane emissions. To date, some chemical compounds and seaweeds (3 Nitrooxypropanol (3 NOP), Asparagopsis taxiformis and Asparagopsis armata) have shown methane inhibitory effects in the laboratory and in limited animal studies. Laboratory experiments have shown methane reductions of up to 99%. However, 3NOP and Asparagopsis sp. are not commercially viable due to (1) Limited supply of seaweed/seaweed bioactives and (2) animal health and food safety issues (potential carcinogen)and environmental concerns (negative effects on the ozone layer); (3) prohibitive costs and (4) limited	€300,843.90	2019EN207 **Final Report not available.**

		aquaculture of Asparagopsis seaweeds. SEASOLUTIONS proposes to comprehensively screen and test the efficacy of natural and native, abundant seaweeds that reach the requirements of long-term efficacy without negative effects. SEASOLUTIONS will provide answers to the following practical issues regarding the development of seaweed feeds for methane emissions reduction including the following research gaps: (1) Nutrition, (2) Delivery - SEASOLUTIONS will answer issues concerning delivery of supplements/additives to pasture-fed animals (3) Developing a convincing economic model (4) Assessing the safety of developed ingredients in animals (sheep, cattle and cows) and any sensory implications on final food end-products (meat, milk).		
Dr Donal O'Brien Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork	2019 Trans National ERA-NET Call	**MELS- Mitigation of Emissions from Livestock Agriculture.** For the EU, manure management and soils represent the majority of emissions from the agriculture and food sectors. Modifying excretal carbon (C) and nitrogen flows through manure management systems and soils is especially key to reducing GHGs from livestock agriculture. This project will focus on gathering knowledge about mitigation measures that are currently available or technically well-advanced and developing methods to implement and document their use at the farm and national scales. Specific objectives are to (1) improve the inventory methodologies to estimate the direct and indirect GHGs from livestock production systems, with a particular emphasis on manure management and grassland management; (2) assist inventory compilers to estimate and document the impact of mitigation measures on the emissions reported within national inventories; (3) provide simplified methods for accounting for C sequestration in soils; (4) assess the suitability and applicability of a range of farm-scale decision support systems (DSSs) for policy-relevant purposes; (5) provide improved algorithms and emission factors for use in farm-scale GHG DSSs; (6) improve methods to assess the cost and savings associated with mitigation measures at the farm and national scales.	€201,358.20	2019EN211 **Final Report not available.**

Dr Fiona McGovern Teagasc Athenry Co. Galway **Lead Institution:** Teagasc **Collaborating Institutions:** Irish Cattle Breeding Federation	2019 Trans National ERA-NET Call	**GrassToGas- Strategies to mitigate GHG emissions from pasture-based sheep systems.** There are 1.1bn sheep in the world producing around 137.8M tonnes of CO2eq (or 6.56M tonnes of CH4) per annum. Therefore, global emissions of GHG (CO2eq) due to enteric fermentation of sheep accounts for 2.6% of total agricultural emissions (FAOSTAT 2016). A long term strategy to make cumulative reductions in GHG emissions is to breed more feed-efficient animals which theoretically could reduce emissions of between 1-3% per annum, (or between 1.38M and 4.1M Tonnes reduction in CO2eq per annum). The international sheep breeding community is at different stages of development in the creation of resource populations to generate feed intake and methane emission measurements for sheep. There is a dearth of published information in this area and to date, no country has yet included GHG reduction as a breeding goal for small ruminants. Therefore the aim of this proposal to encompass research from international research groups looking specifically at GHG emissions from sheep production enterprises and the impact of genetic selection on the environmental footprint of sheep systems worldwide.	€286,518.20	2019EN202 **Final Report not available.**
Food				
Dr Mark Fenelon Teagasc mark.fenelon@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Cork, Queens University Belfast, National University of	DAFM National Call 2019	**U-PROTEIN** (**U**nlocking **P**rotein **R**esource **O**pportunities **T**o **E**volve **I**reland's Nutrition) is focused on the sustainable development and exploitation of existing and novel protein resources within the Irish agro-ecological system. The potential of crop (grassland, cereals, legume, oilseed and niche crops) and marine resources will be examined as alternative protein sources, with post-processing biomass used to generate value added food and non-food streams, delivering circularity throughout the production system. U-PROTEIN's ambition is to build a new food enterprise that can co-exist with Dairy, Meat and Cereal sectors. It will leverage established nutritional and technological expertise to study alternative protein sources, selected on the basis of environmental, social and economic sustainability within the supply chain. It will generate protein resource opportunities for Ireland, to create a diverse	€2,986,591.90	2019PROG702 **Final Report not available.**

Ireland Maynooth, National University of Ireland, Galway, University of Limerick		agri-ecosystem with a lower carbon footprint, which in turn will accelerate Ireland's path to becoming a global leader in the responsible supply of nutritious food solutions.		
Dr Eimear Gallagher Teagasc Ashtown Dublin 15 **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork Cork Institute of Technology	DAFM National Call 2019	**InFoTech- Innovative food processing and new technological solutions for the design of novel healthy products for the prepared consumer foods sector.** As we live in an obesogenic world, foods that generate satiety sensations have benefits for weight management and improved health. InFoTech aims to develop food and beverage formulations with increased satiety modulation for the prepared consumer foods sector, which also have extended shelf-life for exporting to far-reaching international markets. The structure, texture and sensory acceptability of the re-designed products will be fully characterised. Concurrently, microbial safety and in-vitro screening for satiety will be undertaken. Through innovative processing and analytical technologies, this project will build new scientific capability and transferable technologies to the food industry. The combined expertise of the project team will generate a project which goes beyond the current state of the art. This project will strengthen the existing knowledge base in food processing by directly addressing current industry needs and economic risks, which include Brexit, environmental sustainability and consumer health.	€968,038.40	2019R495 **Final Report not available.**

Dr Kaye Burgess Teagasc Ashtown Dublin 15 **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Technological University Dublin	DAFM National Call 2019	**HortAssure- Quantifying, understanding and mitigating microbial and chemical food safety risks in horticulture.** HortAssure aims to support the horticulture industry in mitigating risks associated with microbiological and chemical contamination in horticultural food crops, through provision of evidence based knowledge regarding sources of contamination and assessment of validated technologies and alternatives to mitigate the identified risks in a sustainable and affordable manner. HortAssure will define where critical issues arise for both microbial and chemical contaminants in horticultural crop production. It will tackle the parallel challenge of reducing chlorine usage, whilst ensuring product quality and safety, through assessing the efficacy of alternative biocidal agents, technologies and packaging alternatives which can be incorporated into current production systems. This will support the development of risk exposure models for chlorates and specific microbial contaminants in target crops. Ultimately, HortAssure will support the horticulture industry in meeting their obligation to produce safe food and enable them to take advantage of market opportunities for expansion, underpinned by increased food safety assurance.	€995,412.05	2019R424 **Final Report not available.**
Dr Joe Kerry University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2019	**PECTIPACK- Eco-friendly compostable pectin based packaging material derived from waste sources of fruit pulp and its validation in bread packaging.** Addressing packaging waste has become one of the most pressing environmental issues facing us globally today. Attempts to reduce, reuse and recycle packaging materials have not had the desired effect in controlling packaging wastes. Therefore, there is an urgent requirement to develop, novel, rapidly-compostable, eco-friendly packaging that is sustainable, but initially, fit-for-purpose for food packaging applications. Fruit processors in Ireland generate by-product wastes as fruit pulp and is usually discarded. A more sustainable use of such material would be to manufacture simple food packaging materials, suitable for fresh bread packaging, which could be subsequently composted for use as plant fertilizers. The Circular- and Bio-Economies have become key strategies for European economic growth, targeting reduction of CO2 emissions, utilizing sustainability conceptions of reusing materials and reducing	€591,557.60	2019R428 **Final Report not available.**

		wastes by utilizing them for new product manufacture. This project addresses these strategies by converting fruit pulp, to biodegradable packaging, to natural plant fertilizers.		
Dr Elaine O'Meara University of Limerick Plassey Park Road Co. Limerick **Lead Institution:** University of Limerick **Collaborating Institutions:** Teagasc	DAFM National Call 2019	**DAIRYCLENZ- Development of novel sustainable enzyme-based cleaning-in-place regimes for cheese production.** In response to circumstances including increased milk production, changing markets and Brexit, the Irish cheese industry is undergoing significant expansion. Cleaning practices adhere to high quality standards, ensuring safe, flavoursome and nutritious cheeses. However current international cleaning practices are resource-hungry, involving harsh chemicals and large quantities of heated water which challenge sustainability goals. This project will assess the cleaning and sanitation potential in cheese production of commercial biodegradable enzyme-based cleaning agents using lab-, pilot- and industrial-scale characterisation. The project will validate that new cleaning practices will not compromise the flavour, ripening or consistency of a range of cheeses. The outputs will focus on providing documented codes of practice on the minimum enzyme requirements for efficient cleaning of cheese processing facilities to provide an alternative sustainable avenue for cleaning thus assisting the dairy industry in achieving targets set for reduction of carbon footprint and water usage, and improving sustainability.	€577,476.11	2019R475 **Final Report not available.**
Dr Declan Bolton Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** Technological University Dublin University College Cork	DAFM National Call 2019	**Safe Foods- Shelf-life and safety of fermented and smoked foods.** Shelf-life and safety of fermented and smoked foods Researchers at Teagasc Food Research Centre (Ashtown), University College Dublin and Technological University Dublin will study the growth of pathogenic and spoilage bacteria under different conditions. The data generated will be used to develop models to predict the safety and shelf-life of a range of fermented and smoked foods including pepperoni, salami, sauerkraut, kefir and smoked salmon. The target bacteria include Listeria monocytogenes, Shiga toxin-producing Escherichia coli, Clostridium botulinum, Staphylococcus aureus and heat resistant coliforms. In addition to assuring the safety and providing accurate shelf-life determination, research on virulence gene expression, physiochemical and sensory attributes and packaging will provide the scientific basis for safety and shelf-life	€789,994.60	2019R452 **Final Report not available.**

		optimisation. This work will be undertaken in full consultation with relevant stakeholders using commercial recipes and processes. Full training on predictive software application will be provided.		
Dr Janette Walton Cork Institute of Technology Bishopstown Co. Cork **Lead Institution:** Cork Institute of Technology **Collaborating Institutions:** University College Cork University College Dublin Technological University Dublin	DAFM National Call 2019	**NANS II- National Adult Nutrition Survey II.** Data will be collected on intake and composition of foods, body weight, lifestyle, food choice, and blood and urine. The data will be analysed to assess compliance of food and nutrient intakes with dietary recommendations, status for key micronutrients, prevalence of overweight and obesity, compliance with physical activity guidelines, and factors affecting food choice and eating behaviour. The overall objective of the study is to establish a nationally representative database on food consumption, lifestyle and health status of adults in Ireland to complement similar recent data on children and teenagers. The database will be an important resource for government agencies concerned with developing healthy eating guidelines and obesity prevention and with food safety risk assessment. It will also be used to underpin new product development and product reformulation in the Irish food industry.	€1,241,131.40	2019R445 **Final Report not available.**

Dr Anne Maria Mullen Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2019	**NovelHaemPack- A novel method to produce haemoglobin based films for food packaging applications.** Using a renewable and biodegradable material, blood proteins, we will focus on the development of innovative bio-materials. Blood is high-volume, high-polluting and underutilised and yet contains, among other components, valuable functional proteins. Teagasc researchers have developed a patentable method to create bioplastics using the lower value blood proteins as raw materials, showing potential as a replacement for petroleum-based plastics. The first objective is to more fully characterise the traits of relevance for downstream use in packaging applications i.e. mechanical and barrier properties, active ingredient carrying properties and biodegradability. Secondly we will examine different fabrication steps to enable continuous production of the film. A third objective will see successful film(s) applied to meat products and tested in real food scenarios. The final objective revolves around communication and dissemination of the outputs.	€99,342.50	2019RP309 **Final Report not available.**
Dr Andre Brodkorb Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2019	**FoodEnCaps- A simple method of encapsulation for food**. Encapsulation is a technology to protect a substance or organism from processing, storage and gastric transit and to control the release at the target site intact. Teagasc researchers have recently developed a simple method for the encapsulation of bioactive compounds for food. This low-tech method, based on health-promoting polymers has potential applications for a range of dairy and non-dairy-based products. This project will address some of the short-comings for a successful technology transfer, namely: (i) Formulation - optimisation of the encapsulation matrix in terms of cost and functionality; (ii) Process optimisation - the methods needs to be adapted for different applications while keeping the ease and robustness of the process; (iii) Applications - prototypes of encapsulated bioactive will be produced and evaluated. It is the ambition of the project team to fully transfer the developed technology to an Irish company while protecting the intellectual property rights.	€99,850.72	2019RP312 **Final Report not available.**

Dr Norah O'Shea Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2019	**VisioBot- Validation of a Combined Vision and Robot Test Platform for Commercialisation.** This proposal builds on results from the "SMART Dairy ingredients" project that investigated the behaviour of infant formula (IF) after the application of different thermal evaporative and drying processes, for optimisation of powder functionality. From this work a robotic platform was developed for repeatable reconstitution of IF powders. To meet the end-customers expectations, IF powder must return to a liquid form that resembles milk. The aim of this proposal is to further develop and validate a robotic test platform which consists of a dual arm robot with integrated vision. A streamlined automated method using vision analysis tools will be developed to evaluate the reconstitution properties of IF; in particular the method will be designed to be sensitive enough to detect and diagnose the presence of white damaged powder particles. This proposal will give IF manufacturers the methodologies required to ensure IF exported from Ireland is of the highest reconstitution quality.	€80,177.44	2019RP316 **Final Report not available.**
Dr Richie Hackett Teagasc Oakpark Co. Carlow **Lead Institution:** Teagasc **Collaborating Institutions:** Institute of Technology Carlow Technological University Dublin	DAFM National Call 2019	**DABBING CAP- Distilling And Brewing – BuildING CAPacity.** Substantial amounts of imported grain are used by the Irish drinks industry, particularly maize for whiskey production. Substituting imported maize with Irish wheat would provide an additional market for growers but could cause processing problems within the distilleries. In addition, many of the waste streams from the industry are used in relatively low value end uses such as animal feed. The project aims to develop the knowledge to produce and effectively utilise natively grown cereals, principally wheat but also rye and spelt, in Irish whiskey distilleries. The raw material requirements (grain and water) of the drinks industry and the waste streams and their potential for use in higher value end products will also be investigated. The results of the project will underpin greater utilisation of natively produced grain in the Irish drinks sector as well as identifying higher value end uses for the waste streams from the sector.	€856,745.92	2019R563 **Final Report not available.**

Dr Nigel Brunton University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2019	**BPA-RISK-IRE- Assessment of the risk and route of contamination of Bisphenol A (BPA) in Irish origin meat and meat products.** Assessment of the risk and route of contamination of Bisphenol A (BPA) in Irish origin meat and meat products The project aims to address the challenge posed by the potential contamination of Irish produced meat products by the toxicant Bisphenol A (BPA) an additive used in the making of plastics and food cans. Recent studies have indicated that levels of BPA were present in some the French produced meat products at levels that could be harmful to consumers. This project will investigate the occurrence of BPA in Irish produced meat products. In addition, at the present time the source of the BPA contamination is unknown the project will also investigate the route by which the contamination occurred. This project will generate information regarding the presence of BPA in the Irish food chain and in commodities destined for export and estimate levels of dietary exposure for Irish consumers. This information will then be used in consultation with industry stakeholders to recommend suitable strategies to minimise or eliminate BPA in meat.	€248,308.15	2019R457 **Final Report not available.**
Prof Richard Fitzgerald University of Limerick Castletroy Co Limerick **Lead Institution:** University of Limerick **Collaborating Institutions:** Ulster University	DAFM National Call 2019	**SarcoBlu- Blue whiting protein hydrolysates for management of sarcopenia.** This project focuses on the development of blue whiting protein digestion products (hydrolysates) for application in the management of sarcopenia. Consumption of high quality protein/protein hydrolysates has the potential to reduce the extent of sarcopenia, a condition linked with the loss of muscle mass and strength in the elderly. The specific objectives of this project are: to generate and fully characterise blue whiting protein hydrolysates, to determine the potential of specific hydrolysates to promote cell regeneration and protein synthesis in muscle cells, and to perform a human trial to assess the ability the protein hydrolysates to beneficially alter parameters associated with the risk of developing sarcopenia. In developing scientific evidence of the ability of hydrolysates to protect against the development of sarcopenia, the project will impact public health by improving the quality of life for elderly populations resulting in reduced healthcare costs while adding value to the marine processing sector.	€322,106.16*	2019R617 **Final Report not available.**

Dr Sinead McCarthy Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin University College Cork Queen's University Belfast	DAFM National Call 2019	**SuHeGuide- Food based dietary guidelines for sustainable and healthy lifestyles.** Substantial consumer behaviour changes are required to reduce the environmental impact of feeding the growing global population. SuHeGuide will undertake a range of consumer studies from food consumption to sustainable behaviours in the context of sustainable and healthy food lives. In a first-of-its-kind dietary intervention study, we will test the hypothesis that a sustainable diet, which is acceptable to consumers, can reduce greenhouse gas emissions, while simultaneously achieving nutritional requirements, thereby providing an effective solution to the sustainability and food challenge. SuHeGuide will develop food-based dietary guidelines for healthy and sustainable lifestyles that are acceptable to consumers and meet nutritional requirements, while simultaneously, reducing food related GHG emissions and respectful of biodiversity. These outputs	€961,235.25	2019R546 **Final Report not available.**
Dr Bernadette O'Brien Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Cork Institute of Technology	DAFM National Call 2019	**ChlorateMitigation- Investigation of chlorates in foods: using the dairy industry as a transferrable knowledge model.** EU regulation and customer specification requires the dairy sector to critically manage chlorate residues in milk and dairy products. Chlorine based detergents represent common approaches used to disinfect water and assist in cleaning milk contact equipment on-farm and in food processing plants. This project seeks to develop mitigation strategies for the primary 'at risk' dairy sector to control chlorate through the milk production and processing pipeline. This will be achieved through (i) establishing baseline chlorate levels in Irish milk and dairy foods; (ii) investigating alternative non-chlorine cleaning protocols for effectiveness, in terms of microbiological quality; (iii) examining the impact of water chlorination under Irish conditions on chlorate levels in water. In impact terms, this project will enable assurances of regulatory standards to be achieved and surpassed, thus allowing Irish dairy foods to be recognised internationally as achieving gold standard status in terms of absence of contamination from chlorate residues.	€592,377.14	2019R555 **Final Report not available.**

Dr Aoife Boyd National University of Ireland Galway University Road Co. Galway **Lead Institution:** National University of Ireland Galway **Collaborating Institutions:** National University of Ireland Maynooth	DAFM National Call 2019	**ToxVib- Genomics to Investigate Risks of Toxin-Producing Vibrio in Irish Shellfish.** The marine bacteria Vibrio cause gastroenteritis after consumption of infected shellfish. Due to climate change and warmer marine waters, these bacteria have now extended into Europe, leading the EU to classify Vibrio as emerging pathogens posing a serious threat to human health. Dr Aoife Boyd (NUIG) and Dr Fiona Walsh (MU) will investigate potential risks to shellfish aquaculture and human health in Ireland from pathogenic Vibrio. We will assess environmental effects on presence of toxigenic Vibrio in oysters and mussels. Genomic analysis will identify disease-causing genes of Irish Vibrios. Genes for TTX, a potentially fatal neurotoxin recently discovered in European shellfish, will be targeted for developing novel DNA detection methods. This project will help sustain and grow Irish shellfish production, by assessing current and forthcoming risks of pathogenic Vibrio. This knowledge will minimise contaminated shellfish reaching the market and table, reduce cases of seafood-borne gastroenteritis and increase human wellbeing.	€196,560.00	2019R531 **Final Report not available.**
Forest				
Prof Mick Morris Trinity College Dublin morrism2@tcd.ie **Lead Institute:** Trinity College Dublin **Collaborating Institutions:** University College Dublin, National University of Ireland, Galway, University College Cork, University of Limerick	DAFM National Call 2019	**NXTGENWOOD** The Irish forestry/wood sector is a key contributor to Ireland's economy and a critical component of our climate strategy. There is considerable opportunity to improve its economic benefit by developing high value products such as polymers, chemicals and nutrients from forestry and, in particular, waste forestry materials. This could transform the industry, boost the rural economy and deliver a green vision for new technologies in Ireland but requires significant R&D. There has been a low level of research in relevant areas in Ireland and this proposal centres on development of a research ecosystem that will: 1) launch higher value wood and wood-derived products into the market; 2) generate innovation and unique wood materials/biochemicals that can be exploited; 3) develop a highly trained work force that can enter the Irish workforce and foster the uptake of those emerging technologies and 4) sponsor development of science to help fulfil Ireland's sustainability targets.	€2,989,001.00	2019PROG704 **Final Report not available.**

Dr Simone Ciuti University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2019	**SMARTDEER- A smart and open-science approach to monitor and analyse deer populations in the Republic of Ireland and set the scene for evidence-based deer management.** Deer populations have reached extreme levels in many parts of the Republic of Ireland (RoI), resulting in serious financial and environmental damage to forests, agriculture, welfare and road safety. Neither the precise distribution nor the population density of the four deer species is currently known. This lack of knowledge makes the country unready to face upcoming challenges with deer management, namely costly human-wildlife conflicts and climate change. For a deer management policy to be effective, we propose three actions needed to implement a nationally-coordinated strategy. (i) We aim to collate the deer data collected by stakeholders over the last 25 years. This includes national deer culling data, which are key to study long-term population trends. Furthermore, we need to interact with stakeholders and congregate finer spatial resolution datasets unexploited so far, e.g. systematic deer observations by hunters, forest damage data, and deer-car collisions. The involvement of stakeholders will be maximised through the organization of workshops. The data will be aggregated into an open-access library, creating an evidence base that would drive deer management decisions. (ii) We aim to model subsets of the deer spatial data gathered in the open-access library using recent advances in species distribution and habitat modelling. We will disentangle the biotic and abiotic drivers of deer population dynamics and distribution. This will produce the most up-to-date distribution maps of deer species in the RoI, including the identification of the hotspots of human-deer conflicts to prevent forest damage, traffic collisions, interaction with livestock. (iii) We aim to develop and test a smartphone application for hunters to report the number of deer observed while hunting, a cost-effective means to collect systematic deer observations to significantly improve deer monitoring in the RoI. New evidence-based guidelines for the management of deer will be released at the end of this project.	€244,800.00	2019R417 **Final Report not available.**
Dr David Meredith Teagasc Ashown	DAFM National Call	**RENEW2050- Rural Generational Renewal 2050.** What future drivers of change and challenges will matter most to renewing rural jobs, agriculture and forestry in the	€346,616.73	2019R414

Dublin 15 **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork	2019	period to 2050; what are the implications of these drivers for the attractiveness of farming/forestry, generational renewal and, ultimately, rural jobs; how, in the context of these developments, can new generations be invigorated to participate in farming and forestry; what policy initiatives are required to support new generations, develop human capital and deliver the skills needed to ensure the continued sustainable development of the sector in the period to 2050? These are some of the questions that guide Rural Generational Renewal 2050 (RENEW2050). RENEW2050 brings together a multi-actor consortium of researchers, farm extension professionals, rural policy stakeholders and practice partners with significant knowledge and experience of agricultural and rural development policy. The project draws on the team's knowledge, skills and experience to develop a trans-disciplinary research network that will undertake research, design and implement foresight processes and engage is participatory policy evaluation and design initiatives. RENEW2050 applies a mixed methods research approach to develop detailed understanding of the key challenges and applies this knowledge to inform the foresight process. Trans-disciplinary foresights will be undertaken in three regions, ensuring that geographic differences in challenges and opportunities are reflected in the development of foresight scenarios. These scenarios will provide a means of assessing the performance of current policy or public and private strategies which impact farming and forestry attractiveness and identify potential new policy options and their likely impacts. The study will identify skills challenges associated with the visions of the future and current and potential new methods to address associated human and social capital needs. The research findings will be translated into a policy tool kit for, particularly, policy stakeholders to use in implementing actions renewing rural jobs, agriculture and forestry.		**Final Report not available.**
Dr John O'Sullivan University College Dublin Bellfield Co. Dublin	DAFM National Call 2019	**HydroSed- Hydrological and sediment impacts of forestry operations in Ireland.** Forestry remains a significant pressure in many watercourses at risk of not meeting their WFD status with sediment release being a recognised stressor in this regard. The recognition of these pressures highlights issues with the adequacy and/or implementation of good management forestry practices. This project assesses flow	€597,505.00	2019R447 **Final Report not**

Lead Institution: University College Dublin **Collaborating Institutions:** Cork Institute of Technology		changes and sediment releases from different forestry operations (afforestation, harvesting, windrowing and reforestation) and the efficacy and performance of commonly adopted sediment mitigation measures. Seven forestry sites with adjacent or nearby lotic waterbodies covering three major soil types (peats, peaty mineral soils and mineral soils) have been identified for study. The study sites have been specifically chosen to reflect the significant role of private forest operators in meeting our national target of 18% forestry land cover by 2046 and where mineral soils as opposed to traditional peats (often in upland catchment fractions) are expected to increasingly underpin the establishment of new forests. Study sites will be extensively instrumented and continuously monitored over a three-year period for rainfall, river discharge and sediment input from the forest block using a 'paired-catchment' approach that will facilitate the direct assessment of changes in hydrology and sediment input from forestry activities, with potential influences from any confounding factors being kept to a minimum. Direct measurement of flow and sediment inputs at study sites will be complimented by measures and fingerprinting of deposited sediment in channel bed substrates and the impact of changes and inputs will be related to changed biological status downstream of forest sites. In adding value to the measured datasets, the project will also explore the development and parameterising of hydrological models for the study sites and the integration of LiDAR surveys and hyperspectral imaging as a possible means of assessing changes to forestry drainage networks and the longer-term performance of sediment control measures.		**available.**
Dr Annette Harte National University of Ireland Galway. University Road Co. Galway **Lead Institution:**	DAFM National Call 2019	**MODCONS- Modular mass timber building for the circular economy.** The supply of raw material from Irish forests is predicted to double in the period 2017-2035. In parallel with this, the Government predicts that the population of Ireland will grow by 1 million by 2040 requiring 550,000 new homes to be provided. In addition, supporting infrastructure, such as schools, hospitals, retail outlets and industrial buildings, will be required. This presents both a challenge and an opportunity. The challenge is to develop infrastructure in a sustainable way accounting for the whole	€592,067.30	2019R471 **Final Report not available.**

National University of Ireland Galway **Collaborating Institutions:** Cork Institute of Technology		life cycle of the buildings, while an opportunity exists to grow the circular bio-economy by utilising the increased supply of timber in Ireland to satisfy this demand and creating sustainable employment particularly in rural areas. This project will design, develop and test a sustainable modular timber building solution to support national needs while also creating export opportunities in the sector. The proposed modular building solution will maximise the use of Irish timber in cross-laminated panels for walls and floors and will be optimised for structural integrity, fire, acoustics and vibration. Underlying all aspects of the design is ensuring the modules are optimised for future deconstruction and reuse. To achieve this, high-performance connection systems using thermally compressed Irish Sitka spruce will be developed as part of the project, which will significantly reduce adhesive use in the modules. The prefabricated units will be precision-manufactured offsite and will be capable of acting as standalone single- or multi-storey structures, or as extensions to existing buildings to form a larger footprint or additional storeys. Leading-edge researchers at NUI Galway and Cork IT together with five industry partners bring significant experience in timber product design, development and testing, and design and delivery of modular buildings. Unique state-of-the-art testing facilities at NUI Galway and Cork IT will be used in the delivery of the project.		
Dr Niall Farrelly Teagasc Athenry Co. Galway **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Natioanl University of Ireland Maynooth	DAFM National Call 2019	**FITFORESTS- Response of tree species to climate change.** The decisions regarding the selection of suitable planting material to establish new forests will play a key role influencing the response and resilience of Irish Forests to future climate change. This research will focus on key species in Irish Forestry to provide up to date information on the best provenances and seed origins adapted for future Irish climatic conditions. The proposals aims to provide critical information to assess the performance and adaptation of key forest tree species to climate change by performing the following key tasks :1-Collecting and analysing data from historical provenance trials to assess the adaptability of various seed origins to environmental change, 2-conduct new experiments to assess the impact of climate parameters on the phenology and physiology of key species of importance to Irish forestry, 3-assess variability in timing	€641,064.23	2019R511 **Final Report not available.**

Agri-Food and Biosciences Institute		bud burst and flowering for key broadleaves tree species, 4-determine if species from biogeographic regions show tolerance to drought events and 5-assess the impact of extreme climatic events on the phenology of known tree species. Running concurrently to these tasks a state of the art climate modelling framework will perform biogeoclimatic envelope modelling, utilise information from tasks to assess the likely impact of rising temperatures, changes in precipitation and the risk of extreme events to inform the predicted response of various key species to various climate change scenarios. To inform our predictions about the likely response of tree species to changing climates and to ensure completeness in species information we aim to utilize information from UK and European species and provenance trials. Finally we aim to assess whether the current range of planted material for Sitka spruce, Douglas fir, birch and alder are suitably adapted for current and warmer climates by incorporation of qualified and tested material into new trials in Ireland and France.		
Miss Hazel Williams Waterford Institute of Technology Cork Road Co. Waterford **Lead Institution:** Waterford Institute of Technology **Collaborating Institutions:** Teagasc	DAFM National Call 2019	**AgriDISCRETE- Digitalisation in agriculture and forestry through data security.** Digitalisation in agriculture and forestry through data security (AgriDISCRETE) will address multifaceted challenges related to data use, data security, data sharing and data ownership in the application of digital technologies in agricultural and forestry sectors in Ireland. Bringing together an interdisciplinary research team comprised of data scientists, business scholars, and social/behavioural scientists, the AgriDISCRETE project ensures a holistic approach to considering both the technical and the socio-economic and ethical challenges introduced by data usage and sharing in agriculture and forestry. Five integrated tasks will facilitate the research team to map current technological challenges, identify diverse stakeholder concerns, and develop societally-acceptable technological solutions and social responses. The project will develop practical strategies, tools and solutions that can be used by policy-makers, researchers and innovators to ensure good data governance and responsible data sharing. Embedding a multi-actor approach,AgriDISCRETE aims to inform good data governance practices within Irish agriculture and forestry so that the benefits of	€347,996.46	2019R539 **Final Report not available.**

		digitalisation for agriculture and forestry in Ireland can be realised in a trajectory which is responsible and societally acceptable.		
Prof Maarten Nieuwenhuis University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2019	**DynaMod- Improvements to the dynamic yield models and to Growfor.** The dynamic yield models for Irish forestry have become the standard tool for forest management planning. However, due to developments in the forest estate, with afforestation of better land by private landowners now dominating, the dynamic models, especially for conifers such as Sitka spruce, have been found to inadequately cover the full range of yield classes now experienced in forest management decision making. Therefore, it is necessary to explore ways to improve the models, especially for high and very high yield class stands. It is proposed to carry out an exploration for suitable data first, to assess the quantity and quality of available data that consist of pairs of plot measurements at two points in time in high yield class stands. In addition, the possibility of collecting new data, where plot data from one point in time is available and the second measurement can be carried out at the same location, will be explored. Based on the assessment of these available data, it will then be decided if the development of new yield models that include these new data is warranted, and if so, new models will be parameterised. In addition, the project will develop a web-based application of the Growfor system, which is the user interface for the full set of dynamic models.	€211,852.80	2019R560 **Final Report not available.**
Prof Trevor Hodkinson Trinity College Dublin College Green Dublin 2. **Lead Institution:** Trinity College Dublin **Collaborating Institutions:** University College Dublin	DAFM National Call 2019	**NEXCELSIOR- Next steps in managing the impact of ash dieback.** Ash trees have considerable economic, cultural and environmental value on the island of Ireland for forestry and ecosystem service provision. Given the rapid spread of ash dieback disease on the island since its first finding in 2012, and the extensive and severe damage caused by the pathogen in mainland Europe, research is needed to inform the governments (north and south) and industry on ways to minimise the impact of this fungal pathogen. The pathogen is now past the point of eradication, being present in all 32 counties. This spread of the disease has been reflected in the recent change of policy in Ireland and Northern Ireland to one of management rather than eradication. NEXCELSIOR will therefore devise strategies for managing ash forests	€132,600.00	2019R578 **Final Report not available.**

Agri-Food and Biosciences Institute		(infected and at-risk) under Irish conditions. Key knowledge gaps exist in our understanding of alternative management strategies and their effect on (i) wood quality degradation, (ii) impact of other pathogens with ash dieback infected trees, and (iii) pathogen spread in relation to management regime and microclimate. Our group including Trinity College Dublin, University of Dublin and AFBI Northern Ireland recognise that an all-Ireland approach is required to address its management. We will use state-of-the-art acoustic velocity testing of wood strength and degradation, molecular DNA identification of associated pathogens, and field experiments testing differing silvicultural practices aimed at limiting the impact and spread of the disease. We will couple these with literature reviews and horizon scanning to further guide management and predict future impacts of new pathogens. The overall aim of NEXCELSIOR is to develop evidence-based guidance for foresters to minimise the impact of the disease and to maximise the recovery of timber or other products/services and preserve ash as a component in Irish forests. Involvement of stakeholders from industry, government and NGOs will contribute to developing this guidance.		
Dr Colin Kelleher National Botanic Gardens Glasnevin Co. Dublin **Lead Institution:** National Botanic Gardens **Collaborating Institutions:** Dublin City University	DAFM National Call 2019	**GENENET- Reviewing and updating the network of gene conservation units for target native forest species in Ireland.** Forest Genetic Resources (FGR) are the basis on which the health of our future forests depend as FGR are the ingredients of adaptation. Genetic diversity enables tree populations to adapt to conditions and optimise their performance to succeed. A greater level of genetic diversity is a buffer against biotic or abiotic change, while a lack of diversity increases the vulnerability of a population or species to changing conditions and pathogens. International best practice for FGR conservation involves establishing a network of populations as conservation units to be maintained in situ for dynamic conservation. The EUFGIS database, an initiative by European countries under the EUFORGEN programme, maps and maintains data on these conservation units throughout Europe. To date Ireland has 17 units listed on EUFGIS including populations of oak, birch, mountain ash, alder, ash, aspen and Scots pine. This project proposes to further characterise the	€249,378.15	2019R583 **Final Report not available.**

		17 sites and to add additional sites to the Irish network. Populations will be selected to be added to the network based on criteria such as geographical coverage and using climatic zonation as a proxy for adaptive potential. An estimate of approximately 84 additional sites will be added and characterised based on literature and GIS surveys. These will include 14 species considered of high, medium and low priority in terms of conservation. Ground-truthing and genetic characterisation will be carried out on the high and medium priority species (7 species). GIS surveys will include searches of existing forestry and woodland databases and remote assessment using aerial photography and satellite imagery. Genetic characterisation will involve assessing variation between populations and establishing phylogeographic patterns through comparison to other European data. All of the data generated will be built into a GIS that can be used by DAFM for future management and for uploading to the EUFGIS portal.		
Dr Ken Byrne University of Limerick Plassey park Road Co. Limerick **Lead Institution:** University of Limerick **Collaborating Institutions:** University College Dublin	DAFM National Call 2019	**MARLSITES- Forest growth and development on high pH soils and marl sites.** Forest tree roots have varying tolerance of carbonate or high pH in soil solution. Knowledge in Irish conditions is summarised by Horgan et al. (2003) and Huss et al. (2016). The indications are that all tree species may be limited by carbonates, with alder the most tolerant, though even alder can fail on high water tables. A simple soil field test, in use for over two centuries, the original "acid test", demonstrates the presence of carbonates by a fizz response to applied dilute hydrochloric acid. The test remains valid, and is used in screening lands for suitability for afforestation. However, although sites showing a positive acid test are rejected for grant approval, forest managers report cases of sites showing a positive test where successful plantations have developed. This project will investigate, review and evaluate forest establishment and management practices and protocols with a view to proposing improvements that would increase forest productivity and help ensure sustainability. Specifically, this work will investigate —Performance of a range of tree species on high pH sites, across the national estate, based on the National Forest Inventory and other surveys; —Investigate individual cases reported of successful establishment and	€247,839.26	2019R590 **Final Report not available.**

		growth where soil conditions show positive tests for carbonates; —Examine root-limiting layers using acid testing, and by measuring acid neutralising capacity, pH, and redox potential, supported by soil coring and X-ray CT scanning of roots in soil cores. The study will aim to inform policy and establishment practices on these sites.		
Prof Cathal ODonoghue National University of Ireland Galway University Road Co. Galway **Lead Institution:** National University of Ireland Galway **Collaborating Institutions:** Teagasc Athenry University College Dublin	DAFM National Call 2019	**ForRec- Modelling Opportunities for Forestry Recreation.** Forest benefits are now commonly understood through the ecosystem service framework and recreational visits to forests are considered an important cultural service. In the context of ambitious private afforestation targets, increasingly diverse ownership structures and the adoption of ecosystem service focused policies, it is necessary to adopt a holistic, participatory approach to identify the challenges and opportunities across the entire forest recreation Innovation System, in order to make recommendations in relation to how the potential for forest recreation ecosystem services can be capitalised. Aligned with this overall systems approach, a spatially explicit recreation demand model for Ireland is necessary to understand how visitation differs across the population, based on population characteristics and existing recreational resources. In order to achieve this, the project undertakes the piloting of protocols for annual estimation of annual forest visitation and the development of a demand map that highlights where forest expansion could be targeted to maximise the recreational value of afforestation. The development of this spatial and monitoring infrastructure also creates opportunities to quantify and maximise the economic value of associated (tourism) services, within the wider economy. An additional benefit of developing a spatially explicit demand map is the ability to target afforestation to enhance the value of locations for recreation.	€214,497.93	2019R600 **Final Report not available.**
Dr Annette Harte National University of Ireland Galway University Road Co. Galway	2018 Trans National ERA-NET Call	**InFutUReWood- Innovative Design for the Future - Use and Reuse of Wood (Building) Components.** Construction and demolition waste are a concern today because many components have a high resource value, providing both an environmental and an economic motive for recycling and re-use. Initiatives for sustainable use of natural resources, and for collection and recovery/reuse of materials from waste are the focus of EU and national regulations. Building in wood is	€294,552.16	18RDFOREST VALUE1 **Final Report not**

Lead Institution: National University of Ireland Galway **Collaborating Institutions:** University College Dublin		a priority in Europe as part of a strategy to convert from fossil-dependency to a sustainable, bio-based economy. While timber industries currently have very efficient processing operations, and modern methods of construction reduce waste, there is also a pressing need to recover timber components from a building at the end of life to meet future demand. There is a similar need to be more efficient about the use of the forest resource, bringing a wider range of virgin wood into the value chain. InFutUReWood seeks to develop a method for ensuring the future possibility of circulation of timber products with true consideration of the whole life-cycle, and practical industry issues at design, construction and deconstruction phases. Approaches to the primary design of buildings to facilitate deconstruction rather than demolition will be developed, while considering issues such as the use of chemical treatments, adhesives and other synthetic materials. In addition, grading methods for quality assessment of recovered wood, and similarly variable new wood from more diverse sources, will be developed in a way that is compatible and equivalent to grading of new timber from the main commercial species (including the basis in European standardization). Potential new construction products using recovered timber will be investigated. The Swedish mining city of Kiruna will be a test bed for the technologies developed. Business, economic, and environmental factors over the life-cycle will inform design decisions. Knowledge will be transferred to industry through professional development, industry bodies, codes and standards.		**available.**
Research projects funded by DAFM Call 2017				
Coordinator/Lead Institute + Collaborating Institutions funded	**National / TransNational**	**Project Title and Summary**	**Total DAFM Award** (* denotes project co-funded by DAERA	**Reference No. &Final Report**
Agriculture				

Dr. Conor McAloon University College Dublin Bellfield Co.Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** National University of Ireland Teagasc	DAFM National Call 2017	**SWAB- Surveillance Welfare and Biosecurity of farmed animals.** Surveillance Welfare and Biosecurity of farmed animals (SWAB) will address major current and emerging animal health and welfare problems in the Irish agricultural industry. The aim of the project is to improve the department's animal health surveillance system through enhanced stakeholder engagement; to understand consumer, farmer and veterinarian concepts of animal welfare and the decision-making process related to antimicrobial use. The project will also determine the effects of biosecurity practices on dairy, pig and poultry farms. The outcome of this study will include tools to aid decision making for farmers, veterinarians and policy makers that benefit the wider agri-food sector.	€772,048.85	17S230 **Final Report not available.**
Dr David Meredith Teagasc Ashtown Dublin 15 **Lead Institution:** Teagasc **Collaborating Institutions:** National Universit of Ireland Galway University College Dublin	DAFM National Call 2017	**beSafe- Behaviours for Safer Farming.** The health and safety of Irish farmers is a significant challenge for the future of Irish agriculture and, as a consequence, the Irish export economy. As fatality rates have fallen in other industries in the past 20 years, rates in agriculture have remained stubbornly high, indicating that the underlying causes are complex and deeply enmeshed in farming practices. The aim of this project is to develop a comprehensive understanding of the factors that influence farmer safety and to exploit this understanding to effect positive lasting change. The project will develop an Irish multidisciplinary research network, who will design and assess pilot interventions in the field. Farm safety research in Ireland requires a critical mass of researchers across disciplines in order to collect sustained comprehensive intelligence on the most important causal influences in the Irish context. In addition to generating numerous research papers, this project will introduce a number of new young talented researchers to farm safety from relevant disciplines, such as implementation science, and broaden the research base in Ireland to support the development of future interventions targeting behavioural change across a range of areas, i.e. not just farm safety. Behavioural solutions for farmer safety must be informed by farmers and relevant stakeholders. Teagasc Knowledge Transfer meetings will provide a means for farmers to input to the project and for the project	€595,270.95	17S269 **Final Report not available.**

		to transmit best practice and effect cultural change. Further intelligence and support will be provided by the Farm Safety Partnership, consisting of an array of stakeholders including farmers' associations, DAFM, the HSA and the main farming insurance company, FBD. The BeSafe project will interface with members of the EU COST action SACURIMA to generate international collaborations that will enable the participants to compete for international (e.g., Horizon 2020) and non-exchequer funding to support further advances in the health and safety of Irish farmers.		
Prof Donagh Berry Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Irish Cattle Breeders Federation Waterford Institute of Technology Cork Institute of Technology	DAFM National Call 2017	**GREENBREED- Sustainable ruminant breeding programs for low environment footprint.** The objective of GREENBREED is to develop, validate and deploy the necessary tools and optimal strategies to achieve sustainable and quantifiable genetic gain in environmental and economic efficiency in dairy, beef and sheep. The environmental traits considered are methane, ammonia, nitrous oxide and nitrates. The large project complements background data, knowledge, tools and resources (i.e., high-low selection experiments), with novel approaches for direct and indirect selection for environmental efficiency without compromising economic efficiency or societal concerns of genetically elite animals. GREENBREED specifically develops and validates bioeconomic systems models which, when parameterised with the large quantity of phenotypic, genetic and genomic data generated in the programme, can be used to quantify the consequences of the current five national breeding objectives. The impact of modifications to the breeding scheme either through more or lesser phenotypic data, high or lesser quality data (which impacts heritability and thus accuracy of genetic evaluations) as well as relative weights on the environmental traits will be quantified. Tangible benefits from the project include: 1) physical bioeconomic models with integrated farm and environmental modules specific to Irish dairy, beef and sheep sectors and importantly parameterised by high quality data, 2) an animal-specific environmental footprint breeding rank score to complement the currently available economic breeding ranks, 3) novel, implementable tools and strategies to directly measure/predict animal-level environmental load, 4) novel, easy to understand and easy to generate herd/flock-	€2,988,827.06	17S235 **Final Report not available.**

		and animal-level measures of lifetime environmental efficiency, 5) accurate genetic and genomic evaluations for traits relating to environmental load based on carefully designed data collection strategies, and 6) scientifically sound knowledge of the complete life-cycle impact of the Irish national breeding programs in dairy, beef and sheep on the environmental footprint of the entire sectors as well as the impact of alternative breeding schemes on environmental and economic efficiency.		
Dr. Denis Griffin Teagasc Oakpark Co. Carlow **Lead Institution:** Teagasc **Collaborating Institutions:** Dublin Institute of Technology - TU Dublin Limerick Institute of Technology University College Dublin	DAFM National Call 2017	**CREDIT- Cadium: Reduce, Evaluate, Detect, Inform with Technologies.** Cadmium and other heavy metals occur naturally in soils and can accumulate in plants. Maximum levels are established in legislation and while levels found in Irish produce do not present an unacceptable risk to the consumers it is necessary to continually strive to reduce levels in food. A fundamental understanding of the soil chemistry, and development of novel rapid detection methods are required to develop sustainable, effective solutions for farmers while adhering to good agricultural practice. This project "CREDIT" will harness a range of scientific, knowledge transfer, farming and policy & regulatory expertise to develop appropriate strategies to manage cadmium and heavy metals in crops. The various project outputs will support key stakeholders, including farmers, agronomists, the horticultural industry and policy makers & regulators to combat these issues and preserve Ireland's horticulture industry and reputation as a producer of quality food into the future.	€1,164,864.17	17S254 **Final Report not available.**
Prof. Tommy Boland University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2017	**SmartSward- Future Proofing Irish livestock sustainability.** Multispecies grasslands have the potential to outyield perennial ryegrass monocultures. However, little information is available regarding their production potential and appropriate management within grazing systems. The overarching objective of the SMARTSWARD project is to determine the potential role of multispecies grasslands within cattle, mixed livestock (cattle and sheep) and dairy systems. Multispecies swards containing grasses, legumes and forage herbs will be compared to perennial ryegrass monocultures and perennial ryegrass and white clover swards, in terms of their production potential and impacts on product (meat and milk) quantity and quality	€1,030,238.00	17S267 **Final Report not available.**

Agri-Food and Biosciences Institute Dublin Institute of Technology		and associated methane emissions. Key to this research is the identification of more sustainable animal production systems that will reduce reliance on fertiliser N inputs, while maintaining / increasing productivity (meat and milk), have benefits for animal health such as reduced worm burden and result in excellent quality produce (meat and milk) while reducing greenhouse gas emissions.		
Prof. Gary Lanigan Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc **Collaborating Institutions:** Trinity College Dublin University of Limerick	DAFM National Call 2017	**Agri-SOC- Evaluating Land-Use and Land Management Impacts on Soil organic Carbon in Irish Agricultural Systems.** Carbon (C) sequestration associated with pastures and improved grassland management could provide a mitigation option without impacting on agricultural production. In addition, improved soil carbon should lead to better nutrient cycling and soil nutrient availability. Management practices that can increase soil organic carbon (SOC) stocks to mitigate climate change will provide the basis for inclusion of grassland soils into both carbon trading schemes and life-cycle assessments (LCA's), which will assist the sector both in terms of carbon credits and a reduced carbon footprint on agricultural produce. This project seeks to quantify carbon sequestration within managed grasslands, to identify the upper limits of soil carbon storage and identifying the regulators within a pastoral system that control soil carbon capture. As such it will directly address the *4 per mille* initiative to enhance C stocks and improve soil quality in agricultural soils.	€598,051.83	17S238 **Final Report not available.**
Dr. Dara Stanley University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Trinity College Dublin Dublin City University National University of	DAFM National Call 2017	**PROTECTS- Protecting terrestrial ecosystems through sustainable pesticide use.** Pesticide use is an important component of modern farming. Through Food Wise 2025 there is a vision to ensure farming is economically, socially and environmentally sustainable, and sustainable pesticide use forms an integral part of this vision. However, concerns exist regarding impacts of pesticides on non-target organisms and the ecosystem services they provide. The PROTECTS (Protecting Ecosystem Services Through Sustainable Pesticide Use) project will provide baseline information in an Irish context to build towards mitigating the effects of pesticide use on terrestrial ecosystem services, focussing on pollinators and soils. We will survey pesticide residues in soils and nectar, investigate the potential hazards of pesticide use for bees, and provide recommendations for a soil monitoring programme and how to	€1,084,755.52	17S232 **Final Report not available.**

Ireland Maynooth		mitigate any effects on ecosystem services. Our findings will help to ensure that pesticides can be used safely while protecting wildlife, health and the environment, both in Ireland and internationally.		
Dr Mary Ryan Teagasc Athenry Co.Galway **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2017	**WaterMARKE- Mitigating Agricultural impacts through Research and Knowledge Exchange.** The overall objective of this project is to explore options for a practical operational plan or Knowledge Exchange system to improve water quality. The practical objective is to improve the impact of farming on water quality at lowest cost, with maximum support from all stakeholders involved in the production of water quality improvement. The primary mechanism driving this project is to develop innovation system wide measures that can produce improved measurable water quality indicators as required under national obligations. While it may be difficult given the range of factors that influence the outcomes to attribute direct impacts to the project, it may be possible in the future to gauge (a) the adoption of measures in the policy environment and (b) participation in adopted measures by farmers. We draw heavily upon a previous project funded by the EPA, AgImpact (Identifying Approaches to Improving Knowledge Exchange (KE) in the Irish AgriFood Sector using Expert Opinion).	€249,876.73	17SEPA1 **Final Report not available.**
Prof David MacHugh University College Dublin Bellfield Co.Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	US-IRL Call 2017	**TARGET-TB- Targeted genome editing to enhance genetic resistance to Mycobacterium bovis infection in domestic cattle populations.** Mycobacterium bovis infection, the cause of bovine TB (BTB), costs an estimated $3 billion to global agriculture annually and the primary financial burden of BTB in developed countries is the control of infection. This tri-partite US-Ireland R&D Partnership project will leverage complementary scientific skills, resources and infrastructure available at Recombinetics, Inc., (US-REC), University College Dublin (ROI-UCD) and Queen's University Belfast (NI-QUB). The overall goal will be to identify natural sequence variants (NSVs) in key genes and genomic regulatory elements (GREs) associated with the bovine host macrophage response to infection with M. bovis. The research project will also generate new information on the genetics of host-pathogen interaction for BTB disease in cattle, which will improve existing control and	€325,115.00	17/RD/US-ROI/52 **Final Report not available.**

		management tools such as diagnostics and genome-enabled breeding. In addition, it will define a research paradigm and strategy that can be used for comparable studies of intracellular microbial infections such as Johne's disease in cattle caused by M. avium subsp. paratuberculosis (MAP). The project will take advantage of a multi-pronged, multi-step computational workflow that will be used to prioritise genes for subsequent genome-editing experiments. A scientific pipeline will be implemented for robust functional testing of these gene edits in bovine induced pluripotent stem cell (iPSC)-derived macrophages (iPSCDM) using an in vitro infection model system. These cells will then be used to test the efficacy of specific NSVs in enhancing the bovine macrophage response to M. bovis infection and provide baseline information for future production of gene-edited cattle with increased resistance to BTB disease.		
Dr Susan Joyce University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:**	US-IRL Call 2017	**NAGPro- Improved animal Husbandry through inhibition of Microbial Bile Salt Hydrolase.** We propose to develop innovative antibiotic-free feeding technologies (growth promoters) that will enhance weight gain in chickens to significantly improve yield, enhance profitability and deliver a product of enhanced quality to the consumer. We predict that the work will also have significant potential for applications in other animals. Novel growth promoters will be based upon our recent functional microbiome work and emerging understanding of how gut bacteria interact with the host to control weight gain. In particular, we have previously identified bacterial enzymes called Bile Salt Hydrolases (BSHs) which modify bile acids in the host and influence energy metabolism. Compelling evidence shows that inhibition of BSH activity would cause weight gain. On this basis, we will develop a world-leading research program that will develop BSH inhibitors showing promise as animal growth promoters in this project. We also will test these novel growth promoters in a chicken husbandry model and will investigate the biological basis of the phenomenon using state-of-the-art metabolomics, metagenomics and computational approaches. The proposed work directly addresses the AFRI Priority Program Area of A1231 (Animal Nutrition, Growth and Lactation). Using multidisciplinary approaches, this timely project will be conducted by a team of highly experienced investigators in the USA,	€301,874.10	17/RD/US-ROI/54 **Final Report not available.**

		Republic of Ireland, and North Ireland. The outcomes of the project will lead to the development of innovative non-antibiotic technologies for use in poultry and possibly other livestock. Adoption of our antibiotic-free strategies will undoubtedly improve food safety and reduce the dependence on in-feed antibiotics while maintaining animal productivity and sustainability.		
Dr Alan O'Riordan Tyndall National Institute – University College Cork **Lead Institution:** Tyndall National Institute – University College Cork **Collaborating Institutions:**	US-IRL Call 2017	**AgriSense II- Development and validation of an on-farm, electronic disease diagnosis platform for cattle.** The effective and early detection of disease within cattle is widely recognized as a critical component in maximizing clinical and therapeutic outcomes, increasing production efficiency and limiting the economic impact of infections. AgriSense II will develop an electronic sensor platform consists of two sensors with different sensing mechanisms (potentiometric sensors based on field-effect-transistors and electrochemical impedance) which can be co-fabricated on the same substrate that will greatly reduce false positive and false negative test results therefore providing more robust clinical data to stakeholder such as farmers and veterinarians. The device will target multiplexed (simultaneous) detection of commonly occurring viral pathogens known to cause production diseases that have high animal welfare and economic costs. These diseases include: Bovine Viral Diarrhoea (BVDV), Bovine Parainfluenza Virus-3 (BPIV-3), Bovine Respiratory Syncytial Virus (BRSV), and Enzootic Bovine Leucosis (EBL). New disease specific capture proteins to be developed by QUB will have high specificity and avidity for the selected disease will, for the first time, enable highly selective immunoassays. Electronic sensors will permit rapid diagnostics (in less than 10 minutes) while the dual sensing approach will provide results with higher confidence levels than are currently available due to reduce false positives (negatives). The sensor device will also consist of positive and negative control sensor channels to (i) confirm assay functionality and (ii) correct for non-specific bind, noise and drift. Finally the devices will be validated in a commercial veterinary diagnostics laboratory using archived samples diseases whose control and prevention are critical to the cattle and dairy industries in the United States, the Republic of Ireland and Northern Ireland. This will be followed by	€371,138.80	17/RD/US-ROI/56 **Final Report not available.**

		an extensive on-farm diagnostic validation using milk samples followed by demonstration activities to various stakeholders on-farm.		
Dr Sheila Alves Teagasc Oak Park Co. Carlow **Lead Institution:** Teagasc **Collaborating Institutions:**	SusCrop - ERANET Call 2017	**ProFaba- Developing improved Vicia faba breeding practices and varieties to drive domestic protein production in the European Union.** Europe suffers a major protein deficit, which results in an annual net import of 40 million tonnes of soybean as whole seed or meal. In contrast, the total EU production of soybean, pea and faba bean (broad bean) is 8 million tonnes, approximately equally distributed between the three. Faba bean is adapted to a wide range of climates, has a good disease resistance profile, and its seed protein concentration is higher than that of other starchy legumes including pea, so it is an attractive candidate for boosting protein production across Europe. To realise this potential, faba bean must be an economically competitive and attractive crop for European farmers. In order to accomplish this, we propose to unite the strong faba bean expertise from across Europe to establish common genotyping and bioinformatics strategies as well as common data repositories. Methods and data will be translated for use by partner breeders to ensure immediate impact on breeding strategies and variety development. The individual partners will address specific topics important for crop resilience and productivity, sharing the results as they are produced with the consortium and rendering them public as they are published. Bringing together a large group of partners throughout Europe, we will address many of the issues that currently limit faba bean production, including pest, disease and abiotic stress resistance, interactions with nitrogen fixing rhizobia, and resilience to climate change. Pre-competitive knowledge sharing of data generated using a common set of highly diverse faba bean lines will ensure that local breeder partners can address the most pertinent challenges faced by farmers to increase faba bean competitiveness when compared to cereals and thereby generate a more balanced and protein-self-sufficient European agricultural system, which takes full advantage of biological nitrogen fixation.	€252,585.85	2017EN108 **Final Report not available.**

Dan Milbourne Teagasc Oak Park, Co. Carlow **Lead Institution:** Teagasc **Collaborating Institutions:**	SusCrop - ERANET Call 2017	**DIFFUGAT- Diploid Inbreds For Fixation, and Unreduced GAmetes for Tetraploidy – A novel Fixation-Restitution Breeding method for potato.** This project will impact the sustainability and resilience of the world's 4th most important food crop by developing all of the components required for an innovative breeding system that can overcome limitations of the current breeding method. Predictable fixation of biotic and abiotic stress resistance, in combination with yield, nutritional value and quality, will facilitate SME breeding companies to develop highly performing potato varieties with a sustainability and resilience profile that is impossible to achieve using current methods. Climate change may radically impact global potato production. High temperature, flooding, drought and salinity will impact yield. Climate change may also increase biotic stress by conferring shorter life cycles and increased geographical range to pests and pathogens. Agronomy and pesticides can repair the lack of resistance to abiotic and biotic stresses, but breeding will offer the crop an innate capacity to resist them, allowing an integrated pest management to produce a high quality crop with lower inputs. Unfortunately, potato breeding is a slow and frustrating activity. Tetraploidy and outbreeding hinder the fixation of genetic gains, making the accumulation of multiple beneficial trait alleles very difficult, even over several cycles of selection. High soil temperature inhibits tuber formation; genes involved in heat tolerance have been identified, but are underused in varieties. Varieties with single resistance genes exist, but these offer stepping stones for evolution of pathogenicity; pyramiding R genes greatly contributes to their durable deployment. Breeding high performing varieties combining all such traits is essential for resilience but difficult. Therefore, we propose a new breeding system that allows for a predictable accumulation and subsequent fixation of biotic and abiotic resistances with yield and quality traits. By the end of this project we can deliver the components of this breeding system.	€166,005.92	2017EN109 **Final Report not available.**
Prof Kevin McDonnell University College Dublin Bellfield	SusCrop - ERANET Call 2017	**WheatSustain- Knowldege-driven genomic predictions for sustainable disease resistance in wheat.** To meet the Grand Societal Challenges, we need a sustainable intensification of agricultural production, improving both yield and quality.	€173,915.15	2017EN104 **Final Report**

Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**		Sustainability includes optimized plant health to lower the risk of crop losses from plant diseases and to reduce the dependency on pesticides, which is a key element of the 2009/128/EC directive. New cultivars are needed with reduced environmental impact that combine excellent disease resistance with productivity and end-use quality. Wheat is the most cultivated cereal crop in Europe, and among the top three cereals globally with a total production of 749 million tonnes in 2016 (FAOSTAT). As proof of concept cases, we are targeting stripe rust and Fusarium head blight (FHB), which are among the most threatening wheat diseases in Europe and North America. Stripe rust is infamous for its ability to quickly evolve new pathogen races that overcome resistances in widely grown cultivars. FHB epidemics regularly cause both yield and quality losses in major wheat growing regions and is of serious concern for human and animal nutrition due to the production of mycotoxins. WheatSustain will together with European and Canadian wheat breeders innovate new genomic selection methodologies that can greatly enhance the breeding of new cultivars with improved stripe rust and FHB resistance. Once developed, the methodology can be transferred to other crops and traits and provide long-term impact on agriculture. Cultivars with improved disease resistance will greatly facilitate the implementation of integrated disease control strategies and contribute to a more environmentally friendly agriculture that is less prone to yield and quality losses and less dependent on pesticides. Cultivars with improved disease resistance will also be of great benefit to organic agriculture where fungicides cannot be used.		**not available.**
Dr Achim Schmalenberger University of Limerick Plassey Park Road Biological Sciences Schrodinger Building Co. Limerick **Lead Institution:** University of Limerick	SusCrop - ERANET Call 2017	**potatoMETAbiome- Harnessing the potato-microbiome interactions for development of sustainable breeding and production strategies.** Potato cropping currently relies largely on high inputs of fertilizers, pesticides and water. PotatoMETAbiome will contribute to the development of more sustainable forms of potato cropping by making use of the power and functional traits provided by soil microorganisms and improved interactions between plants and microbes. In order to achieve this, it is necessary to treat plants and the microbes living inside and on the plants as a single meta-organism (Berg et al., 2014). We will identify major plant	€174,700.00	**2017EN100** **Final Report not available.**

Collaborating Institutions:		genes and their activation that are important for the interaction with microbes using a large number of potato lines that respond differently towards stress including pests and climate. We will assess key microbes that support potato plants in nutrient acquisition and response mechanisms to stress. The obtained results will be implemented into field trials to test their relevance under real conditions. The project findings will have an impact on the socio-economy and the environment. The strategy to include potato genotypes that are optimal for beneficial plant-microbe interactions, and participation of stakeholders during the project will greatly support the spread and application of the gained knowledge on sustainable potato cropping across the major European countries. This approach will also influcence future potato plant breeding strategies and improve the resistance of future potato plants to environmental challenges associated with climate change. Specifically, the development of potato plants with improved root biomass and microbe utilization will lessen the impact of abiotic stresses such as drought as well as biotic stresses caused by pathogens. This increase in potato resilience will lead to a much needed reduction in the use of synthetic fertilizers and pesticides, thus reducing the environmental footprint of potato farmers and improving the health of consumers.		
Food				
Prof Yuliya Semenova Dublin Institute of Technology Kevin Street Dublin 2 **Lead Institution:** Dublin Institute of Technology **Collaborating Institutions:**	DAFM National Call 2017	**Opti-Probe- Optical fiber probe for assessment of authenticity and quality of alcoholic beverages.** Increasing public concern with food quality and safety drive the need for simple and cost-effective techniques for authentication of raw materials and finished foods. These techniques are increasingly important to ensure adequate standards of production, uniformity within a brand and prevent falsification. Existing analytical techniques while being the most specific and sensitive, are often complex, time-consuming, and both resource and labour intensive. Moreover, new instruments and methods for traceability and certification, especially those based on low-cost techniques, are needed as marketing tools for locally-produced and renowned food products, and as a means to protect them from adulteration and imitation along the supply chain.	€172,245.10	17F284 **Final Report Not Available.**

		The primary objective of Opti-Probe is to develop and demonstrate a novel, rapid and cost-effective technique for assessment of the authenticity and quality of alcoholic beverages. The proposed method utilizes a bespoke array of highly sensitive fibre optic sensors to function as an optical nose and tongue. Each sensor within the array is a micron-sized silica sphere coated with a thin porous film. The operating principle relies upon measurement of changes in the refractive index of the coating, induced by binding of the chemical compounds present in the beverage. The project will investigate the capability of the proposed optical sensor to discriminate between varying alcoholic beverage categories, their origin, brand, blend status, age and flavour. Principal component analysis will be employed for data analysis, permitting comparative benchmarking of results against those obtained via standard analytical techniques.The long-term objective is to open the door for future applications of this simple and cost-effective approach in the authentication of a wider range of raw ingredients, food products and consumer goods including perfumes and prescription drugs.		
Dr Jesus Frias Dublin Institute of Technology **Lead Institution:** Dublin Institute of Technology **Collaborating Institutions:** University College Dublin	DAFM National Call 2017	**NUTRADEL+ Establishment of a commercialisation route for a Leucine-Lysine-Proline based antihypertensive formulation.** The recently completed NUTRADEL project (11 F 042) presented a number of novel findings which helped to better understand the requirements for oral delivery of anti-hypertensive angiotensin converting enzyme (ACE) inhibitor tripeptides, IPP and LKP: i) the oral delivery of these peptides is mediated by a specific peptide transporter (PepT1) with the potential for broad and significant competition from other dietary peptides ii) the blood-pressure lowering effect of the peptide was not completely elucidated and may comprise a combination of systemic ACE inhibition along with possible local effects in the GIT circulatory system iii) the use of intestinal permeation enhancers with a history of use in pharmaceutical clinical trials may contribute significantly to increasing the bioactive effect of a tripeptide formulation and iv) the spontaneously hypertensive rat model has demonstrated equivalent blood-pressure lowering for food-derived tripeptides with the commercial ACE inhibitor (captopril) How-to This	€99,397.50	17FP243 **Revoked**

		project aims to bring these results closer to industrial application by i) developing experiments in which industrial grade tripeptides will be further optimised in nanoparticles made with chitosan and zein via the method of ionotropic gelation to develop oral peptide formulation ii) undertaking in vitro experiments to elucidate local effects using study of tripeptide effects on dilation of the smooth muscle of rat vascular rings iii) the development of chitosan/zein particle formulations of the peptides with intestinal permeation enhancers (C10) and inhibitors of PepT1 to further understand the relative contribution of the PepT1 and epithelial tight junction routes and iv) benchmarking the optimal formulations against the commercial oral small molecule ACE inhibitor Captopril in further in-vivo experiments. Impact The project will progress the present state of the art to further identify the feasibility of using hydrolysated purified peptide ingredients that will enable further scale up processes. It will also further assess the transport and the therapeutic effect of the identified peptides, with a clear commercial benchmark. As a result of this project, the peptide formulations will be brought to a level of readiness to initiate human trials.		

Dr Paula Burke University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc Dublin Institute of Technology	DAFM National Call 2017	**CAMPYDECON- Controlling Campylobacter Contamination in Poultry Processing.** The 2016 EFSA Zoonosis report identified campylobacteriosis as the most commonly reported zoonosis. There is an increasing EU trend for confirmed human cases with predominant occurrence on broiler chicken meat. Campylobacter is prevalent as a commensal microorganism of poultry and it persists throughout all stages of production. This highlights the importance of processing stages for implementing industry and consumer acceptable controls. Additionally, poultry processors strive to extend shelf life. Consumer aversion to chemical intervention limits flexibility in processing approaches. Technologies that can identify, characterise and locate the microbiological risks in conjunction with technologies that decontaminate without leaving residues and are not prone to microbial resistance are urgently required. A recent report from the Campylobacter stakeholder group (CSG) identifies interventions that have greater potential consumer acceptability, with a view to market acceptance. Therefore, this project adopts these recommendations to develop a suite of technological interventions to detect, discriminate and decontaminate Campylobacter within poultry processing. We responsibly co-innovate with industry, consumers and endusers through the CSG to arrive at acceptable interventions to promote the future likelihood of adoption. We develop imaging and genomic approaches to detect and characterise the microbiological risks posed in poultry processing. We propose ground breaking cold plasma and light based interventions to offer antimicrobial efficacy without the use of chemical sanitizers. Preliminary studies point to rapid inactivation of Campylobacter with cold plasma in less than 60 seconds. These technologies are non-invasive, leave zero residue and are not found to adversely affect quality. A critical advantage of this world-first suite of technologies for the poultry industry are the risk tailored interventions combined with the complementary broad spectrum approaches of LED and In-package cold plasma treatment. Effective broad control combined with preventing recontamination is desirable and can provide a defence against antimicrobial resistance in addition to increased shelf-life.	€ 1,228,450.48	17F275 **Final Report Not Available.**

Prof Frank Monahan University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2017	**BEEF-SIG-Signature of Irish Grass-fed Beef.** Irish beef is increasingly marketed on the basis of the uniqueness of its grass based production. Currently, Irish beef for the U.S. market must be derived from animals with a "More than 80% Grass Diet" (Bord Bia, 2017). The guarantee to supply beef from animals with a "More than 80% Grass Diet" is based on mandatory recording by producers/farmers of the level and timing of various feed inputs (grass, silage, cereal concentrates, etc) under the Bord Bia Sustainable Beef & Lamb Assurance Scheme (SBLAS) and transmission of this information to meat processors who ultimately make the decision on whether or not the beef is suitable for the U.S. market. There is, however, currently no way of proving that the beef selected for sale in the U.S. meets the "More than 80% Grass Diet" criterion. The guarantee assumes accurate and truthful recording of data by producers. There is an urgent need to support, with robust scientific data, the "More than 80% Grass Diet" guarantee and, more widely, the extent of Ireland's grass-based production and the uniqueness of the products that arise from it. The project sets out to quantify (i) the compositional "signature" of beef from production systems with different levels of grass input and (ii) differences between Irish grass-fed beef and beef from other international sources. Novel methods of quantifying compositional differences due to level of grass feeding or country of origin will be investigated. The robustness of the methods in discriminating production system and country of origin will be tested using advanced statistical techniques. A novel, pro-active approach for beef assurance will be explored using the targeted delivery of a unique elemental or molecular discriminator (through mineral supplements) based on rare earth elements and stable isotope ratios of heavy elements.	€594,115.60	17F252 **Final Report Not Available.**
Dr Olivia McAuliffe Teagasc Moorepark Fermoy Co. Cork **Lead Institution:**	DAFM National Call 2017	**ListeriaChallengeStudies- Understanding Listeria monocytogenes growth in food in order to simplify the guidelines for undertaking food challenge studies.** The problems with L. monocytogenes are two-fold; 1) a public health issue with the incidence of listeriosis continuing to rise, 2) an industry problem as (presumed) presence of L. monocytogenes will lead to product recalls. L. monocytogenes is resistant to preservatives and processes used to control bacterial growth in food.	€ 1,190,685.69	17F244 **Final Report Not Available.**

Teagasc **Collaborating Institutions:** University College Dublin University College Cork University of Limerick National University of Ireland Galway		Thus, it can readily cross-contaminate food from environmental reservoirs and can survive and grow in foods even in the presence of preservatives. In this project, challenge studies of L. monocytogenes in foods will be undertaken using the EU Reference Laboratory (EURL) challenge study guidelines in parallel with protocols where changes in temperature, pre-growth of the inoculum, inoculum size and inoculation method will be made. The foods tested, from Irish food processing environments, have previously shown high levels of L. monocytogenes or shown to support growth of L. monocytogenes. Genome sequence data of 50 L. monocytogenes isolates (already obtained) will facilitate determination of the link between genotype and phenotype, by examining virulence, their ability to grow at low temperature, under acid and osmotic stress or in the presence of the food microbiome and other inhibitors. Thus, their ability to grow in foods will be assessed. Currently, EU regulations do not consider the risk posed by individual strains of L. monocytogenes and this study will seek to determine if a clear differentiation can be made between virulent and avirulent strains. The genetic analysis coupled with the food challenge tests will allow us to build predictive models that correlate genetic traits with the likelihood of growth in the major food groups. In parallel with this multi-disciplinary approach, workshops and demonstration activities will be held to transfer the knowledge gained to DAFM inspectors and Environmental Health Officers and the EURL. Scientific data to support changes in the EURL guidelines for challenge studies and a greater understanding of the ability of foods to support growth will make it easier for food producers to assess the risk of L. monocytogenes growing in their food products and will result in improvements in the safety of foods with respect to L. monocytogenes.		
Prof Dmitri B Papkovsky University College Cork College Road Co. Cork	DAFM National Call 2017	**MICROSENS- Demonstration of sensor-based rapid microbial testing technology to increase shelf life, safety and traceability of industrial fresh meat products in Ireland.** MICROSENS is set to demonstrate the use of emerging sensor-based rapid microbial testing systems throughout the process of manufacturing of fresh meat products, and operational and commercial benefits of its adoption by leading meat	€ 544,018.44	17F222 **Final Report Not Available.**

Lead Institution: University College Cork **Collaborating Institutions:** Teagasc		producers in Ireland. We will set up the validated high-throughput microbial test which uses benchtop fluorescence plate reader, liquid oxygen sensing probe MitoXpress® and crude meat homogenates, and also introduce two advanced tests, namely: i) mobile on-spot testing platform based on the autonomous handheld reader and bead sensors; ii) mobile swab testing of meat carcasses, production surfaces and process hygiene based on platform i) set-up. These analytical systems will be thoroughly assessed in laboratory and then industrial settings with core meat products (mainly beef and lamb) and production processes used by the Irish companies, with the view of replacing the slow and laborious conventional colony counting tests. Adoption of MICROSENS approach will provide meat companies: easier, faster and more comprehensive microbial testing; significant improvement of shelf life through faster batch release (<6h or same day to result vs current 24-48 h); reduced microbial contamination, improved quality and microbial safety of final products; better control of production process and hygiene. MICROSENS relies on team's strong expertise in optical sensor technologies and bioassay development for food applications, the significant preliminary R&D work and strategic alliances with leading Irish food and technology companies who are willing to participate and contribute to this project.		
Dr Patrick Forrestal Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2017	**NBPT-Safe- Ensuring food safety in grass systems using NBPT treated urea.** Nitrous oxide emissions, including from fertiliser nitrogen comprise one-third of all national greenhouse gas (GHG) emissions. Agricultural ammonia emissions, including from urea fertiliser, account for 99% of national ammonia emissions. Ireland has committed to reduce GHG emissions by 30% and ammonia emissions by 5%. Food Wise 2025 and Origin Green aim to sustainably increase agricultural production. The use of inhibitors such as urease inhibitors e.g. N-(n-butyl) thiophosphoric triamide (NBPT) and nitrification inhibitors e.g. dicyandiamide (DCD) have been shown to reduce emissions from fertiliser use by up to 80% in Irish conditions. The discovery of DCD residues in New Zealand milk powder in 2013 led to withdrawal of milk and the banning of the use of DCD over perceived food safety risks. This project will quantify	€599,941.18	17F207 **Final Report Not Available.**

		the human health risk associated with NBPT inhibitor residues to underpin the quality and safety associated with Irish agricultural produce and to facilitate confidence in the use of inhibitors to reduce emissions from fertiliser use.		
Dr Declan Bolton Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Trinity College Dublin Dublin Institute of Technology	DAFM National Call 2017	**Foodborne C. diff.- The foodborne emergence and epidemiology of Clostridium difficile in Ireland.** Recent research suggests that Clostridium difficile is an emerging foodborne pathogen of public health concern that may negatively impact on the Irish agri-food sector. Although the project team has already completed a literature review and the proposed research is based on current knowledge gaps, the first Task will extend this review to further develop our knowledge base and inform the proposed activities in the project. Tasks 2 and 3 will include a microbiological survey of cattle, sheep, poultry (Task 2) and pigs (Task3) on the farm, in the abattoir and on associated meat products. Ready-to-eat (RTE) salads will also be investigated as a vehicle of transmission. All isolates will be subject to initial molecular characterization (ribotyping and PCR testing for the main virulence factors including toxin genes tcdA, tcdB, the binary toxin genes cdtA and cdtB and the tcdR and tcdC regulatory genes) and antibiotic susceptibility testing. Spore germination and growth in relevant food products/storage conditions will also be investigated (Task 2). Tasks 4 and 5 will use whole genome sequencing to investigate; [1] the genetic relatedness of human clinical isolates and foodborne C. difficile (Task 4), and [2] the virulence potential in a broad range of Irish foodborne C. difficile isolates including an assessment of the emergence of new pathogenic strains in the future (Task 5). Task 5 will also undertake microbiome analysis in the different ecological niches in which this organism is found. All of the data generated will be used in Task 6 (Risk Assessment) to rank meats and other relevant foods in terms of C. difficile risk, quantitatively assess the effect of season, crosscontamination and cold-chain conditions on the germination efficiency/survival of C. difficile spores and assess the contribution of contaminated meat/other foods to the increased risk of infection in patients treated with antibiotics. The final task (Dissemination, Task 7) will ensure an ongoing dialogue with stakeholders during the project, develop a control strategy in full consultation with	€ 839,738.62	17F206 **Final Report Not Available.**

		our stakeholders and disseminate the data/knowledge generated, thus providing the scientific basis for government policy and advice to consumers.		
Dr Dilip Rai Teagasc Ashtown Dublin 15 **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork	DAFM National Call 2017	**ProcessPotato- High pressure processing and ultrasonication on improving the shelf-life, nutritional and functional qualities of Irish potato cultivars.** A major emphasis of potato processing is preservation or shelf-life extension by preventing undesirable changes in wholesomeness, nutritive and sensory attributes. Though processing extends shelf life, it affects the stability and levels of bioactive compounds, vitamins, and minerals. Besides being a staple nutritional diet for centuries, potatoes are also known to contain bioactive compounds such as chlorogenic acid, caffeic acid, kukoamines, anthocyanins and carotenoids that have salutary roles on human health. These bioactives possess anti-diabetic and anti-hypertensive activities. The loss of these bioactive compounds along with other micro-nutrients (vitamins and minerals) is a major concern for food processors during food processing operations and subsequent storage of food products. Another key problem in industrial potato processing is the 'browning' of peeled and cut potatoes initiated by the enzyme polyphenol oxidase. Current industrial practice is the usage of sulphites (E220-228) to prevent browning. However the sulphites-usage has raised health concerns and the influence of sulphites on bioactive contents has been poorly documented. Similarly, the overall nutritional value of potato is greatly underestimated because of its high glycaemic index (GI), and warrants further investigations as the GI values differ with different cultivars and methods of cooking. Emerging technologies, which have potentials for future food processing, may serve better alternatives in retention of bioactive compounds and minimisation/elimination of anti-nutrients and browning in potatoes. In this project, we aim to assess and optimise various minimal processes that will help to retain bioactive contents in major Irish potato cultivars. Studies on the effect of potato storage conditions will also be performed, and the efficacies of processed potato extracts for hypoglycaemic activities will be investigated.	€199,988.64	17F299 **Final Report Not Available.**

Dr Norah O'Shea Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** Cork Institute of Technology National University of Ireland Galway	DAFM National Call 2017	**3 DDAIRY- Exploitation of dairy ingredients in the development of 3 Dimensional Structured Dairy Snacks.** The project will develop a new dairy processing platform in the form of 3D printing and development of value-add dairy snacks. Brexit implications are being described as potentially catastrophic for the Irish agri-food sector. Hence, dairy processors need to continue to develop innovative high-value products to remain competitive. This project will extend the market potential for dairy ingredients by developing new processing applications and new dairy products using 3D printing. Although, 3D printing has been recommended as a technology of the future in strategy documents (e.g. Horizon 2020 and Teagasc Foresight document), its potential has not yet been fully explored in the food sector. Benefits of 3D printing include flexibility to fabricate products in any shape or size, combined with more efficient and optimal use of ingredients. Personalized nutrition is also considered as another potential advantage in using 3D printing. From a recent Bord Bía study, 64% of Irish consumers agreed a high protein diet from products made with clean traceable ingredients was essential for maintaining a healthy diet. This project will use natural and clean dairy ingredients in combination with 3D printing to produce unique and value-add 3D structured prototypes. The project will pursue five main areas of investigation: 1) Ascertain the optimal technological properties of dairy ingredients to generate the ideal printing material for 3D printing. 2) Fabrication of a high quality food grade 3D printer that can be adapted to different dairy printable inks and value-add edible inks. 3) Characterisation of the functional, chemical composition and shelf-life of the prototypes. 4) Development of 3D printable food-grade functional edible inks and microstructures, which can offer additional functionality in the form of colour, flavour and nutrition. 5) Consumer and sensory acceptance of the 3D structured prototypes, which is essential for development of successful processes and products.	€585,090.87	17F246 **Final Report Not Available.**

Prof Richard Fitzgerald University of Limerick Castletroy Co. Limerick **Lead Institution:** University of Limerick **Collaborating Institutions:** University College Cork University of Ulster Galway Mayo institute of Technology	DAFM National Call 2017	**MaraBioactive- Extraction and exploitation of bioactive fish components for health enhancement.** Recent scientific and global protein demand developments along with EU fish quota changes clearly indicate that blue whiting (Micromesistius poutassou) is a viable source of nutritional and functional ingredients. However, significant challenges exist in the generation and exploitation of clean flavoured, white coloured and odour free blue whiting-derived proteinaceous ingredients. The aim of this project is to investigate the development of reproducible and scalable (to semi-pilot scale) protocols for the generation of prototype blue whiting biofunctional peptide ingredients with demonstrated appetite modulating activity. In the first instance, different processing parameters will be investigated to develop reproducible peptide preparations. Furthermore, the contribution of seasonal variation in blue whiting nutritional composition on peptide ingredient consistency and semi-pilot scale reproducibility will be assessed. Direct enzymatic hydrolysis will be employed to extract blue whiting proteinaceous components which will be screened in an array of in vitro and cellular bioassays associated with markers of appetite control. The role of lead candidate hydrolysates on food intake and satiety will subsequently be assessed in vivo using acute and chronic small animal studies. Two selected lead hydrolysates will be formulated into food products and sensory studies will be performed. Mass spectrometry analysis will be employed to characterise the peptide profile and identify the bioactive peptide sequences present in potent fraction(s) of the lead candidate hydrolysate sample. Information arising from this project will generate evidence for validation of a marine peptide-based functional food dietary strategy for health promotion and disease prevention, specifically in relation to appetite control and energy intake. The relevance of this proposal is that the seafood sector is a significant contributor to the Irish economy worth over €800 and £67.3 million, respectively, and employing approximately 11,000 and 2,000 people in the Republic of Ireland and in Northern Ireland, respectively, in 2010.	€844,779.00	17F260 **Final Report Not Available.**

Dr Noel McCarthy Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork	DAFM National Call 2017	**NowGen- Commercialization of Next Generation Infant Formula.** This FIRMplus proposal builds on the outcomes of an outgoing FIRM-funded project "Concept Protein Ingredient for Next Generation Infant Formulation". The latter project highlighted the complexity of altering the protein profile of milk for use in first-stage infant formula and successfully manufactured a protein ingredient containing a casein to whey protein ratio similar to that in human milk through the use of membrane filtration at lab and pilot-scale (300 kg batch size). The microfiltration of skim milk at temperatures <10°C allowed for the permeation of β-casein into the whey protein stream. The aim of this FIRMplus project is to move this process up to commercialization scale, and to also continue on the journey of 'humanization' of bovine milk protein by dephosphorylation of the β-casein fraction. The dephosphorylation of this protein will lead to the production of a softer more digestible curd in the infants' stomach. The dephosphorylation of the β-casein fraction will also allow for a more stable product whereby re-micellization of the β-casein will not occur during evaporation and also make the casein fraction less reactive to ionic calcium. Commercialization of this protein ingredient will be moved from the pilot scale processing hall in Moorepark and take place in Moorepark Technology Limited. Here membrane filtration will take place at 5000 kg scale. A local Dairy company have offered that they will provide medium heat skim milk for trials at this scale. Microfiltration using polymeric spiral wound membranes followed by a standard ultrafiltration process will allow for the production of two highly valuable protein streams (i.e., Milk protein concentrate (heat stable) and a novel whey protein ingredient for infant milk formulations).	€97,760.00	17FP273 **Final Report Not Available.**
Dr Alice Lucey University College Cork College Road Co. Cork **Lead Institution:**	DAFM National Call 2017	**RubusElite- Development of a novel high protein, polyphenol enriched dairy beverage forathletes and physically active individuals.** As global markets for food-based solutions to support performance nutrition continue to expand; there is tangible opportunity to provide innovative functional beverages underpinned by robust scientific evidence to this rapidly broadening sector.1 Health benefits associated with increased consumption of polyphenol compounds are well-	€866,042.60	17F277 **Final Report Not Available.**

University College Cork **Collaborating Institutions:** Teagasc Waterford Institute of Technology		established.2 While protein consumption after exercise supports beneficial effects on post-exercise recovery3; fruit-derived polyphenols have also been observed to reduce oxidative stress, muscle damage and pain post intensive exercise.4 The effects of incorporating polyphenols into a high-protein dairy beverage to support additional benefit for muscle recovery systems remains to be established. This multi-disciplinary project proposes to develop and test for physiological efficacy a novel high–protein dairy-based beverage, tailored for performance nutrition which incorporates the antioxidant-rich blackberry-polyphenol extract developed as part of the on-going FIRM Cardio-Rubus project*. Critical hurdles for the development of functional foods with plant-based bioactives will be rigorously addressed through the study of advanced food technologies which support the stabilisation of polyphenol compounds within foods. Optimisation and validation of polyphenol delivery systems within food matrices and the recycling of polyphenol by-products post-beverage production will be investigated. This project will deliver the RubusElite proof-of-concept sports randomised controlled-trial (RCT) in moderately active adults to investigate if the incorporation of an antioxidant-rich polyphenol extract into a high-protein dairy beverage delivers additional benefit for muscle recovery, muscular stress, gut microbiota, and central stress processing thus, providing robust scientific evidence of physiological efficacy to support health claim substantiation. While this RCT will be conducted within a setting modelled to demonstrate muscle damage and recovery, its application and commercial appeal could be readily translated to all physically active individuals. Additionally, pertinent qualitative consumer preference data from Irish athletes and physically active individuals will be collected to meaningfully inform market intelligence on the development of future bioactive-based functional foods within the performance nutrition setting.		
Dr Eibhlis O'Connor University of Limerick Castletroy Co. Limerick	DAFM National Call 2017	**FIBREMET- Characterising the effect of Dietary Fibres on the Gut Microbiota and Metabolic Health in 'at-risk' individuals: Opportunities for New Food Product Development.** Hypothesis that specific dietary fibres can modulate the gut microbiota and thus improve metabolic health in inflammatory bowel disease (IBD) sufferers.	€628,991.25	17F251 **Final Report Not**

Lead Institution: University of Limerick **Collaborating Institutions:** University College Cork Teagasc		Background: Metabolic dysfunction (increased adiposity, hypercholesterolemia, dyslipidaemia, hyperglycemia, hypertension) is increasing in prevalence in IBD as the most common cause of chronic disability among this growing population group. In line with the general population, declining metabolic health is a phenomenon that is rapidly replacing historical projections for IBD sufferers including weight loss and suboptimal nutrient intake. Furthermore, the economic burden of IBD is increasing as associated metabolic dysfunction has a huge impact on health-care systems. There has been a paradigm shift towards investigating the role of the gut microbiota and its implications in the pathogenesis of various disease states including IBD, obesity and metabolic syndrome. Indeed poor metabolic health has been associated with an altered gut microbiota. While a wealth of human dietary interventions, especially focusing on fibre have shown improvements in metabolic health, few have considered mediating these improvements via the microbiota. This study aims to answer this important research question. The proposed research builds on knowledge gained from previous DAFM-funded projects to advance our understanding of the role of specific functional ingredients (dietary fibres) in modifying the gut microbiota and metabolic parameters in IBD sufferers. Our collaborative group have over a decade of experience in designing pre-clinical and clinical trials using specialised nutrient formulation for targeted impact on the gut microbiota and clinical biomarkers. Experimental Approach: We will use a number of human dietary challenge studies to assess the ability of defined dietary fibres to modulate important microbiota species and clinical parameters of metabolic dysfunction in IBD sufferers. Thus we will identify specific health promoting ingredients that can be incorporated into novel, functional foods by the Irish food industry to support health claims and promote health.		**Available.**
Prof Lorraine O'Driscoll Trinity College Dublin College Green Co. Dublin	DAFM National Call 2017	**MilkEVs- Milking extracellular vesicles for improved infant milk formula.** MilkEV is aligned with: FoodWise-2025 and Food Harvest-2020 highlight Agri-Food sector's potential to increase national employment. Foodwise-2025 acknowledges gaps in translating research into products and in the capacity of industry to absorb new	€595,013.90	17F234 **Final Report Not**

Lead Institution: Trinity College Dublin **Collaborating Institutions:** Teagasc		research and innovation. MilkEV will establish differences/similarities between IMF EVs and cows and human ("gold standard") milk EVs; inform on EVs in IMF ingredients and any losses during IMF processing; and deliver new, essential information on IMF industries' ingredients and products. The Stakeholders Advisory Panel will ensure MilkEV is guided by industry needs and is consumer appropriate. Government's Action Plan for Jobs - Growing Irish Enterprise and Foreign Direct Investment: Ireland produces ~10% of the world's IMF. It is essential that these multinationals and ingredient suppliers have an ever-expanding presence here. Cutting-edge "home-grown" research to ensure optimal IMF will contribute to this. - National Talent Drive Action 10/11's plan to provide opportunities to PhD students and graduates, by training 2xPhDs and 1xPost-Doc. (PD) in state-of-the-art milk and IMF EV analyses. NRPE areas H: Food for Health (functional foods/ ingredients in Ireland) and I: Sustainable Food Production/Processing (sustainable, competitive, efficient Agri-food production and food processing). MilkEV will deliver new knowledge contributing to optimal IMF (Area-H), by maximising collaboration and resource-sharing between relevant research-active institutes (Area-I). Sustainable Healthy AgriFood Research Plan (SHARP)'s principle of maintaining/enhancing competitiveness of the Irish agri-food sector. Based on one of Ireland's primary resources (milk), MilkEV will help optimise the high-value product, IMF; enhancing knowledge-base in the IMF sector; and contribute to processing optimisation/innovation for this food.		**Available.**
Dr Breige McNulty University College Dublin Bellfield Co.Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2017	**NTFS II- National Teen's Food Consumption Survey II.** The overall objective of this project is to establish for the Republic of Ireland (ROI) a nationally representative database of food consumption in teenagers aged 13-18 years to update 2005-6 data for this group and to complement more recent data on preschool children, school-aged children and adults. The survey will be comparable with existing survey data in ROI and with surveys in UK (GB & NI). The ROI database will be designed to address both nutrition and food safety issues of relevance to the development and implementation of public health policy, food safety risk assessment and to the needs of the food industry. In addition to detailed data on food consumption, data will be	€1,342,037.50	17F231 **Final Report Not Available.**

University College Cork Dublin Institute of Technology Cork Institute of Technology		also be collected on body weight, lifestyle, including physical activity, determinants of food choice, blood and urine, and composition of foods and food recipes. Food composition databases will be updated and restructured to facilitate future analyses of food ingredients, packaging migrants, residues, contaminants, allergens, bioactives and microorganisms. Blood will be analysed for nutritional status of iron, folate and vitamin D and urine will be analysed for salt intake. These biofluids will also be stored to facilitate future analyses of nutrition and metabolic indicators, markers of food intake and for estimating exposure to food chemicals. Data will be analysed to estimate intakes of foods and nutrients and compliance with dietary recommendations, to determine status for key micronutrients, to establish the prevalence of overweight and obesity, to investigate physical activity patterns and compliance with guidelines, to identify psychological, social and attitudinal determinants of food choice and eating behaviour. Findings will be disseminated to relevant stakeholders. The project will be carried out by a multi-disciplinary research team with strong linkages to related on-going research in food and health sciences.		
Prof Eileen Gibney University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2017	**SCaRES- Seafood Consumption and Risk Exposure Study.** This proposal targets the call, to generate specific consumption data, on seafood, to improve the characterisation of the risk from exposure to biotoxins and other contaminants from consuming shellfish. In doing so, the proposal brings together a unique partnership of expertise within UCD relating to collection of food consumption data for different population cohorts as well as risk assessment expertise. In the past nationally representative surveys severely lacked reported eating occasions of seafood, with the most recent survey comprising of 133,050 rows of data with only 12 of these related to Shellfish, not sufficient data for risk exposure assessment in this food group. It is therefore clear that a targeted data collection approach is required. Thus the proposal aims to collect reported dietary intake data from n=1000 seafood consumers, using novel online dietary intake assessment techniques, to determine habitual intakes of seafood for use in risk assessment. This approach will represent a significant step forward in terms of public health policy contribution by being able to	€197,193.74	17F263 **Final Report Not Available.**

		characterise the likelihood of illness in a population or population sub-group on an annual basis. The project will use the seafood consumption data to underpin an exposure assessment of selected marine biotoxins in Irish produced shellfish to develop the first detailed risk assessments for these marine biotoxins in Irish produced shellfish. The methods proposed within this project will meet the needs of the call, and ensure the data collected would be aligned for analysis with similar European datasets. Furthermore, it will demonstrate the use of novel intake assessment technologies for fast and cost effective collection of data for risk assessment purposes, reducing the time and cost required for data collection.		
Dr Tom O'Callaghan Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2017	**PastureProd- Comprehensive review of the advantages and disadvantages of pasture based feeding systems to the chemical composition, characteristics and quality of milk and dairy products.** There are many dairy production systems used throughout the world, influenced by a variety of geographical factors such as climate, land usage and availability of feed/forage. Total mixed ration (TMR), indoor, high-input feeding systems are widely used in the US, parts of Europe and the southern hemisphere. Approximately 90% of the global milk supply is derived from indoor TMR style feeding systems. Ireland's temperate climate, combined with plentiful rainfall, provides ideal conditions for a low-input, pasture based; sustainable and carbon-efficient farming system. This somewhat unique seasonal pasture system has become an important marketing strategy used by Irish manufacturers and state agencies such as Bord Bia, to promote dairy products on the international market. Such marketing has been successful as it stimulates consumer perception that milk from cows fed on pasture comes from a more natural environment, with improved nutritional properties compared to that of cows fed on a TMR system. As consumers become more aware of the benefits of a healthy and balanced diet, and the increased demand for the use of "Pasture based" labelling of products and regulation around this, a comprehensive review of the existing literature is required to provide a foundation for such claims and perceptions surrounding pasture derived products nutritional superiority. There is a large bank of information and literature available on the effects	€61,510.00	17F218 **Final Report Not Available.**

		of different feeding systems including use of concentrates, varying grass swards and levels of supplementation on the nutritional profile and quality of milk and dairy products. PastureProd will therefore aim to form a team of experts in the areas of dairy, nutrition, sensory, lipid and agricultural science to carryout a comprehensive review of existing literature of the potential advantages and disadvantages of pasture based feeding systems to milk and dairy products nutritional profile and product quality.		
Prof James Lyng University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	2017 Trans-National SUSFOOD2	**MEFPROC- Improving Sustainability in Food Processing using Moderate Electric Fields (MEF) for Process Intensification and Smart Processing.** The adoption of novel sustainable, innovative processing solutions capable of producing microbiologically safe, high-quality products is essential for future economic growth and advancement in the European Food Industry. Novel mass transfer (e.g. extraction/impregnation) and volumetric heating (e.g. softening, coagulation, cooking or heat processing) operations based moderate electric field (MEF) application to foods represent an extremely energy efficient yet low cost group of applications which will have a definite role in this innovation revolution. Unlike high voltage pulsed electric fields (PEF), a technology which has received considerable attention in recent years, MEF involves a simpler more direct application of electrical current (i.e. no capacitors, pulse forming networks etc.) which is in the form of AC (vs. DC in PEF) at considerably lower field strengths (i.e. V/cm vs. kV/cm) than PEF. Further process intensifications and marginal gains are possible if MEF is applied in combination with ultrasound (US). The consortium consists of (1) leading European researchers in electro processing, ultrasound, process control and computer modelling (2) MEF and US equipment manufacturers (3) food manufacturers interested in utilising MEF with US for mass transfer and/or heating applications but prevented from doing so by gaps in knowledge. The overriding objective of the proposed project is to bridge gaps in scientific and technical knowledge currently preventing uptake of MEF and US by the food industry providing innovative and sustainable processing solutions for European Food Manufacturers in a host of sectors. Key to achieving this aim will be the	€350,000.00	17RDSUSFOODERA-NET3 **Final Report Not Available.**

		quantification and demonstration of yield gain and reduced energy consumption with MEF (and US enhanced MEF) compared to existing heating and/or mass transfer operations. To assist commercial uptake, dissemination and information generation to counteract non-technical barriers to uptake are other project aims.		
Prof Lorraine Brennan University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	17RDSUSFOOD2ERA-NET2	**ImPrOVE- Innovative (pre)Pomace valorization process.** The ImPrOVE (Innovative (pre)POmace Valorization procEss) project addresses a major European wide agro-related problem: pomace resulting from pressing fruit. This high amount of pomace is considered waste, but contains natural and highly functional compounds. Skin and core of fruit contain protecting and functional molecules: antioxidants, stabilizers, colorants, aromas, fibers with potential in high value applications in cosmetics, diets and, as bio-additives in food and beverages. ImPrOVE aims to fully valorize pomace by using a combination of existing and innovative processes. These should be easy without high energy/cost demands, resulting in access for S(M)E's (economic strategic European targets) with profit redistributed over the whole chain, strengthening Europe's agro and food activities. ImPrOVE will design a generic process flow applicable to most pomace types. Two cases will be studied: Southern European olive pomace and Mid/Northern European apple/pear/cherry/cucumber pomace. Total valorization is achieved in three process clusters: (1) pretreatment giving raise to aromas and oil from separated seeds; (2) extraction of high value materials from the pretreated pomace and (3) valorization of the resulting fibrous mass, either directly (functionally designed fibers) or by splitting cellulose-lignin and valorizing both materials physically, enzymatically and/or chemically. An ambitious concept is to use bio-based ionic liquids (BIOILs) or natural deep eutectic solvents (NADES) as extraction liquids advanced green solvents. More ambitious, highly appealing, is to study whether the extraction solution itself can be utilized instead of the isolated and purified ingredients, avoiding some downstream processing. Dermatological and metabolomic tests, (eco)toxicity, biodegradation, industrial relevance, scalability and economic viability will be sustainably addressed by the European multidisciplinary partner cluster, with academic and industrial members.	€285,800.00	17RDSUSFOODERA-NET2 **Final Report Not Available.**

Prof Brijesh Tiwari Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:**	2017 Trans-National SUSFOOD2	**BIOCARB-4-FOOD- Extraction and characterization of BIOactives and CARBohydrates fromseaweeds and seagrasses FOR FOOD-related applications.** Carbohydrates are the most important source of food energy in the world being also key ingredients for food formulations, serving as thickeners, stabilizers and gelling agents or providing functional attributes. Functional and technological properties of polysaccharides depend on composition, structure and physicochemical characteristics, defined by source and extraction method employed. Seaweeds and seagrasses are a valuable and under-exploited source of carbohydrates, in particular cell wall polysaccharides (phycocolloids), and bioactive compounds such as polyphenols or carotenoids. Current industrial procedures used by European companies for carbohydrate extraction from seaweeds are highly inefficient in terms of processing time, water and energy requirements. Furthermore, the remaining biomass (generally much more than 50% of the initial material) is used as compost or simply disposed as organic waste. We propose to explore, in close collaboration with industry, novel, environmentally friendly and efficient extraction techniques (ultrasound, microwave, enzymes and their combinations), combined with the exploitation of the remaining biomass, rich in bioactive compounds, to sequentially obtain novel carbohydrate-based extracts and fibers (nanocellulose) from seaweeds and seagrasses. We will characterize structure, technological properties, toxicity and bioactivity of the fractions obtained from the various extraction technologies and a life cycle assessment (LCA) will also be conducted for proving the sustainability of the procedures. The project is expected to contribute to improved process efficiency, development of ingredients with high added value from already commercialized seaweed species and from under-exploited sources (seagrasses) which can positively impact in the competitiveness of seaweed, food and non-food companies at EU scale by a better valorization of raw materials.	€ 305,884.40	17RDSUSFOODERA-NET1 **Final Report Not Available.**

Prof Mary McCarthy University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:**	2017 Trans-National SUSFOOD2	**Plateforms- Sustainable Food Platforms: Enabling sustainable food practices through socio-technical innovation.** In recent years, we have seen an increase in the range of food provisioning platforms available to consumers. Each platform presents consumers with a unique choice architecture. These emerge from both e-commerce development and consumer-driven food provisioning. Little is known about the impact of these new platforms on food choices, or to what degree they represent new opportunities to promote sustainable food practices. PLATEFORMS aims to produce in-depth knowledge on how food practices are affected by socio-technical innovations in food provisioning platforms, and communicate success stories of sustainability to platform owners and policy makers. The project includes both business-driven platforms (e.g. supermarkets, online stores) and consumer-driven platforms (e.g. food cooperatives). Methodologically and theoretically, the project is positioned between individualistic and systemic approaches – whereas the first is focusing on changing individual consumer behaviour, and the second is ignoring consumers in favour of other actors and more "macro" solutions. More specifically, this project takes a socio-technical practice approach, seeing consumption in all its phases of planning, provisioning, storing, cooking, eating, and disposing – driven by practices more than by individual choices. The project will promote sustainable food choices through involvement with platform owners, dissemination of academic results and communication of sustainable success stories across countries and platforms. The communication will target platforms owners, policy makers, and NGOs. By producing new in-depth knowledge about concrete strategies to enable sustainable food consumption through food provisioning platforms, the project will affect consumer practices and choices on a larger scale. Moreover, through intervention studies and collaboration with platform owners, it will be possible to quantify the effect of interventions.	€194,493.00	17RDSUSFOODERA-NET4 **Final Report Not Available.**
Forest				

Prof Christine Griffin National University of Ireland Maynooth Maynooth Co. Kildare. **Lead Institution:** National University of Ireland Maynooth **Collaborating Institutions:** Teagasc	DAFM National Call 2017	**PW-IPM- Towards Integrated Pest Management for Pine Weevil in Ireland.** The large pine weevil Hylobius abietis is a serious pest of reforestation sites for up to five years post felling, and can kill up to 100% of trees if not protected. Currently, cypermethrin is the only effective insecticide that can be used in Ireland against pine weevil, but its use continues under derogation only until 2021. Thereafter, alternative means of managing pine weevil will be required for Irish forestry to retain Sustainable Forest Management (SFM) certification. Forestry plays an important economic, environmental and social role in Ireland with a contribution to the economy of €2.3 billion; it contributes to rural stabilisation and viability, and climate change mitigation through carbon sequestration. It is national policy to practice SFM, and more generally to reduce chemical pesticide use in accordance with the EU Sustainable Use of Pesticides Directive. Integrated pest management (IPM) seeks to manage pests rationally through appropriate silvicultural practices, biological control, and application of pesticides only when necessary. This proposal will review tools available as components of an IPM system for pine weevil, including alternative pesticides, identifying the strengths and weaknesses of each and its applicability in an Irish context, and identifying knowledge gaps and future research or policy needs. Knowing when plants are at risk facilitates more targeted timing of pesticide application, thereby minimising use. We will use simulation modelling and existing data on weevil populations in Ireland in a novel approach to improve forecasting of weevil attack, and likely impacts of climate change on weevil life cycles. Bringing together Teagasc, Coillte and the higher education sector, with an advisory panel representing regulatory and industry interests, the project will help develop critical mass in IPM in Ireland. Involvement of external assistance from Forest Research will ensure that the project is up to date with research and practice in the UK.	€168,181.25	17C228 **Final Report Not Available.**

Prof Maarten Nieuwenhuis University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2017	**LIFOR- LIDAR integrated forecasting.** A timber supply forecast is compiled for Ireland on what is routinely becoming a 5-year basis. In brief, the forecasts provide an indication of the potential roundwood production over the following 20 years. This is valuable information to the wood processing industry, timber growers and policy makers. These groups help maximise the production benefits from forestry in a sustainable way. Compiling an accurate picture of timber availability is challenging, and our knowledge of the current state of private forests and how fast they are growing has significant limitations. This proposal outlines a framework to utilise aerial LiDAR to improve productivity estimates both in terms of growth rates and productive forest area. Processing LiDAR information can determine the average canopy height of a stand, delineate areas of stands based on canopy height and identify top height, i.e. an important indicator to estimate stand yield class. Aerial LiDAR can also identify openspace, roads, extraction paths and other features within forests, which can provide a more accurate estimate of a stand's productive area than the 17.5% – 20% reduction assumed in the 2016-2035 forecast. This aerial LiDAR-based assessment will undergo a ground truthing process through manual inventory carried out by a research master's student. This will include a range of species types and there will be sufficient sample estimates to ensure that productivity can be estimated for a wide range of species. There will be a range of processing techniques investigated and each will be compared, and the benefits/drawbacks will be assessed. The main outcomes will be a comparison these productivity estimation methods, both for the status of a forest and for forecasting outputs using the model used to generate the private aspect of the 2016 – 2035 forecast.	€199,978.22	17C250 **Final Report Not Available.**

Dr Niall Farrelly Teagasc Athenry Co. Galway **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2017	**Genesis- Genomic evaluation for the sustainable Improvement of Sitka spruce.** Tree breeding enabling the selection of faster growing trees with desirable traits has the potential to increase productivity and increase the output of sawn timber for the forestry sector in Ireland. However it is a long term process taking many years to test and produce improved material. This proposal will (i) develop and evaluate a genomics platform to accelerate, improve decision making, and increase efficiencies in the Irish tree breeding programme, and (ii) generate important phenotypes for traits not previously evaluated in the Irish tree breeding programme. This will deliver increased value and competitiveness to the wood processing sector while ensuring the resilience of the forest resource. The proposed research involves development of a novel and cost effective genotyping platform (GenoSpruce) that will be available to the Irish Sitka spruce tree improvement programme (ISSTIP) to be utilised for DNA fingerprinting, characterisation of genetic diversity, evaluating efficiency of seed orchards and within-family genomic selection. We will also make use of emerging genomic resources (SNP Chip) to characterise advanced material in the Irish Sitka Spruce Tree Improvement Programme (ISSTIP) with genome-wide markers, and evaluate using 'diversity index breeding' to make better crossing decisions within the ISSTIP. We will collect new phenotype data (tree form, wood quality, and acoustic properties) on advanced material within the ISSTIP and combine it with the genotype data for cross selection. Finally we aim to evaluate the breeding population for new resilience traits to determine whether the current population would benefit from the inclusion of additional material more resilient to climate change and biotic risk. The project will bring together commercial and academic researchers with complementary expertise to deliver a package of work that will add significant value to the ISSTIP.	€597,100.00	17C297 **Final Report Not Available.**
Research projects funded by DAFM Call 2015				
Coordinator/Lead Institute + Collaborating Institutions funded	**National / TransNational**	**Project Title and Summary**	**Total DAFM Award** (* denotes project co-	**Reference no. & Final Report**

			funded by DAERA	
Agriculture				
Prof Stephen Gordon University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Cork Institute of Technology Agri-Food and Biosciences Institute Teagasc Irish Cattle Breeders Federation	DAFM National Call 2015	**NexusMAP- Next generation approaches to improved diagnostics and molecular epidemiology for control of Mycobacterium avium subsp. Paratuberculosis.** Advances in bioinformatics, 'omics technologies and computational infrastructure are opening up new research avenues in the study on infectious disease. Such Data Analytics or 'Big Data' approaches are becoming common in human medicine, and in this proposal we seek to open up such data-rich approaches to the study of endemic infectious diseases of livestock in Ireland. To achieve this we fill focus on Johne's disease, caused by Mycobacterium avium subsp paratuberculosis (MAP), as our exemplar disease. The focus on Johne's disease is driven both by the lack of effective diagnostics and control interventions for this disease, as well as to provide underpinning evidence for the Johne's disease control programme that was launched in Ireland in 2013, which is overseen by Animal Health Ireland (AHI, Republic of Ireland) and Animal Health and Welfare Northern Ireland (AHWNI). Our project seeks to address key knowledge gaps in our understanding of MAP and Johne's disease, including the need for increased insight into MAP transmission dynamics, improved diagnostic and prognostic biomarkers, and control systems. To achieve this we have assembled a team of highly experienced researchers from across the island of Ireland and supported by international collaborators who will address these research questions using Next generation approaches for control of MAP (NexusMAP). We will combine computational biology and high-throughput 'omics technologies, integration of extensive datasets on animal movement, and health and geographical information systems to deliver this ambitious project. The outputs from this work will therefore help to support not only the nascent Johne's disease control programme, but also the sustainable control of other endemic infectious diseases of livestock through the development and application of common	€959,374.00	15S651 **Final Report not available.**

		approaches for pathogen tracking, antigen mining, data integration, and computational analysis.		
Dr. Sinead McParland Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Irish Cattle Breeders Federation	DAFM National Call 2015	**FENOTYPING- Feasible phenotyping strategies for efficient and effective genetic gain in difficult-to-measure traits in cattle and sheep.** Successful breeding programs are currently predicated on access to vast quantities of phenotypic information. The introduction of genomic information into genetic evaluations, however, requires a re-assessment of strategies to achieve accurate genetic evaluations. The objective of this two-year feasibility study is to generate an all encompassing report (and publicly available tools) to guide Irish (and global) dairy, beef and sheep (and other) sectors on realising the best return on investment in phenotyping (and genomic) strategies for achieving accurate genetic evaluations, especially for difficult-to-measure traits. Although emphasis in the project is predominantly on feed intake and animal health, the approaches developed will be sufficiently generic to be applicable to all traits in most species. The objectives of FENOTYPING will be achieved through 1) evaluation of alternative family-based phenotyping strategies (e.g., phenotyping the animal itself or its ancestors or cousins, or a combination of all) complemented with genomic information, 2) assessment of the performance, ease-of-use, and cost of available tools for the gold standard measurement of feed intake, 3) the potential of international collaboration in the exchange of phenotypic data to achieve accurate genetic evaluations for feed intake and health, 4) strategies to, and benefits of, including difficult-to-measure traits in (Irish) national dairy, beef and sheep breeding programs, all culminating into a 5) cost (Task 1, 2, 3) : benefit (Task 4) of alternative feasible phenotyping strategies for difficult-to-measure traits. The report will provide an objective roadmap of how best to achieve genetic gain, for especially difficult-to-measure traits, but the tools developed will be sufficiently generic to be useful in the future to quantify the overall cost of exploiting newly developed phenotyping tools in on-going projects. The impact of this project is a more holistic and pertinent breeding goal to achieve genetic gain at minimal cost to a self-financing breeding scheme.	€133,647.92	15S672 **Final Report not available.**
Dr. Bridget Lynch	DAFM	**NutriGen- The interaction between genotype and nutrition in high yielding dairy cows**	€1,145,554.00	15S675

University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Agri-Food and Biosciences Institute Teagasc	National Call 2015	**in seasonal grass based systems of milk production.** NutriGen aims to improve the current understanding of the complex interactions between genetics and nutrition in the high yielding dairy cow. The main objectives of the project are to identify key drivers of feed efficiency and energy balance in high yielding dairy cows and the evaluation of the impact of various nutritional strategies and genetic traits on dairy cow performance in a seasonal grass based system of milk production. This will be tested through a combination of desk top studies utilising existing research data and dairy cow nutrition experimentation to examine short and long term implications. This new knowledge will strengthen national capacity with immediate application to farm advisors, farmers and relevant policy makers. A bio economic model will be developed with the ability to conduct a detailed financial evaluation of the likely economic impact of the investigated strategies and the results will be disseminated to key stakeholders.		**Final Report not available.**
Dr. Edgar Garcia Manzanilla Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2015	**AMURAP- Antimicrobial use and resistance in Animal production.** Bacteria resistant to several antibiotics are currently one of the main concerns for WHO. All countries are taking action to address this problem at a human, animal and environmental level. Project AMURAP is collaboration between University College Dublin School of Veterinary Medicine, Teagasc and DAFM to study the use of antibiotics in Irish pig and chicken farms and the consequences in the appearance of bacteria resistant to antibiotics in products and environment. The project will provide a first baseline on the use of antibiotics in Ireland as it has been recently done in other countries. This baseline is key in order to demonstrate the good practices currently applied in pig and poultry Irish farms and to further reduce the use of antibiotics by better farming to ensue Irish pork and chicken keeps being one of the safest in the word.	€572,446.64	16S676 **Final Report not available.**

Dr. Nóirín McHugh Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Irish Cattle Breeders Federation Waterford Institute of Technology Agri-Food and Biosciences Institute	DAFM National Call 2015	**MultiRepro- A multidisciplinary approach to improving the reproductive performance in the Irish sheep, beef and dairy populations.** Reproductive performance is a key determinant of biological and economic efficiency in livestock; reproduction is, however, a multifactorial trait controlled by genetics, nutrition and management. The objective of MultiRepro is to generate a comprehensive and holistic list of the genetic and management strategies available (and their interaction) for improving reproductive performance in sheep, beef and dairy cattle. This multidisciplinary project exploits both available national data and generated experimental data and includes both researchers and industry input. The outcome of this project will lead to a better knowledge of the factors influencing reproductive performance encompassed within a decision support tool. The inclusion of the Teagasc beef, sheep and dairy knowledge transfer specialists is integral to ensure these results are disseminated to industry and provides producers with the essential tools to minimise the reduction in farm profit due to reproductive efficiency.	€777,681.00	**1**5S696 **Final Report not available.**
Dr. Stephen Butler Teagasc Moorepark Fermoy Co. Cork. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Irish Cattle Breeders Federation	DAFM National Call 2015	**FertileBull- New strategies to predict and monitor semen fertility.** FertileBull proposes a novel multidisciplinary approach to critically assess sperm physiological function, and to identify new markers that can be used to predict phenotypic fertility of both conventional semen (male or female calf equally likely) and sex-sorted semen (90% chance of calf of the desired gender). The proposed research will involve unparalleled examination of sperm physiology and cellular interactions within the female reproductive tract using state of the art technologies. The primary objectives are to develop diagnostic criteria for screening tests to predict male fertility in bulls, and to verify these predictors in field trials. An accurate test (or suite of tests) for bull fertility would be hugely beneficial for the cattle breeding industry in Ireland and across the globe. By using only high fertility bulls, the efficiency and profitability of both dairy and beef production systems can be markedly increased.	€1,096,129.00	**15S732** **Final Report not available.**
Dr. Eugene McCarthy	DAFM	**ADIOS- Amoebic disease of salmon.** As with most intensive aquaculture systems,	€601,346.88	15S745

Galway Mayo Institute of Technology Co. Galway **Lead Institution:** Galway Mayo Institute of Technology **Collaborating Institutions:** National University of Ireland Galway University College Dublin	National Call 2015	economic viability is continually challenged by disease and cage-reared mortality rates of up to 20% have been estimated to occur within the Irish Atlantic salmon (Salmo salar) industry base. Of greater concern to industry in Ireland are the estimated loss (12%) incurred specifically to gill disease (Rodger 2007) and is now considered to constitute one of the major health challenges in salmonid farming regions. In terms of economic impact, the most significant disease caused by gill parasites is amoebic gill disease (AGD), which is considered to pose the most serious threat to the salmon aquaculture industry in Ireland. AGD is believed to be a multifactorial condition involving both environmental and biological factors, while knowledge gaps still remain on the potential role of other pathogens such as parasites, bacteria, and viruses in the development of the disease. Based on current knowledge and expertise within the consortium, this project aims to generate knowledge for the development of preventative and curative practices and tools which will be adapted to relevant life stages and husbandry practices for the culture of Atlantic salmon. These will include: identification of genetic traits associated with host response to infection and their correlation to resistance, proteomics and next gen sequencing for identification of biomarker and targeted therapies and reduction strategies. The impact of this project will improve the sustainable production, economic performance and consumer perception of Irish aquaculture. This proposal is aligned to the Department of Agriculture and Food research framework and the objectives (A1.2 aquaculture breeding, A1.5 diagnostics and A1.7 disease control options) of the call topic 'Food Institutional Research Measure' to address the challenges faced by Irish industry for sustainable salmon aquaculture.		**Final Report not available.**
Dr. Ewen Mullins Teagasc Oakpark Co Carlow. **Lead Institution:** Teagasc	DAFM National Call 2015	**SCOPE- Sensing crop pathogens: A novel surveillance system for crop diseases of economic importance.** Ireland's climate supports our crops to produce some of the highest yields in the world. Yet, our climate also supports several crop diseases that can destroy yields. While farmers use pesticides to control diseases, this is unsustainable due to pesticide resistance among diseases and EU legislation which is curbing pesticide use. Of relevance to barley which suffers from 'leaf scald' disease and potato, which suffers from PVY disease, to address this, we need to be able to accurately quantify how	€1,042,320.20	15S618 **Final Report not available.**

Collaborating Institutions: Dublin City University University College Cork		much/little disease is in a crop, before symptoms appear. This is the primary goal of SCOPE, which will develop nanosensors for both leaf scald and PVY to allow farmers to quickly diagnose samples in the field in a matter of minutes. As a result SCOPE will support barley and potato growers to integrate novel pest management strategies into their systems, which long term could reduce pesticide usage.		
Dr. John Mackrill University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:**	DAFM National Call 2015	**SMOCC-.Small-molecule Modulators of Oomycete Calcium Channels** Water moulds are fungus-like in appearance and cause disease in commercially important plants, fish and crustaceans. Late blight of potatoes is a water mould estimated to cost Irish agriculture about €10 million per annum, due to crop losses and expenditure on fungicides. Water moulds are becoming resistant to certain fungicides, whereas the use of other protective chemicals may be prohibited under upcoming EU legislation. Like all other cellular life, water moulds can respond to stimuli from their environments with increases in calcium ions, which in turn control functions like growth, reproduction, movement and death. Water moulds possess a unique type of ion channel, or molecular switch, which allows calcium influx and which is not found in animals or plants. The aim of this project is to develop new types of anti-water mould pesticides, which work by opening these channels, allowing toxic amounts of calcium to enter their cells.	€195,086.16	15S669 **Final Report not available.**
Dr. Sheila Alves Teagasc Oak Park Co. Carlow **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork Waterford Institute of Technology	DAFM National Call 2015	**OPTI-BC- Optimizing production technology in Ireland for break crops.** The sustainability of current crop production practices in Ireland is challenged by the lack of rotation. There is a need to increase the area of broad-acre break crops such as oilseed rape and beans. However, the research base underpinning both the management of these crops, and potential high value end uses is weak. The overall aim of this project is to develop an understanding of the factors impacting on the performance of bean and OSR crops in Ireland and to develop crop management practices that will improve performance in our climate. Rape seed oil quality for human consumption will also be addressed. OptiBC will give updated agronomy information to producers, a potential source of home produced protein for the animal feed industry, information about the quality of cold pressed oils for the food industry and sustainable crop production with better soil health and fertility, protecting our productive land resource	€956,760.35	15S704 **Final Report not available.**

Dr. Helen Grogan Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2015	**NewLeaves- Alternative crops for cut foliage sector.** This project will identify novel foliage plant lines to feed into the cut foliage sector in Ireland in response to growing demand from export and home markets. In addition, information will be gathered on threats to this fledgling industry from pests and diseases that damage cut foliage plantations. There are two main objectives: the first involves identifying high quality specimens of a wide range of decorative shrubs with desirable traits, such as unusual leaf colour or shape, and then developing propagation technologies to reproduce them. The second objective is to survey cut foliage plantations for troublesome pests and diseases and then identify environmentally responsible measures to tackle them. On completion, stocks of elite 'mother plants' will be available for propagation under licence by cut foliage growers or specialist plant nurseries. Practical advice will be available to help growers deal responsibly with pest and disease problems that reduce their profitability.	€558,335.00	15S759 **Final Report not available.**
Dr Daire Ó hUallacháin Teagasc Johnston Castle Co. Wexford **Lead Institution:** Teagasc **Collaborating Institutions:** National University of Ireland Galway Sligo Institute of Technology Trinity College Dublin Dublin City University	DAFM National Call 2015	**FARM-ECOS- Farming and natural resources: Measures for Ecological Sustainability.** This project will identify and outline the evidence for novel, cost-effective measures to protect and enhance farmland biodiversity. These measures will increase habitat quantity, enhance habitat quality and improve ecological connectivity, from farm to landscape scale. The project will build on international research to identify new agrienvironment measures appropriate to Irish conditions. We will address gaps in knowledge related to the importance of habitat quality and ecological connectivity in halting biodiversity loss and enhancing the provision of above and below ecosystem services. The results will feed into cost-benefit models to help identify measures suitable for inclusion in future iterations of agri-environment policy.Through addressing the challenges associated with protecting and enhancing biodiversity and ecosystem services, the project will help the agri-food sector achieve its objectives in relation to the development of economically and environmentally sustainable food production systems.	€890,846.90	15S619 **Final Report not available.**
Dr. Karl Richards Teagasc Johnston Castle Co. Wexford	DAFM National Call 2015	**MINE- Manipulation and integration of nitrogen emissions.** Using cutting edge techniques this project will provide greater understanding of the processes and factors control emissions of the greenhouse gas nitrous oxide (N2O). It will evaluate a range of	€964,710.00	15S655 **Final Report**

Lead Institution: Teagasc **Collaborating Institutions:** National University of Ireland Galway Agri-Food and Biosciences Institute Trinity College Dublin		methods to reduce N2O emissions from Irish grazed grasslands from field to farm scales. The objectives are to identify the regulators of N2O emissions and assess a range of options to reduce emissions at a range of scales using cutting edge techniques. This research will lead to reduced N2O emissions from farms while maintaining production thus will de-coupling intensification and production increase from rises in GHG emissions. This will further improve agricultural emissions intensity, GHG emissions per unit product, underpinning Bord Bia's Origin Green Strategy of sustainable food production.		**not available.**
Dr. Oliver Tully Marine Institute Oranmore Co. Galway **Lead Institution:** Marine Institute **Collaborating Institutions:** National University of Ireland Galway	DAFM National Call 2015	**SEERAC- Spatially explicit ecological risk assessment framework for conservation planning of coastal waters.** This project will evaluate, develop and demonstrate methods to assess the risk of environmental effects from industry activity in the marine sector relative to the conservation objectives for the marine environment reflected in numerous EU Directives. Such methods would seek to achieve the most efficient and lowest cost reduction in the environmental footprint of industry by optimising 'what and how much could go where' solutions. Planning authorities face increasingly complex problems in consenting to development; the range of activities requiring consent is increasing, these activities may be competing for the same space and the environmental conservation targets also vary spatially and can be defined at different spatial resolutions. Decision support tools that will be developed during the project are critical for planners in this complex environment. These tools would be transparent, objective, well informed by data and be capable of guiding consent authorities during the planning process.	€332,225.52	15S687 **Final Report not available.**

Dr. Stephen Hynes National University of Ireland Galway. Co. Galway **Lead Institution:** National University of Ireland Galway. **Collaborating Institutions:** Teagasc	DAFM National Call 2015	**VACES- Valuing agricultural catchments Ecosystems Services.** Agricultural ecosystems supply market services such as food, fibres, fuels and other non-market services vital to human well-being. The purpose of this project is to create an inventory of the ecosystem services provided by farmers in agricultural catchments and place economic values on these services. Cost-effective public policy, in the form of agrienvironmental schemes that provide incentives for farmers to provide ecosystem services from agriculture, require estimates of how society can maximize returns on such investments. Both market and non-market valuation methods can provide estimates of the costs to farmers of supplying these ecosystem services as well as the amount that consumers would be willing to pay to receive them. Research is required both to design cost-effective incentives to provide ecosystem services in agricultural catchments and to measure which kinds of ecosystem services could provide the greatest overall welfare benefits to society.	€107,196.13	15S786 **Final Report not available.**
Prof. David Reid National University of Ireland Galway Oranmore Co. Galway. **Lead Institution:** National University of Ireland Galway **Collaborating Institutions:** University College Cork Queens University Belfast Agri-Food and Biosciences Institute Galway Mayo Institute of	DAFM National Call 2015	**FishKOSM- Fisheries knowledge for optimal sustainable management.** FishKOSM will develop ways to achieve sustainable yields from fisheries that can also deliver better ecosystem, economic and social outcomes. It will use genetics, ecosystem modelling and risk assessment methods to do this, and work with stakeholders to this end. It will provide fisheries management approaches based on this research. FishKOSM objectives are to develop sustainable yield targets for management that account for predator-prey interactions, changes in fish biology, and in fishing itself, and outcomes for fish stocks, fisheries and fleets working with these targets. We will show the ecological risks involved, and likely social and economic effects. Fisheries stakeholders will be involved throughout. FishKOSM's impact should be a more sustainable long term Irish fishing industry, especially in terms of environment, high quality food, jobs and economic growth. It will contribute informed and appropriate advice to ecosystem based fisheries management in Ireland, while building national scientific skills and capacity.	€1,488,745.00	17S744 **Final Report not available.**

Technology				
Dr. David Stead University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc University College Cork	DAFM National Call 2015	**CAPRI-Green- Enhancement of CAPRI modelling with specific focus on its environmental and economic analytical capacity for Ireland.** The CAPRI (Common Agricultural Policy Regionalised Impact) model is a spatial economic model that is widely used to support European decision making related to the Common Agricultural Policy (CAP) as well as the modelling of Greenhouse Gas (GHG) emissions from agriculture. This project aims to improve how the model represents GHG emissions, together with developing a new representation of Ireland at a more disaggregated regional level than is currently the case. It will also enhance the expert capacity within Ireland to utilize this very influential model for policy analysis. The enhanced version of the model will be used to evaluate various agricultural policy scenarios and their potential impact on GHG emissions, thereby making an important contribution to policy analysis and policy formation both within Ireland and the wider European Union.	€496,778.75	15S756 **Final Report not available.**
Dr. Bernadette O'Brien Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** National University of Ireland Maynooth. Cork Institute of Technology	ERANET Call 2015	**Grass-Q- Development of ground based and Remote Sensing, automated `real-time¿ grass quality measurement techniques to enhancegrassland management information platforms.** The focus of this project is to develop and enable an intelligent system that will apply precision management to whole farm grassland and grazing systems. The goal is to optimize grass quality, utilization efficiency, and ultimately profitability, with minimal labour requirement and maximum objectivity. To precisely allocate to the cow herd the absolutely correct area of grass, it is necessary to have an accurate 'real-time' measure of grass quality (as well as quantity). The research proposed here is new and innovative, in that two very different techniques will be used to derive this grass quality measure, either by automated grass quality data capture by a near infrared spectroscopy (NIRS) sensor at ground level or by Remote Sensing image data captured using satellite or unmanned aerial vehicles (UAVs) and subsequent predictive modeling. This project provides a unique opportunity for these two techniques to be operated in parallel. The output or product of this research will be the provision of high quality, 'real-time', geo-tagged information in the form of herbage mass, and specifically grass quality, through a user friendly software package on a Smartphone App or web-based decision support	€242,683.00	15ICTAGRI_1 **Final Report not available.**

		system (DSS). The grass quality measure will be defined as % dry matter (DM), % organic matter digestibility (OMD) and % crude protein (CP). This latter parameter information (CP) together with the location specific nature of the data will also hold potential for targeted fertilizer application procedures for the future. This proposed work is central to one of the two fundamental priorities for SHARP, that being sustainable food production, with competitiveness and sustainability being two of the guiding principles focusing on the pillars of animal production, grass and sustainable management of those. Furthermore, this proposed work is aligned with the FoodWise 2025 vision for the Irish agrifood industry, which recognizes as a key fundamental principal, the grass-fed livestock production system which provides a significant comparative advantage in terms of cost competitiveness and environmental efficiency. The proposed work will enhance both grass utilization efficiency and targeted fertilizer application.		
Dr. Dermot Forristal Teagasc Oakpark Co. Carlow **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin National University of Ireland Galway	ERANET Call 2015	**CTF-Optimove- Mainstreaming controlled traffic techniques and optimization of movements.** CTF-Optimove will focus on yield potential, avoiding production loss on headlands, improving machine performance, optimising CTF configuration and vehicle routing, and dealing with region specific constraints in countries like Denmark, Ireland, and Belgium. The guidelines will be presented at transnational workshops and a transnational advisory network will be put in place. Besides this, the uptake by farmers will be promoted by working with innovative farmers, industry and advisory groups. The specific objectives of this project are:• To develop an operational tool in a form of a Decision Support System (DSS) to minimize soil disturbance and compaction involving specific operational tools. The developed DSS will optimize the planning and control of operations (e.g. soil-sensitive route planning, logistics and scheduling under workability constraints - field readiness) including the configuration and execution of minimal soil compaction practices (e.g. CTF, field traffic planning)• To focus particularly on field headlands by quantifying the levels of crop losses on arable field headlands and identify the factors which contribute to such that losses such as soil structure damage, crop damage, inaccurate input application, etc. as well as determine the role of optimising traffic patterns and input application precision in reducing production losses and	€259,196.00	15ICTAGRI_2 **Final Report not available.**

		optimising costs on headlands areas.• To determine the role of innovative newer sensors in assessing headland position effects.• To effectively quantify quality and demonstrate the benefits of CTF in terms of work rates, fuel consumption and costs. To this end, a tractor will be instrumented with a set of sensors (i.e. fuel meter, speed radar) and data from the tractor operational data will be acquiredgained through the tractor ECU (Electronic Control Unit). • To carry out an adoption study for different farming systems in Denmark, Ireland and Belgium (incl. compatibility with existing systems, social factors influencing farmer uptake, economic viability). • To exploit the results of the demonstration sites. • To promote the uptake by farmers by developing an innovative dissemination package closely working with farmers, industry and advisory groups.		
Food				
Dr Declan Bolton Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Cork Institute of Technology	DAFM National Call 2015	**Clean Broilers- Clean broilers through enhanced farm biosecurity, processing prerequisites and HACCP based interventions.** Campylobacter is the commonest bacterial cause of gastroenteritis in Ireland and Europe. In 2013 (the last year for which there is data available) there were an estimated 68,705 cases of infection in the Republic of Ireland (HPSC, 2015, EFSA, 2010a). Data from the European Centre for Disease Prevention and Control (ECDC) suggests that approximately 43% of confirmed cases are hospitalised. Moreover, although specific data is not available for Ireland, the economic burden of campylobacteriosis is reported to be in the region of £900m for the UK and €2.4bn in the EU, per annum. The handling, preparation and consumption of broiler meat accounts for approximately 20% to 30% of human campylobacteriosis cases, while 50% to 80% may be attributed to the chicken reservoir as a whole (EFSA, 2011). A public health risk reduction of at least 50% would be achieved if all broiler batches complied with microbiological criteria setting a critical limit of <1,000 (103) CFU/g neck skin (EFSA, 2011). Thus, the European Commission recently published draft legislation amending Regulation (EC) No 2073/2005 and proposing processing hygiene criteria (PHC) for the poultry sector. It is proposed that 15 birds will be randomly selected per flock, 10g of neck flap shall be taken and pooled to give 5 x 25g final samples. Within a moving	€1,042,845.00	15F641 **Final Report not available.**

		window of 50 samples, no more than 5 may exceed the limit of 103 cfu/g. It is planned that this legislation be in place by September 2016. The EC are currently discussing intervention options to assist processors in achieving this target. To date EFSA have considered the use of trisodium phosphate, acidified sodium chlorite, chlorine dioxide or peroxyacid solutions. All are considered to be 'safe' for use and effective in achieving the Campylobacter reductions required (EFSA, 2011). The specific objective of this project is to ensure that the maximum number of birds at retail are as clean as possible thus facilitating compliance with the proposed EC Campylobacter PHC. This will be achieved by reducing neck skin Campylobacter counts on all first thin broiler batches to <103 CFU/g through the development, validation and transfer of improved biosecurity on broiler farms and more effective prerequisites (GHP) and HACCP interventions in the processing plant. The commercial cost (cost-benefit analysis) of changes in practices (eg. feeding regimes & removing thinning) and interventions (eg. freezing) to treat noncompliant birds (carcass Campylobacter counts in excess of 103 cfu/g) will also be assessed. In addition to protecting public health, our research will assist our poultry industry stakeholders in achieving compliance with the new EC Campylobacter process hygiene criterion, including preventative measures and corrective actions for FBOs if the microbiological criteria are not achieved. The project will also deliver a 'demonstration farm' to assist in the training of broiler farmers and a virtual Campylobacter data centre (VCDC) to manage (collate, store and analyse) the Campylobacter broiler testing data generated by the private laboratories for the 3 major poultry processors in the Republic of Ireland. The information generated, in combination with the baseline data obtained in this project, will be important in better understanding and monitoring/assessing improvement in the broiler Campylobacter issue. Finally, the research approach and outputs are specifically designed to complement and integrate into the antimicrobial susceptibility testing (AST) programme (undertaken at DAFM Backweston) required under new legislation in 2016 and beyond.		

Dr Geraldine Duffy Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2015	**Vtec One for Health- Surveillance of Verocytotoxigenic E. coli in Ireland: A One Health Approach.** Ireland has the highest rate of human clinical cases of verocytotoxigenic E. coli (VTEC) in the EU, at around 15 cases per 100,000 population, compared to an EU average of 1 case per 100,000. Globally, the profile of VTEC strains causing human illness is continuing to change, and a diversity of serogroups outside the top six (O157, O26, O103, O111, O145, O104), with a variety of virulence profiles, now account for a substantial proportion of VTEC human clinical illness cases (~ 30% in EU in 2013, EFSA, 2015). It is not currently possible to fully define markers for human pathogenic VTEC or the factors that absolutely predict potential to cause human disease (EFSA, 2013). Nonetheless EU DG SANCO and the MS Competent Authorities are taking the view that 'unknown risk' does not mean 'no risk' and that a risk assessment is required if VTEC is recovered in a food product. This illustrates the continuing emergence and challenges posed by this diverse group on pathogens for the consumer, regulators and food business operators (FBOs). This project proposes a One Health approach to surveillance of VTEC in Ireland, with cross-sectoral collaborations across the environment, agri-food chain, veterinary and human public health. Value will be added, by linking the proposed project with other externally funded research and activities on this pathogen. The project will address key data gaps in Ireland on the prevalence and types of VTEC circulating in the agri-food chain and assessment of their human risk potential. The scientific platform to be exploited will be whole genome sequencing of Irish VTEC strains from the environment (wild-life, water, waste), food producing animals (cattle and sheep), food (raw milk cheese, sprouted seeds and fresh produce, meat), and human illness facilitating a national comprehensive comparative analysis of strains from across the total chain, in line with approaches currently being taken in other countries. The metadata on all isolates will be combined with phylogenetic information from the WGS to investigate geographical and temporal linkages and for source attribution of human VTEC isolates.	€1,216,184.00	15F629 **Final Report not available.**

Dr Martin Danaher Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2015	**Raw Milk Cheese- Research supporting the unpasteurised milk and associated cheesemaking industry from a food safety perspective.** Ireland's agri-food sector accounts for approximately €24 billion of the Irish economy and the dairy industry is one of the most important, indigenous industry sectors. The abolition of milk quotas in 2015 presents the opportunity to significantly increase Ireland's production of milk and associated added value products, for example, cheese. Ireland has an international reputation for the quality and variety of its artisan food products, including cheese made from unpasteurised milk. It is important for the entire dairy industry that this reputation is not damaged. Therefore, there is an urgent need to develop advanced analytical methodologies and risk tools to analyse the risks associated with unpasteurised milk cheese. The aim of this project is to assess microbiological (general microbiological quality and foodborne pathogens), toxicological (mycotoxins) and residue (anthelmintic drug residues) risks associated with unpasteurised milk used for cheesemaking. Exposure to such contaminants will be assessed, and appropriate advice will be given to the cheese producers in order to give research support to the industry and protect consumer health. During the project, 400 samples of unpasteurised milk and associated cheese (from at least 10 unpasteurised milk cheesemakers) will be assessed for microbiological, toxicological and residue risks.	€149,627.00	15F690 **Final Report not available.**
Dr Cyril Carroll National University of Ireland Galway. University Road Co. Galway **Lead Institution:** National University of Ireland Galway **Collaborating Institutions:** Teagasc	DAFM National Call 2015	**Campclean- Campylobacter – Control On-farm via Prevention and Exclusion.** Campylobacter infections are the leading cause of gastroenteritis worldwide with poultry meat identified as the primary vector due to carcass contamination from intestinal pathogens. An estimated 2 log10 reduction of intestinal C. jejuni counts would yield a 30-fold decrease of human cases of campylobacteriosis. Extensive ongoing research to reduce flock contamination, including bio-security, vaccination, phage therapy and competitive exclusion using probiotic feed additives containing naturally occurring bacteria with bacteriocin activity, have had little impact to date. The aim of the Campyclean project is to provide poultry producers and processors with novel, safe natural biocides and cleaning treatments to reduce the prevalence and level of Campylobacter in poultry flocks. This project will capitalise on prior research projects at	€599,284.00	15F702 **Final Report not available**

		NUI Galway and Oilean Glas Teoranta, which identified GRAS, polysaccharide-based bioactives from seaweed with the ability to achieve a Campylobcter-limiting effect, giving a 1-3 log reduction in Campylobacter colonisation in broilers. Research with Necon Ireland Ltd. has validated the antimicrobial properties of copper/silver ionised water for the control of pathogens in hospital water systems, food-related process lines and on surfaces. The interventions proposed will address prevention (ionised water) and reduction (plant bioactives) of Campylobacter colonisation. This collaborative, inter-disciplinary and multi-sectorial proposal will translate laboratory research on these novel natural anti-microbials and water treatments to on-farm application, establish their mechanism of action, and develop effective feed and implementation methods that will add commercial and marketing value to Irish Poultry Sector, assist with EFSA, FAO and WHO targets and increase the RDI capability of two Irish SMEs		
Prof Suzie Coughlan University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Marine Institute	DAFM National Call 2015	**FoVIRA- Foodborne Viruses in Ireland – farm to fork Investigation, Identifying Risk and mitigation Approaches for Hepatitis E Virus, Hepatitis A Virus, Norovirus & Sapovirus.** Foodborne viruses pose a risk to public health and are a threat to consumer confidence in the safety of Irish food. Recent developments in testing methodologies (including the publication of International Standards for the detection of viruses in food), growing public health, consumer and industry concerns make it feasible and moreover, essential to address current deficiencies in our knowledge about the risk from viral pathogens in the Irish food chain.The aims of this project are to determine the prevalence and molecular epidemiology of Hepatitis E virus (HEV) in Irish pigs/ pig products and of Hepatitis E virus (HEV), Norovirus (NoV), Sapovirus (SoV and Hepatitis A Virus (HAV) in Irish berries and shellfish and to apply genetic sequencing techniques to investigate the association between viruses identified in the food-chain and those isolated from human infections. A HEV cell culture system will also be established to provide the foundation for future work on HEV inactivation and infectivity studies.Data generated from this research will contribute to a risk exposure assessment and will be used to identify potential control points and risk mitigation measures for viral foodborne pathogens. This collaborative project also provides a unique opportunity to build national capability in	€559,661.00	15F724 **Final Report not available**

		the area of food testing within three leading Irish public laboratories, the National Virus Reference Laboratory, Marine Institute and the Central Veterinary Research Laboratory. This capability, and the network of expertise developed, will provide a sustainable foundation for future work to address the emerging threat to food safety and the food industry posed by these enteric viruses.		
Dr Aidan Coffey Cork Institute of Technology Bishopstown Co.cork **Lead Institution:** Cork Institute of Technology **Collaborating Institutions:** University College Cork	DAFM National Call 2015	**ANTIYEAST- Isolation, characterisation and exploitation of natural anti-yeast agents and their application as consumer-friendly preservatives in food and beverages.** Yeast contamination is a problem in a wide range of food products. Yeast growth, leading to spoilage, is an important cause of economic losses in food industry. The sensorial changes that appear in spoiled food result in consumers' complaints. Vacuum-packed cheeses and other foods/beverages stored under similaranaerobic conditions are particularly susceptible. The overall objective of this project is to characterise the anti-yeast activity of compounds either produced by protective lactic acid bacteria (LAB) or plant-derived compounds identified as defensins. We have previously identified a strong anti-mould LAB strain and the strain has been patented and licensed to Industry. As yeast inhibition was not investigated previously, the proposed project aims to isolate and characterise potential anti-yeast compounds from LAB strains including those previously shown to have anti-mould traits. These anti-yeast compounds would be chemically synthesised to unravel their inhibitory concentrations against selected yeasts. In parallel, antimicrobial peptides known as defensins would also be investigated. These are present in diverse organisms (plants, humans, insects etc). Some defensins in the scientific literature have already been shown to have inhibitory activity against yeast, and indeed one anti-yeast defensin has already been identified in our laboratory where it has been subjected to preliminary investigation against other microorganisms. Here, we propose to mainly focus here on plant defensins that can be easily extracted from seeds and or/chemically synthesised. The inhibitory activity of anti-yeast compounds from LAB and the plant defensins will be assessed both in vitro and in a range of food products (dairy, cereal products and beverages). In addition, the impact of these compounds on a wide range of product parameters will be measured. Special emphasis	€421,200.00	15F731 **Final Report not available**

		will be placed on product safety aspects. Challenge tests will be performed on the food products and cytotoxicity assays will be carried out as well. A comprehensive dissemination and product protection plan will be an integral part of the project.		
Prof Elke Arendt University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Teagasc Cork Institute of Technology	DAFM National Call 2015	**TalentFood- Novel Technological Approaches for the developmenT of low FodMap food products.** Irritable bowel syndrome (IBS) is the most common functional gastrointestinal disorder and has an estimated global prevalence of 10-20% of the general population and constitutes the most common cause of gastroenterology referral. IBS symptoms are triggered by the consumption of the poorly absorbed fermentable oligo-, di-, monosaccharides and polyols (FODMAPs) and insoluble fibre. On reaching the distal small intestine and colon, FODMAPS and insoluble fibre increase the osmotic pressure in the large-intestinal lumen and provide substrates for bacterial fermentation, with consequent gas production, abdominal distension and abdominal pain or discomfort. This condition reduces considerably the patients' quality of life. Sixty-two percent of IBS patients either limited or excluded certain food items from their daily diet and of these 12% were at risk of long-term nutritional deficiencies. In patients with IBS, a diet low in-FODMAPs effectively reduced functional gastrointestinal symptoms. This high-quality evidence supports its use as a first-line therapy. FODMAPs occur in a wide range of foods, including wheat/rye, and people in numerous countries (including Ireland) rely on bread and wheat products (e.g. bread and pasta), for a substantial part of their diet. Nowadays, in Ireland, there are no low-FODMAP food products available on the market and IBS sufferers are forced to follow FODMAP elimination diet by excluding a wide range of foods form their diet. Low-FODMAP diet should not limit IBS suffers' life, it should limit their pain and discomfort, such that they can lead a normal (pain-free) life. TALENT project will develop cereal-based low-FODMAP food products by providing effective technological solutions using enzymatic/malting and fermentation processes with remarkable reductions on FODMAPs and with a concomitant improvement of their nutritional qualities. A strong participation of food industry partners and support associations in this project will help contribute to the social feasibility and economic viability of the strategies developed.	€1,063,850.00	15F602 **Final Report not available**

Dr Linda Giblin Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Cork Institute of Technology	DAFM National Call 2015	**TOMI- Thermal Or Membrane processing for Infant formula.** TOMI will produce infant milk formula (IMF) by cascade membrane filtration (CMF) as an alternative to thermal processing. This next generation IMF will be safe with enhanced bioaccessibility, bioavailability and digestion of proteins, peptides and fats. At present IMF undergoes rigid heat treatment to ensure microbiological safety and long shelf life. As a consequence of the special composition and the heat regimen, IMF is more prone to thermally induced degradation reactions than regular milk products. At the same time, regulations (Commission Directive 2006/141/EC) specify that IMF composition is able to satisfy (1) normal physical growth and (2) is of sufficient biological quality (adequate amounts of protein and in a form that can be utilized by infants). There is scope to improve the nutritional quality of IMF by reducing the thermal load. However this must be accomplished with a clear quantification of the benefits and without compromising safety. The objective of this project is to formulate IMF with reduced levels of thermal treatment using CMF. The process and product will be evaluated to ensure safety is not compromised. TOMI will map the fate of CMF IMF during gastro-intestinal digestion using pioneering intestinal models to investigate bioaccessibility and bioavailability of proteins, peptides and fats and compare results to thermally processed IMF. A real strength of TOMI is the use of piglets in a 28 day feeding trial to mimic the infant gut. IMF represents a particularly important food category to the Irish food sector with approximately 10% of the entire global exports of IMF manufactured in Ireland. This project addresses a primary concern of the IMF industry and has the potential to radically improve the quality of IMF produced in Ireland.	€590,964.00	15F604 **Final Report not available**
Dr Maurice O' Sullivan University College Cork College Road Co. Cork **Lead Institution:** University College Cork	DAFM National Call 2015	**NATRIOPT- Novel Clean label Strategies for the Nutritional and Sensory Optimisation of Reduced Salt and Fat Processed Meat Products.** NATRIOPT optimises processed meats through the reduction and or replacement of salt and fat using novel ingredients as replacers (eg. edible seaweeds). Potential therapeutic benefits of seaweed consumption have been reported in the management of body weight, obesity and cardiovascular diseases thus offsetting negative effects of salt and fat. There is also considerable evidence that heterogeneity of distribution of salt content (eg, two batters	€871,796.00	**15F610** **Final Report not available**

Collaborating Institutions: Teagasc		with different salt contents unevenly mixed or encapsulation) in processed products enhances sensory perception of salt flavour intensity. Additionally inclusions of aromas that suggest saltiness and fat/creaminess can offset the sensory disadvantages of salt- and fat-reduced products and is termed Odour-induced saltiness enhancement (OISE). These will be explored along with the effects of matrix changes on flavour chemistry systems utilising advanced GC (Gas Chromatography) techniques. Salt and fat reduction has a major impact on flavour perception due to changes in the ratios of polar and non-polar flavour molecules. To date this has not been comprehensively undertaken and adds a unique dimension to the proposed project. This data, captured from state of the art GC techniques as well as sensory and consumer data will be mined using chemometrics. Thus this deep understanding of the inherent flavour chemistry systems involved in salt and fat reduction/replacement combined with affective (hedonic) sensory data will allow for the development of optimised products from both a nutritional and sensory perspective. To date UCC and AFRC have obtained very extensive experience in nutritionally optimising processed meats (PROSSLOW, MEATMATRIX) and are uniquely aligned in progressing the state of the art in this field. This is very timely considering recent negative scientific reports and media attention concerning processed meats. By building on existing knowledge and utilising novel natural replacers, products which are more appealing to consumers can be developed.		
Dr Noel McCarthy Teagasc Moorepark Fermoy Co.Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Cork Institute of	DAFM National Call 2015	**DAIRYDRY- Developing the next generation of protein-enriched spray dried dairy powders with enhanced hydration properties.** There is a growing market for high protein powdered dairy ingredients. These powders are often poorly soluble, causing major problems both in manufacturing and the enduser. There is a need to develop high protein powdered ingredients optimized for quality and ease of dispersion. Little is known of the mechanism of dairy powder hydration, and new methods and data are needed to understand the key factors controlling powder hydration. New process technology will be developed to efficiently hydrate primary ingredients before spray drying. Poor hydration of high protein powders is a generic problem frequently manifested as high sediment, surface free fat/flecks and fouling of process pipelines. The	€2,192,740.00	15F679 **Final Report not available**

Technology University College Cork University of Ulster Waterford Institute of Technology		standard industry-accepted test for powder solubility is based on crude sedimentation. Little is known about how powder formulation/processing affects rehydration at the molecular and particularly the nano/microstructural scales due to the complexity of powder constituents, shear forces and speed of hydration. This project is an innovative major collaboration bringing together Ireland's leading research centres in the areas of dairy science, ingredient and process dehydration technology, photonics, and imaging expertise. New protein-enriched dairy powders will be formulated and processed using pilot-scale liquid processing and spray drying facilities. A new Industry Advisory Board, comprising Irish dairy processors will ensure industry relevance. Physico-chemical properties will be characterized at the molecular, nano- and microscales in real time using advanced spectroscopy, microscopy and high speed imaging. Prototype photonics-based sensor devices including off-line flow cells and in-line infra-red sensors will be developed to measure the pattern of dispersion and dissolution of specific constituents such as lactose, proteins and milk salts using infra-red and Raman spectroscopy. New tools will thus be developed to characterise and measure hydration of individual powder particles for the first time. Results will be used to reverse engineer new base powders optimised for rehydration.		
Dr John Tobin Teagasc Moorepark Fermoy Co.cork **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork	DAFM National Call 2015	**SETUP- Future proofing the Irish cheese-whey industry – a step change process to move Irish dairy commodities up the value chain.** Dairy processors in Ireland must future proof their operations against price volatilities in dairy commodities, particularly based on the outlook for the 2016 production season. This project targets novel valorisation technologies, such as new fractionation designs, which fit existing production platforms, for future investment. The creation of high added value in existing product portfolios, particularly cheese and whey, will help buffer the Irish dairy industry against international market volatilities. The STEPUP project aims to revolutionise cheese and whey processing technologies in the Irish dairy industry by reversing the cheese to whey relationship in both Cheddar and Swiss type commercial processes. As such this project will develop, low temperature, scalable, cascade ceramic/organic microfiltration(MF) and ultrafiltration(UF) processes to create whey depleted	€599,000.00	15F683 **Final Report not available**

		recombined milks suitable for cheese making. The soluble proteins(whey/β-casein)removed prior to cheese making will provide processors with an ideal whey source which is extremely desirable for sports/nutritional products and in particular to infant formula manufacturers due to improved nutritional quality. The absorption of the whey depleted milks in custom cheeses suitable for manufacture in typical Cheddar/Swiss type plant designs, creates options for cost effective stabilisation of caseins in low operational cost (as compared to spray drying), long shelf life products(i.e. cheese). Additionally Irish cheese manufacturers will benefit from the new cheese varieties of Cheddar, Swiss and Quark style cheeses created by the STEPUP project, which will be specifically targeted for export markets, which already absorb~172,000 tonnes of cheddar type cheese and 35,000 tonnes of speciality cheeses from Irish processors per annum. Finally removal of whey proteins before cheese manufacture will mean that subsequent whey streams will contain little or no whey proteins. However, the protein composition of whey produced by the STEPUP project will be dominated by Glycomacropeptide(GMP),which will provide Irish dairy processors with a high value,highly functional glycoprotein stream for use in staged nutritional/medical products.		
Dr Paul Cotter Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Institute of Technology Tralee University College Cork	DAFM National Call 2015	**NIHAM Foods- Generation of Functional Foods to Promote the Growth of Newly Identified Health Associated Microbes in the Gut.** Irish researchers have established themselves as global leaders in the gut microbiota field. It is critical that we do not now miss the opportunity to take advantage of the ever greater understanding of the composition of the human gut microbiota and its contribution to health and disease to develop new functional foods that enhance health through targeted programming of the microbiota (Thematic Research Area B.3.1). Until now, prebiotics (nondigestible food ingredients used by beneficial bacteria) were employed with a view to enhancing the growth of the classical, health promoting gut microbes (or probiotics), Lactobacillus and Bifidobacterium, only. However, the application of new DNA sequencing techniques have revealed the next generation of health associated gut microbes. These include Akkermansia muciniphila (anti-obesity), Faecalibacterium prausnitzii (anti-	€603,909.00	15F635 **Final Report not available**

		inflammatory), Eubacterium rectale, Ruminococcus bromii and Roseburia sp. (all butyrate producers*) across a number of cohorts of the population with specific nutritional needs, including infants, young children, adolescents, obese individuals and older people. While it is relatively difficult to grow these microorganisms sufficiently well to facilitate their direct use as probiotics, it is possible to instead develop bioactives and growth substrates that can be incorporated into functional foods to encourage the growth of these microbes already naturally present (but at sub-optimal levels) in the human gut. If we do not take advantage of this knowledge immediately, we will miss an 'once-in-a-generation' opportunity to provide Irish industry with a key advantage in the functional food/gut health space. During the course of 'NIHAM-Food' (Foods for NewlyIdentifedHealthAssociatedMicrobes), bioinformatic analysis of the metabolic pathways present within these microbes (using genome sequence information that is already available) and high-throughput growth assays will be employed to identify the functional food components that will encourage their growth in the laboratory and, ultimately, within the gut. Food processing technologies will be employed to optimise the extraction and application of these nutrients and in vivo and in vitro studies will be employed to demonstrate the extent to which the components enhance the growth of these highly-desirable microbes. Ultimately, the project will lead to the development of new, value-added functional foods that enhance health and wellness throughout the lifecourse. Given that increases in proportions of A. muciniphila, F. prausnitzii, Eubacterium rectale, Ruminococcus bromii and Roseburia sp. would all benefit obese individuals, there will be a particular focus on this cohort when it comes to the human intervention Task within this project. However, it is anticipated that the functional foods developed would positively impact on the gut health on a large proportion of consumers. * butyrate production has been associated with a number of beneficial effects including maintaining gut barrier integrity, reduced artherosclerosis, lower heart attack risk as well as anti-obesity/anti-diabetes benefits		
Prof R.J. Fitzgerald University of Limerick	DAFM National	**BSG-NIVO- Incorporation of novel brewers' spent grain (BSG)-derived protein hydrolysates and blended ingredient in functional foods for older adults and**	€683,937.00	15F647

Co. Limerick **Lead Institution:** University of Limerick **Collaborating Institutions:** University College Cork Cork Institute of Technology	Call 2015	**assessment of health benefits in vivo.** Brewer's Spent Grain (BSG) represents a substantial waste product of the Agri-Food sector. Previous and ongoing research in our laboratories has isolated protein and polyphenolic co-fractions, which have demonstrated in vitro antioxidant and anti-inflammatory effects. The proposed research aims to build on this knowledge by optimising the extraction of BSG protein, phenolics, carbohydrate and lipid by methods including enzymatic extraction, solvent extraction and isoelectric precipitation. All fractions will be fully characterised by advanced chromatographic methodologies including reverse-phase high-performance liquid chromatography and ultra-performance liquid chromatography. It is proposed that producing a novel blended ingredient incorporating each isolated fraction would result in synergistic bioactive effects and yield an ingredient with more potent and complete health-promoting properties. All fractions produced will be initially screened for bioactivities of interest in vitro; antioxidant, immunomodulatory, anti-hypertensive, effect on adipocyte metabolism and satiety signals. This initial screening process will inform the production of a novel blended ingredient and allow the selection of samples with greatest bio-efficacy for incorporation into food formulations. These food products will be specifically tailored for the older adult cohort, being informed by national dietary databases and allowing for physiological changes occurring with aging and needs and preferences of older adults. A range of formulated foods will be analysed for their sensory acceptability using sensory trials and will evaluate texture, flavour, aroma, appearance and overall acceptability. The functional food with greatest acceptability will be selected for a human interventional trial in older adults. This randomised double-blind placebo-controlled trial will measure the effect of the functional food with BSG-derived ingredient(s) on biochemical and functional markers including blood lipids, glucose, inflammatory markers, serum glutathione, weight, body mass index, waist circumference, blood pressure and muscle strength. In the final phase of the project, in vivo findings will be further validated in vitro and mechanisms of action identified.		**Final Report not available**
Prof Kevin Cashman University College Cork	DAFM National	**BioKfoods- Development of biofortification approaches for enhanced vitamin K content of foods: proof of stability, efficacy and sensory appeal.** Vitamin K has	€533,403.00	15F670

College Road Co.Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Teagasc	Call 2015	important physiological functions which relate to blood coagulation (its classical role), but also bone turnover and strength, inhibition of arterial calcification, amongst others. Inadequacy of vitamin K intake is common in all age groups within the population, and this translates into under-carboxylation of key Gla-proteins, respresenting sub-clinical vitamin K deficiency – also common in the population. Clearly, there is an urgent need for food-based strategies for increased vitamin K intake so as to minimise risk of sub-clinical vitamin K deficiency. There are, however, some important hurdles which point towards the need for more creative food-based solutions. For example, vegetables and vegetable dishes are key food contributors to vitamin K intake. Promoting greater vegetable consumption in the population, across all age groups, has been a mainstay of dietary guidelines over several decades, but adherence and uptake of this advise has been challenging. Biofortification of foods with vitamin K is an important potential complementary food-based approach to addressing low vitamin K intakes in the overall population, young and old. Eggs have been shown to be an ideal vehicle for biofortication with vitamin D and cultured/farmed fish likewise. The same approach can be adopted for vitamin K, with scope to potentially increase the content of phylloquinone (vitamin K1) and/or menaquinine (vitamin K2) in eggs and cultured fish. These two foods are being used as exemplars in this project, but there are numerous foods which could be used likewise. The biofortification approach needs to be evidence-based, and this project will bring together a multidisciplinary team of human and public health nutritionists, analytical chemists, food technologists, sensory scientists, and animal nutrition and feed, poultry and culture fish specialists. This research will contribute to the development of functional food products capable of enhancing nutritional status of the consumer while assuring consumer/sensory acceptance.		**Final Report not available**
Dr Lorraine Brennan University College Dublin Bellfield Co. Dublin	DAFM National Call 2015	**OPTI-AGE- Functional foods for Optimal nutrition for healthier ageing.** Osteoporosis is a major public health problem among older adults. Given the significant healthcare costs of treating osteoporosis and its consequences, new strategies to maintain better bone health in older age are urgently needed. Vitamin D and calcium have well established preventive roles against osteoporosis, but other nutritional factors are emerging, with	€302,354.00	15F685 **Final Report not available**

Lead Institution: University College Dublin **Collaborating Institutions:** University of Ulster		recent evidence suggesting important protective roles for folate and the metabolically related B vitamins. We hypothesise that the beneficial effects of Bvitamins will be observed in older adults at-risk of sub-optimal B-vitamin status (either because of low dietary intakes or a genetic variant in metabolism). The aim will be to develop and test a new functional food product designed to enhance bone health in older Irish adults. We will draw on the Trinity Ulster Department of Agriculture 'TUDA' study, the largest database of its kind in Europe, providing comprehensive data on 5200 older Irish adults recruited from both North and South of Ireland (as part of a previous FIRM initiative with co-funding from DEL NI). We will build on our recent TUDA findings showing that those with low B-vitamin intakes (or genetic variation in folate metabolism) were at significantly higher risk of osteoporosis. In parallel studies at UCD and Ulster, we will conduct a 2- year randomised controlled trial (RCT) to demonstrate the benefit on bone health of combined low-dose B vitamins (folic acid and vitamins B12, B6 and B2) in 'at-risk' older people (n=228). Concurrently, in collaboration with our industrial partners, we will develop a new B-vitamin fortified drink and conduct a 4-month controlled intervention study (n=80) to test its effectiveness in optimising B-vitamin status in the target group. The research outputs anticipated from this project will benefit the Irish Agri-Food Sector via development of a new functional food with proven health benefits in meeting the specific needs of older adults *Total Award (* denotes projects co-funded by DAERA)		
Dr Dagmar Stengel National University of Ireland Galway University Road Co. Galway **Lead Institution:** National University of Ireland Galway	DAFM National Call 2015	**SMO-BIO- Seaweed-Microbe Interactions to enhance bioactive yields for food applications.** Irish seaweeds are recognised as an important source of valuable bioactives with, e.g., antioxidant, anticancer, anti-inflammatory, antidiabetic potential for food applications. However, their chemical composition is highly variable, and fluctuates according to environmental influences. More recently, the impacts of biotic (including microbiome) impacts on algal chemical composition and associated bioactivity have been demonstrated but the implications of these impacts on algae used for food applications remain poorly understood. Additionally, storage and processing methodologies influence both directly (e.g. degradation/oxidation processes) and	€824,992.00	15F698 **Final Report not available**

Collaborating Institutions: University College Dublin Teagasc		indirectly (through microbe-mediated processes) the food value of algal biomass. This project will assess the role of seaweed-associated bacteria in bioactive production, and potential degradation, and investigate the scope to apply naturally produced enzymes to increase bioactive yields. Project objectives are to 1) perform for the first-time a characterisation and isolation of bacteria associated with natural Irish seaweeds of food value, 2) evaluate the role of epiphytic bacteria in bioactive production by seaweeds and induced enhancement of bioactive yields, 3) assess the impact of storage and processing conditions on high value compounds in seaweed food species, and 4) assess microbial enzymatic activity with potential applications in bioactive recovery by enzyme-assistant extraction. This project combines established expertise in seaweed biology (NUI Galway; Stengel), microbial biotechnology (UCC: Dobson; NUI Galway: Fleming) and food science and chemistry (Teagasc Ashtown: Rai). It builds on existing capacity developed under the Marine Beaufort Biodiscovery Discovery Programme (http://www.qub.ac.uk/researchcentres/MarineBiodiscovery/) (and NutraMara, (http://www.nutramara.ie/) as well as recent FIRM-funded projects and a recently funded ERA-net project (Marine Biotechnology) NEPTUNA (http://www.marinebiotech.eu/sites/marinebiotech.eu/files/public/NEPTUNA%20Project%20description%20ERA-MBT%20Call%201.pdf). A link between bacterial colonisation, diversity and seaweed functionality, and biochemical composition and related bioactivity will be established for selected seaweed species with recognised value to the Irish seaweed/food industry. Expected project outputs include characterisation of novel seaweed bioactives; processes to enhance bioactive levels and composition, and reduce algal biomass degradation by selecting appropriate storage methodologies; and the development of new applications in bioactive extraction technologies.		
Dr Anna Marie Mullan Teagasc Ashtown Dublin 15. **Lead Institution:**	DAFM National Call 2015	**BioOpps- Opportunities for functional and bioactive protein ingredients derived from co-products of the Irish meat industry.** Recovery of high value protein-rich bioactive/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. Several previous FIRM funded projects,	€90,818.00	15F707 **Final Report not available**

Teagasc **Collaborating Institutions:**		and other international research efforts, have focused on developing methods for generating and extracting these compounds from natural sources, including high value-added co-products derived from meat sources. Examples of products generated include extracts with techno-functional (emulsifiers etc) or biological (heart health) properties. While clear opportunities for recovery of high value functional and bioactive co-products from these streams have been identified, one of the main challenges for technology transfer and commercialisation of these products is the lack of a robust analysis of the market and product specifications etc for such products from an Irish industry perspective. The current project proposes a comprehensive study of the opportunities for selected bioactives derived from co-products of the Irish meat industry, including an overview of the global market and its main producers, global trends, key market drivers, opportunities for small/new players, the supply chain, the competitive landscape, quality, safety and cost requirements (product specifications), available methodologies for production (processes and technologies), regulatory environment, return on investment and a SWOT analysis. As well as guiding research, knowledge generated will be critical in feeding into decisions taken at an industry or national level in how to best exploit these outcomes		
Prof Alan Kelly University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2015	**INFAMILK- The relation between the Human Milk Microbiome, Composition and Infant Nutrition.** Human breast milk (HM) is the Gold Standard feeding regime for newborn infants and represents a baseline for the functional performance of infant formulae. While many milk constituents – for example oligosaccharides, immune cells, and microbes – have been studied for decades, new analytical approaches, research findings, and paradigm shifts are rapidly providing new insights as to how they might impact both maternal and infant health. Moreover, interdisciplinary work is beginning to shed light on how these factors might be interacting in both the mammary gland and the infant's gastrointestinal tract, and influencing the development of the gut microbiota. Establishment of the intestinal microbiota commences at birth and it plays a major role in maturation of the immune system, protection against pathogens, and the long-term metabolic welfare of the infant. In terms of infant health, it is imperative to understand	€600,308.00	15F721 **Final Report not available**

		how early infant nutrition influences the development of a healthy gut microbiota. This project will investigate milk compositional analysis of a large number of lactating mothers from initiation of lactation following giving birth to end of lactation (6 weeks minimum) and will include proteomics, metabolomics and the HM microbiome and will involve computational approaches to understand its complexity, effectors, and functions, as well as the analysis and role of host cells (immune and otherwise) in HM. The relationship between milk constituents and infant health will also be explored, as will the emerging area of milk genomics. Interestingly, no studies have yet been reported to reveal the evolving composition and functionality of HM over lactation, coupled with infant health and development including gut microbiota in infants exclusively fed breast milk, using next generation sequencing. The objective of this platform study is to define the composition, functional performance and microbiome of breast milk over time, using state-of-the-art analytical technology, and correlate findings with gut microbiota composition, using NGS in infants exclusively fed breast milk. The findings of this Platform Study will inform Infant Milk Formula manufacturers as to essential baseline composition, with which to compare and tailor different formulations and ingredients to mimic the biological effects of human breast milk. Thus, the project will provide new opportunities for optimisation of infant milk formula composition, with appropriate new bioactive ingredients such as milk fractions, probiotics and prebiotics to effectively programme the early infant gut microbiota in a manner resembling that of mother's milk. In addition, the work will directly benefit Irish companies producing next-generation ingredients for IMF applications.		
Prof Dolores O'Riordan University College Dublin Bellfield Co. Dublin. **Lead Institution:** University College Dublin	DAFM National Call 2015	**NutriPlus- Innovative food structures to enhance the sensory experience, the nutrient profile and nutrient bioavailability for older people.** Nutriplus will grow Irish dairy capabilities to develop innovative products to target the global elderly population by developing foam and emulsion structures that are easy to chew, digest and promote nutrient bioavailability. Consumer intelligence underpinning the research will be supplied by the partner food companies. One of the key functions of the gastrointestinal tract is the ingestion, digestion and absorption of nutrients. As people age several	€599,950.00	15F737 **Final Report not available**

Collaborating Institutions: Waterford Institute of Technology Teagasc		conditions develop that limit this capability, causing poor health. In the mouth weakened teeth/gums and muscle dysmotility make chewing unpleasant and unsuccessful. In the stomach/intestine decreased secretions (acid,pepsin) reduce digestive capability leading to immunocompromisation. The national adult nutrition survey (2011) highlighted that over 65's were below the estimated daily requirement by 85% for vitamin D, 37% for magnesium while the HSE (2008) reported that diseases of the digestive system cost the HSE 333,716 hospital bed-days. This project focuses on food structure, developing microgel stabilised foams (enriched with vitamins) and nanoemulsion/microemulsions that are easily digested providing a readily available source of vitamin D. Foam/emulsion digestion will be examined in detail, facilitating manipulation of the digestion process to favour the formation of substructures that resolubilise vitamin D improving bioavailability. Sensory science will play an integral role; firstly a pilot study will be conducted to identify the attributes most desired by the older cohort in foams and emulsions. A technique called temporal dominance of sensations will be used to record the sequence of perception of several emulsion attributes by participants. Scale-up studies will ensure processing parameters (temperature, sheer) do not degrade the emulsions functionality/sensory appeal. Human intervention studies will determine the effectiveness of the optimised foam and emulsion structures on improving vitamin D bioavailability. The emulsions will improve general health among over 65's, the foams will target a much later lifestage who suffer from oral processing difficulties.		

Prof Lokesh Joshi National University of Ireland Galway. **Lead Institution:** National University of Ireland Galway. **Collaborating Institutions:** Teagasc	DAFM National Call 2015	**EFFICIenz- Enzymes for efficient milk oligosaccharide production.** This application builds upon an ongoing FIRM-funded project "Enzymatic generation of sialylated lactose from waste whey using marine-derived sialyltransferases" (SIALenz). Two strategies were proposed for the production of sialylated oligosaccharides for use in infant formula supplementation. One strand described in vitro reaction of sialic acid and lactose catalysed by novel animal sialyltransferases while the second strand described bacterial fermentation on lactose using a metabolically engineered Lactococcus strain. The enzymatic addition of sialic acid (Neu5Ac) to lactose cannot be achieved efficiently and with specificity by chemical synthesis. A number of studies have shown that the sialylated oligosaccharides, possess anti-adhesive effects against certain pathogens and pro-adhesive effects for beneficial commensal strains. Sialyllactoses are present in bovine milk but at much lower levels than in human making isolation from bovine milk an impractical option at present. A commercial necessity for the production of sialyllactoses by the in vitro approach using novel purified CHO expressed sialyltransferases is an inexpensive supply of the substrate CMP-Neu5Ac (CMP-activated sialic acid). We propose to use purified CMP synthetase (CMAS) to convert Neu5Ac to CMP-Neu5Ac. Because CMP-Neu5Ac is relatively unstable, a secondary goal is to fuse CMAS with ST6Gal1 making a complex that transfers labile CMP-Neu5Ac directly from CMAS to ST6Gal1 thereby making 6'sialyllactose from lactose and sialic acid. In our second approach to HMO production, we propose to use the expertise gained in the SIALenz project to expand our repertoire of oligosaccharides to the production of fucosylated oligosaccharides. Fucosylated HMOs are important in shaping the infant gut microbiome and are associated with a lower risk of diarrhoea and respiratory disease. We are currently in the final stages of creating a metabolically engineered E. coli strain capable of producing 3' and 6'-sialyllactose. We will use a similar recombineering approach and enzymes derived from marine bacteria/non-human pathogen sources to produce 2'fucosyllactose	€98,877.00	15F747 **Final Report not available**
Prof Albert Flynn University College Cork	DAFM National	**NCFS II- National Children's Food Consumption Survey II.** The overall objective of this project is to establish for the Republic of Ireland (ROI) a nationally representative	€1,232,199.00	15F674

College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:** University College Dublin Dublin Institute of Technology Cork Institute of Technology	Call 2015	database of food consumption in children aged 5-12 years to update 2003-04 data for this group and to complement more recent data on preschool children and adults. The survey will be comparable with existing survey data in ROI and with surveys in UK (GB & NI). The ROI database will be designed to address both nutrition and food safety issues of relevance to the development and implementation of public health policy, food safety risk assessment and to the needs of the food industry In addition to detailed data on food consumption, data will be also be collected on body weight, lifestyle, including physical activity, determinants of food choice, urine, and composition of foods and food recipes. Food composition databases will be updated and restructured to facilitate future analyses of food ingredients, packaging materials, residues, contaminants, allergens, bioactives and microorganisms. Urine samples will be stored to facilitate future analyses nutrition and metabolic indicators, markers of food intake and for estimating exposure to food chemicals. Data will be analysed to estimate intakes of foods and nutrients and compliance with dietary recommendations, to establish the prevalence of overweight and obesity, to investigate physical activity patterns and compliance with guidelines, to identify psychological, social and attitudinal determinants of food choice and eating behaviour. Salt intake will be estimated from urine excretion. Findings will be disseminated to relevant stakeholders.The project will be carried out by a multi-disciplinary research team with strong linkages to related on-going research in food and health sciences.		**Final Report not available**
Dr Áine Hennessy University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:**	DAFM National Call 2015	**BASELINE-DIET- Analysis of diet and eating behaviours in infants and young children as determinants of weight status and health outcomes for innovative product development.** Irish consumers are increasingly aware of the relationship between food and health, and are embracing the concept of foods that are wholesome, clean and enhance health and wellness. Parents are particularly concerned with providing healthy foods that foster good eating habits and behaviours in early childhood, a time of rapid growth and development, which will continue into later life. The Cork BASELINE Birth Cohort study is Ireland's first prospective cohort study which is following 1500 children from 15 weeks gestation throughout childhood. Data collected from birth onwards	€69,759.00	15F703 **Final Report not available**

		include biological samples, early infant feeding and nutrition and a unique longitudinal dataset, the largest to date in the world, of eating behaviours in infants and young children. Our study currently holds Ireland's largest food consumption dataset of 2-year old children and includes biomarkers of nutrient status, prospective validated health outcome variables as well as detailed information on linear growth and body weight status. Currently, the 5-year follow-up assessments are ongoing, for completion in September 2016. The exploitation of these resources will support innovative development of foods and food ingredients to enhance the health and wellness of infants and young children and aid in the development of public health policy. The overall objective of this study is to examine diet and eating behaviours in early childhood and together with the 2-year and 5-year follow up data, investigate associations with dietary quality, nutritional intakes and nutritional status, including growth outcomes, throughout early childhood. Specifically, this project aims to: Investigate the use of follow-on and growing-up milk products and their effect on diet, nutrient intake (with a particular focus on nutrients of concern previously identified in this population subgroup, e.g. vitamin D and iron) and status as well as validated health outcomes, such as body weight in an extensively characterised paediatric cohort. Identify dietary patterns and key food groups that support healthy body weight and growth and development. Investigate longitudinal changes in eating behaviour and evaluate the impact of eating behaviour on weight status from 6 months of age up to 5 years.		
Dr Brijesh Tiwari Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:**	JPI HDHL 2015	**ProHealth- Innovative processing to preserve positive health effects in pelagic fish products**. Increased awareness of the diet's importance for overall health, increase the demand for products with enhanced healthiness having good sensorial properties. Pelagic fish is rich in omega-3 lipids (EPA and DHA) with documented beneficial effect against coronary heart diseases, easily digestible proteins; vitamins (E and D). Therefore pelagic fish is a valuable food resource in a healthy diet. However, during processing; high temperatures, exposure to air, prooxidative components (like heme), may lead to loss or destruction of the valuable healthy components i.e. oxidation of omega-3 fatty acids and proteins. During raw material storage, microbial contamination can lead to	€332,442.50	16HDHL1 **Final Report not available**

		formation of histamine. Therefore, optimal processing technologies to transfer healthy pelagic fish raw material into healthy and safe pre-prepared food products is needed.		
Dr Eibhlis O'Connor University of Limerick SR1001 Schrodinger Building Co Limerick. **Lead Institution:** University of Limerick **Collaborating Institutions:** University College Dublin	JPI HDHL 2015	**Maneul- Malnutrition in the Elderly Knowledge Hub.** The Joint Action "Malnutrition in the Elderly Knowledge Hub" is part of the Strategic Research Agenda of the Joint Programming Initiative "A Healthy Diet for a Healthy Life". The general objectives of the Malnutrition in the Elderly Knowledge Hub (MaNuEL) are to extend scientific knowledge and to strengthen evidence-based best practice in the field of malnutrition in older persons, to build a sustainable, transnational competence network of malnutrition experts, and to harmonise research and clinical practice. MaNuEL consists of six work packages that will focus on: 1) defining treatable malnutrition in older persons, 2) malnutrition screening in older persons, 3) determinants of malnutrition in older persons, 4) prevention and treatment of malnutrition in older persons, 5) policies and education regarding malnutrition screening and treatment in older persons across Europe, and 6) management of MaNuEL. The specific objectives to be addressed in these work packages are: develop a definition of treatable malnutrition, compile data on the prevalence of treatable malnutrition from existing studies, provide insight into the body composition characteristics of those with treatable malnutrition, obtain an overview based on published literature on existing screening tools for malnutrition in older adults, select preferred malnutrition screening tools for older adults in different community and health care settings, obtain malnutrition prevalence data in older adults across Europe (and beyond) based on these preferred screening tools, identify key determinants of (treatable) malnutrition, develop a list of reliable and valid instruments to measure these determinants, obtain an overview on the effects of non-pharmacological interventions on malnutrition, obtain an overview on on-going and planned studies on non-pharmacological interventions, obtain an overview on current policies and practice across Europe regarding screening and treatment of malnutrition in older persons in	€249,079.00	15HDHL2 **Final Report not available**

		different health care settings, obtain an overview on formal education of health care professionals across Europe regarding screening and treatment of malnutrition in older persons. MaNuEL will create a network of dedicated scientists to build better research capacity on malnutrition across Europe. It will contribute to a common / shared understanding regarding the definition of malnutrition, the aetiology and prevalence of malnutrition in older persons, preferred screening tools, and effective interventions for malnutrition in older persons from different health care settings. MaNuEL will perform systematic literature reviews to complete the present fragmentary picture on malnutrition and to identify potential knowledge gaps. Furthermore, MaNuEL will bring together and harmonize transnational datasets from nutritional intervention trials and observational studies to perform secondary analyses and build a research infrastructure for future research questions. Finally, MaNuEL will provide insight in current clinical practice, policies, and health professionals education on malnutrition and will identify best practice examples and recommendations for improvement.		
Prof Catherine Stanton Teagasc Moorepark Fermoy Co Cork. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork	JPI HDHL 2015	**Longlife- Food Fermentations for Purpose: Health Promotion and Biopreservation.** LONGLIFE will involve innovative processing of food substrates (milk and cereals) into fermentates, using novel strains of lactic acid bacteria (LAB) and yeasts to produce value-added fermented liquids and powders, grain-derived foods and beverages, long-fermented sourdough bread, and meat products with improved health benefits, organoleptic qualities and extended shelf-life. Based on pre-selection of starter bacteria capable of producing bioactive metabolites (exopolysaccharides, polyols and antimicrobial compounds) and their use during fermentation of milk, cereals and meat, we propose to improve the fermentation process by manipulating processing conditions to optimise food properties for health and economic benefit. Characteristics such as digestibility, palatability, stability and quality of the finished products will be taken into consideration to ensure highly marketable products are developed. Additionally, new prebiotic ingredients will be developed within the LONGLIFE consortium based on novel superheated steam processing of bran substrates for enhancing bio-functionality in	€667,000.00	15HDHL3 **Final Report not available**

		food/beverages. Ex vivo studies will yield data on the validation of health effects (prebiotic and bioavailability/digestibility) of the generated ingredients and products. The project will have a positive impact on the food industry through the innovative processes developed which can improve food processing efficiency, lead to new markets and increased competitiveness. The developed products with improved functionality and shelf-life will contribute to more sustainable food production and nutrition security, benefitting the health of citizens, society and the economy.		
Forest				
Dr. Annette Harte National University of Galway Ireland **Lead Institution:** National University of Ireland Galway **Collaborating Institutions:**	DAFM National Call 2015	**EARTH- Exploitation And Realisation of Thinnings from Hardwoods.** This project aims to support the development of the forest-based sector in Ireland by developing knowledge on the wood quality Irish hardwood thinnings and identifying possible end-use applications. This will be achieved by undertaking a study to quantify the available dimensions from first and second thinnings. The physical and structural properties of the material will be determined through experimental testing. Based on the information arising out of these investigations, potential end-uses of the material will be identified: in roundwood form, as engineered wood products, or as wood energy products. This project will endeavour to increase the financial returns to forest owners by focusing on the potential value that exists within their forests. Increased take-up of thinnings will also generate employment in rural areas and will contribute to rural development. Identification of new products from hardwood thinnings will lead to job creation opportunities.	€194,543.72	15C666 **Final Report not available.**
Dr. Annette Harte National University of Galway Ireland **Lead Institution:** National University of Ireland Galway	DAFM National Call 2015	**CICLT- Commercialisation of Irish Cross-Laminated Timber.** Cross-laminated timber is a sustainable, efficient, heavy-duty panelised construction material that can be used in demanding applications including multi-storey buildings. The potential to use Irish Sitka spruce to manufacture a cross-laminated timber modular flooring system has been identified. This project will develop the necessary data to support the commercialisation of this product. The objective of this project is to verify the adequacy of the panel mechanical performance, identify suitable connection systems and efficient installation technologies. In addition, this project will endeavour to develop a production process,	€80,035.00	15C694 Final Report Available https://www.gov.ie/en/publication/ce553-

Collaborating Institutions:		which by standardisation within the manufacturing process, will optimise the production effectiveness. The development of a novel, high-performance and cost effective product will support the utilisation of Irish timber in construction. The sale of such products will potentially increase turnover in both the forestry and construction sectors, leading to job creation particularly in the rural community.		research/
Prof. John O'Halloran University College Cork North Mall Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Bird watch Ireland Coillte	DAFM National Call 2015	**SHINE- Supporting Hen Harrier In Novel Environments.** Hen harriers traditionally occupy open habitats but forest habitats are now important for nesting. However, research at University College Cork has demonstrated that this species may be subject to an ecological trap, where they are selecting habitats in which they can survive, but where habitat quality does not permit them to thrive. The proposed project builds on previous work on this species which evaluated habitat selection, the use of forested landscapes in relation to nesting, foraging and breeding success, and the interactions with wind energy development. It aims to provide support for practical site-focused planning and management measures that both increase the habitat value of forests for hen harriers and reduce the influence of pressures on hen harriers within forest-related habitats. This project aims to exploit large, archived datasets on hen harrier breeding ecology in Ireland, a large proportion of which has been collected by UCC as well as the latest 2015 survey data. We will investigate the relationship between hen harrier breeding success and forest management practises in the face of climate change. In addition, we will incorporate new data from a satellite tagging project (RaptorLife). This will yield valuable new flight path and ecological data, complementing the data collected using GPS tags on hen harriers since 2007 by UCC. Fieldwork will be conducted to address two gaps in existing knowledge; vulnerability to predation and the influence of clear-felling debris (brash) on habitat quality. We will also address three specific site-focused planning and management measures; 1) identify areas where forest removal may benefit hen harriers; 2) review current pressures to hen harriers using 2015 survey data and 3) conduct a meta-analysis of alternative mitigation measures to current Red Zones in place. Finally we will work with a well-established community group (IRD Duhallow) to disseminate findings both locally and nationally.	€199,881.94	15C638 **Final Report not available.**

Dr. Aine Ni Dhubhain University College Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2015	**FOROWN- Irish private forest owners: The role of knowledge transfer and social networks.** Private forest ownership will account for an increasing proportion of the forest estate in Ireland. Thus private forests will play an increasing role in delivering ecosystem services, not least timber production. Reflecting this, forecasted timber supply from private forests is expected to double in the next 20 years. For this forecasted supply to be realised private forest owners must become mobilised and ensure that their forests are managed, and in particular thinned. However, many forest owners have yet to become engaged in forest management and with other forestry stakeholders. This study aims to understand the factors that influence forest owners' engagement specifically focussing on the role of knowledge transfer events and the social networks of owners. It will also explore broader issues relating to owner engagement including the values owners assign to their forests, and engagement with the value chain. It will do so using a number of approaches guided primarily by a purposive sampling framework. Semi-structured interviews will be conducted with forest owners to obtain a general understanding of their engagement in management, the value they place on their ownership and what influences their forestry-decision-making. To address the role of advisory services in supporting forest management decision-making, the learning that occurs at knowledge transfer events (e.g. thinning demonstrations) will be assessed to ascertain the capacity building that occurs at the events. Gaps between forest owners' intentions to act in a particular way (e.g. thin their forests) and their actual actions in relation to those intentions will be explored in a longitudinal study. The social networks of forest owners will be identified to determine the role these play in owner engagement. The results of this study will lead to the development of better targeted advisory and policy initiatives to assist Irish forest owners manage their forests sustainably.	€198,363.75	15C648 **Final Report not available.**

Dr Trevor Donnellan Teagasc Athenry Co. Galway. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Dublin Institute of Technology Agri-Food and Biosciences Institute	DAFM National Call 2015	**Irish Land UsES- Irish Land Use Emission and Sequestration Support Tool.** This project will model future land use developments in Ireland under a range of scenarios, with a view to understanding the implications for GHG emissions and carbon stocks. It brings together the expertise of researchers working in a range of disciplines, including the economics of agriculture and forestry, environmental science, forestry research and spatial analysis. The key objective will be to integrate the, heretofore independently developed, modelling capacity that these researchers have created, into a framework which allows for cross model consistency in terms of scenario assumptions and associated analysis. This will create the research capacity to address specific scenarios across a range of models in the knowledge that there will be internal and global consistency in the models' results. The integrated modelling platform will be capable of being used as a decisions support tool for policy makers, analysing the tradeoffs between different strategic choices, which could arise from domestic or international policy options. The ultimate aim is to assist policy makers in delivering policy which can generate desirable outcomes for land use. Taking its cue from Food Wise 2025, the project will balance economic and environmental objectives for growth in the agri-food/forestry sectors. The integrated model will investigate the potential future GHGs emissions and sequestration of the agri-food and forestry sectors arising from particular strategies and the associated economic implications of particular strategies. The ultimate objective should be to manage a growth path for the agri-food and forestry sector which achieves an appropriate balance between economics growth and net carbon emissions. This will reflect constraints imposed by policy negotiations at the EU level, alongside national level priorities to be determined by government. Scenario simulations will demonstrate which scenarios for agriculture and forestry are more or less supportive of the horizon ambition of carbon neutrality in the sector by 2050.	€1,384,824.93	15C650 **Revoked.**
Research projects funded by DAFM Call 2014				
Coordinator/Lead Institute + Collaborating Institutions fuffnded	**National / TransNational**	**Project Title and Summary**	**Total DAFM Award** (* denotes project	**Final Report**

			co-funded by DAERA	
Agriculture				
Dr. Donagh Berry Teagasc Moorepark Fermoy Co. Cork **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Irish Cattle Breeding Federation	DAFM National Call 2014	**HealthyGenes- Long term sustainable breeding strategies for consistently superior health in cattle.** This is a high impact project. The objective of HealthyGenes is to develop and implement a world-class long-term and sustainable breeding strategy for improved animal health in Irish dairy and beef cattle, well beyond the lifetime of this project. This will be achieved through efficient and effective feedback between the individual recording the phenotype and the genetic evaluation system. This project will deliver: 1) animal health data from a range of different sources linked directly to the national database, 2) the generation of knowledge of the genetic parameters and genomic architecture for a range of diseases and their inter-relationships as well as genetic associations with performance traits, and 3) a detailed understanding of the economic impact of compromised health quantified which will be relayed back to producers through decision support tools. The genetic and genomic research will be undertaken from routinely collected data but also through the collection of animal health traits in a well-structured very large dairy cow population. The outcome from this project will be a guaranteed world-class national routine genetic evaluation for a range of animal health traits and their inclusion in the national breeding objectives. HealthyGenes will exploit information and expertise from on-going projects.	€1,120,108.10	14S801 **Final Report not available.**
Dr. Orla Keane Teagasc Grange Dunsany Co. Meath **Lead Institution:** Teagasc	DAFM National Call 2014	**SSPSA- Strain specific pathogenicity of Staphylococcus aureus.** Intramammary infection or mastitis results in inflammation of the mammary gland and is primarily caused by bacterial infection. Genetic selection for mastitis resistance is performed indirectly using traits genetically correlated to mastitis, such as somatic cell count (SCC). However, the genetic correlation between SCC and S. aureus mastitis is only moderate. Host-pathogen co-evolution is a paradigm of infection biology with hosts adapting to recognise pathogens and mount an effective immune response while pathogens evolve to avoid such recognition. Mastitis pathogens that evade the host immune system and fail to induce a	€348,940.70	14S802 **Final Report not available.**

Collaborating Institutions: University College Dublin		significant inflammatory (SCC) response will have a selective advantage. S. aureus can evade the immune response by internalising within mammalian cells and modulating the host's ability to produce pro-inflammatory cytokines, designed to attract immune cells into the udder. This ability is strain-dependent. Therefore, genetic selection on lower SCC alone may inadvertently result in a selective advantage for strains of mastitis pathogens which result in a reduced inflammatory response. This project aims to test the hypothesis that S. aureus displays strainspecific pathogenicity and pathogen-specific factors influence SCC. This project will identify robust bioavailable markers of S. aureus infection that could be used to refine selection of mastitis resistant animals.		
Dr. Donagh Berry Teagasc Moorepark Fermoy Co.Cork **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin Irish Cattle Breeding Federation	DAFM National Call 2014	**OVIGEN- Multi-breed sheep genetic and genomic evaluations.** Previous studies in cattle suggest genetic gain can be increased by 50% with genome-wide genomic selection. Responses from genomic selection are expected to be greater in Irish sheep because the accuracy of genetic evaluations currently achieved in Ireland with traditional approaches is low. OVIGEN will focus on: 1) increasing the number of phenotypes for genetic and genomic evaluations (especially on commercial crossbreed sheep), 2) developing accurate national genetic evaluations, 3) scoping the feasibility of international evaluations, 4) implementing genomic selection from generated genotypes and phenotypes on 11,560 sheep, and 5) evaluating alternative breeding schemes. Genetic and genomic evaluations for all performance traits will be developed in this project. The impact is a large increase in accuracy of the genetic evaluations for all traits reducing fluctuations of individual animal estimates of genetic merit over time, a demand of Irish sheep breeders. The outcome from OVIGEN will be a national across-breed genomic selection breeding programme for Irish sheep advancing Ireland to the forefront of international genomic selection. The strong inclusion of ICBF/ Sheep Ireland and Teagasc extension in this project ensures rapid and seamless implementation. OVIGEN has the potential to increase genetic gain by at least 350% (i.e., from €0.04/lamb/year to €0.14/lamb/year).	€1,106,382.50	14S849 **Final Report not available.**
Dr Laura Boyle Teagasc Moorepark Fermoy	DAFM National Call 2014	**PROWELCOW- Strategies to Protect and improve the welfare of dairy cows in Irish sytems of milk production.** Expansion of dairy herds post quota poses serious threats to the welfare of Irish dairy cows. One of the greatest concerns is an increase in the	€78,260.83	14S890 **Final**

Co. Cork. **Lead Institution:** Teagasc **Collaborating Institutions:**		prevalence of subclinical and clinical lameness. This has negative implications for profitability and could erode the 'welfare friendly' image of Irish dairying systems. This project aims to better understand risks to cow welfare and to identify and develop strategies to protect it. These strategies will be focused on identification of welfare traits for inclusion in the Economic Breeding Index (EBI) and development of a cow welfare assessment scheme. A post-doctorate (PD) will be hired to review the literature to establish risk factors for cow welfare, to identify the main welfare issues likely to be of relevance in Irish dairying systems and to identify welfare traits for the EBI. The PD will evaluate international dairy cow welfare assessment schemes and their relevance for Irish systems of milk production. A survey of dairy farmers will be conducted to identify current/emerging management, housing, nutritional practices with relevance to cow welfare. From this a welfare assessment scheme for use in pasture based systems will be developed and priority areas for research identified. A social scientist will interview stakeholders in the dairy industry to determine perspectives on dairy cow welfare and ideas for ways in which cow welfare can be protected as the industry moves into a non-quota era.		**Report Available** https://www.gov.ie/en/publication/ce553-research/
Dr. Finola Leonard University College Dublin Bellfield Dublin. **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc Cork Institute of Technology	DAFM National Call 2014	**Pathsurvpigs- Investigation of respiratory disease in Irish pig farms, associated rish factors, and the relationship with performance, welfare and antimicrobial use.** Respiratory disease is among the most significant infectious conditions contributing to production losses in the pig industry. However, there are few data available on respiratory disease, associated pathogens, morbidity and mortality in commercial pig units in Ireland, despite high levels of antimicrobial drug usage and the need to improve production efficiency, health and welfare. This project proposes to bring together for the first time in Ireland, expert researchers in the areas of veterinary pathology, microbiology, epidemiology and pig welfare to address this deficit. Baseline data on respiratory pathology on farm and at slaughter will be collected, including cross-sectional data from 80 to 100 farms and data from longitudinal studies on up to 20 farms. Simple diagnostic approaches will be optimized for on farm use, in conjunction with sophisticated laboratory pathological and microbiological analyses where required. A holistic approach will be	€717,781.71	14S832 **Final Report not available.**

		adopted and data on respiratory disease will be set in the context of information on risk factors for disease, farm management and productivity, other disease problems, animal welfare and antimicrobial usage. This will allow comprehensive cost-benefit analysis to be completed and maximize understanding of the underlying reasons for disease occurrence on farms and cost to the industry. Data on costs, risk factors and associated effects on pig welfare and productivity can then be used to drive management change on farms to control respiratory disease and associated losses, thus contributing to more profitable and sustainable pig production.		
Dr Keelin O'Driscoll Teagasc Moorepark Fermoy Co. Cork. **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2014	**ENTAIL- Environmental enrichment and nutritional strategies to reduce tail biting in pig farms.** Pigs are highly motivated to perform exploratory behaviours. In commercial facilities this behaviour is often directed towards other pigs, particularly in times of stress. This results in tail-biting, one of the most serious health, welfare and production problems in pig production. Docking of pigs' tails is used as a control mechanism, yet even so, tail lesions due to biting are present in up to 70% of pigs. Moreover, routine tail-docking is forbidden in the EU. However, manipulable environmental enrichment reduces the amount and severity of tail-biting, and is a legal requirement. This project will investigate the efficacy of two enrichment materials on pig welfare: compressed straw and wood. Straw is extremely effective as enrichment; however the replacement rate of compressed blocks could be dependent on the diet of the pigs. Thus we will also investigate whether fibre level can impact the replacement rate of the straw. Wooden 'chew' posts are an alternative to straw, but there is little research on the most effective type of wood (e.g. hard or soft wood). Moreover, wood may be a cheaper option than straw in Ireland. Finally, we will investigate the feasibility of managing pigs with undocked tails using the most effective enrichment strategies identified.	€177,784.43	14S871 **Final Report not available.**
Dr. Dan Milbourne Teagasc Oakpark Co.Carlow. **Lead Institution:**	DAFM National Call 2014	**VICCI- Virtual Irish Centre for Crop Improvement.** This project will see the establishment of a Virtual Centre for Crop Improvement (VICCI) which has at its core two principle objectives: (i) to exploit the output of recent/current research programmes to effectively interconnect the application of biotechnology tools to varietal improvement goals and (ii) to build sufficient capacity in Ireland to lead to the identification and development of	€2,992,993.88	14S819 **Final Report not**

Teagasc **Collaborating Institutions:** University College Dublin National University of Ireland Galway National University of Ireland Maynooth Trinity College Dublin		improved crop varieties for the Irish agri-industry. Across barley, wheat, oats, ryegrass, beans and potatoes, key traits for crop enhancement have been identified in disease resistance, nutrient use efficiency and productivity. In addition to the output traits identified this multi-institutional centre (Teagasc, UCD, NUIM, TCD and NUIG) will also address food quality issues for import replacement in the form of processing potatoes. By addressing current policy requirements as per FoodHarvest 2020 and the NRPE (Section 3) the relevance and impact of the proposed work is real and ultimately will significantly decrease the farming industry's environmental footprint in the form of water quality and greenhouse gas emissions.		**available.**
Dr. Michael Gaffney Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin National University of Ireland Maynooth	DAFM National Call 2014	**EPIC- Establishing a Platform for IPM in Irish Crops.** As part of the Sustainable Use of Pesticides Directive (2009/128/EC) EU member states are obliged to develop National Action Plans (NAP) to reduce the impact pesticides have on human and environmental health. Within each NAP the encouragement and introduction of Integrated Pest Management as means of reducing the dependency of the different cropping systems on such pesticides is essential. However the capacity of each cropping system to reduce pesticide input through the adoption of IPM is dependent on the specific pest targeted and their interactions with the different crops and their environment. As Irish climatic conditions can exacerbate such pest problems it is strategically important to evaluate IPM strategies adopted in climatically similar regions for their efficacy in Irish cropping situations. The proposed project, EPIC (Establishing a Platform for the IPM in Irish Crops) seeks to address these issues. To achieve these goals EPIC will a) establish through detailed surveys the potential for / or limitations of IPM within Irish tillage and horticultural crops b) use specific case-studies the determine the potential for current forecasting or risk based IPM strategies c) disseminate best practise to farm level through various mediums, including the production of crop specific IPM best practise guides.	€763,015.00	14S879 **Final Report not available.**
Dr. Helen Grogan Teagasc Ashtown Dublin 15.	DAFM National Call 2014	**AgGenes- A genomic approach to understanding and improving mushroom compost utilisation.** This project will use the most current genomic and molecular tools to investigate the mechanisms underlying the processes of nutrient utilisation by Agaricus bisporus with the ultimate aim of improving mushroom crop yields, particularly in the	€395,200.80	14S865 **Final Report**

Lead Institution: Teagasc **Collaborating Institutions:**		third flush. We will be conducting genomic analysis of compost, casing and mushroom samples to track changes in compost degradation genes and/or other significant biological pathways/processes throughout the cropping cycle from Phase 3 filling to third flush. We will work with industry to obtain samples from commercial crops in progress. The International spawn company Sylvan, based in Ireland (Navan) will provide us with some interesting strains to compare gene expression profiles from a compost utilisation perspective. The work should lead to other projects with either individual businesses or EU consortia. We plan to use the project as a forum for discussion with interested stakeholders on preparing an EU proposal for horizon 2020. This project will train a senior post doctoral scientist and a PhD student in Agaricus genomic techniques who can feed into Irish research organisations and mushroom businesses.		**not available.**
Dr. Trevor Donnellan Teagasc Athenry Co. Galway **Lead Institution:** Teagasc **Collaborating Institutions:** National University of Ireland Galway	DAFM National Call 2014	**PRIDES Irish Food- Proofing Relevant Indicator Data to Evaluate the Sustainability of Irish Food.** This project examines the current and future need for Irish sustainability metrics at farm, product and sector level across economic, environmental, social and innovation dimensions. The project will engage with stakeholders to assess the current and likely future demand for sustainability metrics from the perspective of agricultural, rural development and environmental policy and also in the context of the domestic and international promotion of Irish food, resulting in the development of objective, rigorous and nationally representative metrics of sustainability. The study will conduct a review of available Irish data that could be used to assess sustainability and will also identify data which are not currently available, but which would be required for the generation of new or improved sustainability metrics. In conjunction with the stakeholders, additional data collection will be prioritised with relation to need and feasibility of generation/collection. In addition, given that existing methodologies are employed to measure sustainability within the farm-gate, a full life-cycle analysis will be investigated. The feasibility of collating existing datasets to create historical sustainability measures will also be examined. Developments in terms of Irish food production will be assessed in the context of their implications for future sustainability, providing valuable information for policy formulation.	€199,607.08	14S889 **Final Report not available.**

Dr. Kevin Hanrahan Teagasc Athenry Co. Galway. **Lead Institution:** Teagasc **Collaborating Institutions:** National University of Ireland Galway	DAFM National Call 2014	**TFP IrishAg- Total factor productivity of Irish Agriculture: Measurement, Scources and Comparisons.** There is an acknowledged dearth of regular, consistent and reliable information about the total factor productivity (TFP) growth performance of the Irish (and EU) agricultural sector and sub-sectors. The primary objective of this project is to establish a standardised measure of TFP that will be capable of being updated and published annually using Teagasc National Farm Survey (NFS) data and data from the Central Statistics Office (CSO). This TFP indicator series will be an important economic performance indicator for the sector as a whole. This research will also examine the determinants of historical productivity performance at sectoral and sub-sectoral levels and undertake a comparative analysis of Irish agriculture's TFP performance internationally. The knowledge based bio-economy is predicated on the idea of productivity augmenting knowledge adoption by farmers and other economic agents within the agricultural sector. The achievement of smart and green growth, that is growth at what Ricardo called the intensive rather than the extensive margin, will be critical if Irish agriculture is to successfully meet the challenges it faces. Knowledge of how agriculture is performing in terms of productivity growth (as measured by total factor productivity indices) will be critical in framing policies designed to improve the economic and environmental sustainability of Irish agriculture. EU agricultural policy continues to become more market orientated and simultaneously more focused on the environment. Growing agricultural incomes, while maintaining the environmental sustainability of Irish agriculture (within a policy environment in which income supports will remain decoupled from production) will require increased emphasis on improving the productivity performance of the Irish agricultural sector.	€191,577.81	14S875 **Final Report not available.**

Dr. Fiona Thorne Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2014	**MetricComp- Measurement and Understanding of the International Competitiveness of Irish Agriculture.** How do farms in Ireland compare with farms in other countries, in terms of output price, costs of production, profit margin and market share? With the impending end of the milk quota system and the ambitious plans for the Irish dairy and other agriculture sectors set out in in the Food Harvest 2020 report, the competitive position of Irish agriculture and the determinants of this competiveness performance will be critical in framing public policy that seeks to maximise the contribution of the agri-food sector to the Irish economy. This project will examine the international competitive performance and potential of the main sectors of Irish agriculture against our main trading partners and competitors using microeconomic data from the European Commission's FADN, bilateral trade data, and data from international farm comparison networks (IFCN Dairy and AgriBenchmark Beef, Sheep and Crops). An analytic framework within which measures of the competitiveness performance of Irish agriculture can be updated on an annual basis will also be developed. The sources and the process of competitive performance (i.e. competitive potential and competitive process) in Ireland (and competing countries) will be examined, with a particular focus on innovation.	€194,745.83	14S847 **Final Report not available.**
Dr Maeve Henchion Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** National University of Ireland Galway University College Dublin Dublin Institute of Technology	DAFM National Call 2014	**BIO-EIRE- A Bio Economy for Ireland - An Evaluation of Development Opportunities, Policies and Initiatives Shaping Ireland's Transformation to a sustainable low carb on bioeconomy.** Ireland's agriculture, food, forestry and marine sectors are some of Ireland's most important manufacturing sectors, employing 150,000 people and contributing €24 billion to the economy. Ireland benefits from competitive advantages that include (1) a mild climate supporting very high biomass growth; (2) a low-cost grass based system supporting large dairy/beef cattle herds; (3) the imminent lifting of milk quotas expected to generate substantial dairy sector growth; (4) large agrifood & beverage industries with global marketing reach, (5) large volumes of under-utilised organic wastes/residues; and (7) supportive government policies targeting economic growth. These resources can be leveraged to engineer new process technologies and produce a variety of new bioproducts and bioservices, capitalising on the global trend toward more sustainable lifestyles, displacing imports and increasing exports, enhancing development of the Irish	€299,488.00	Final Report Available https://www.gov.ie/en/publication/ce553-research/

		bioeconomy and reducing detrimental impacts on the environment. BIO-ÉIRE will undertake a review of options that can be viably deployed by Irish-based producers and companies, providing an overview of medium and longer term commercial opportunities as well as a detailed analysis of 8 prioritised near-term value-chains, providing stakeholders with the technical and economic data to support relevant business cases, identifying barriers to commercial deployment and providing suggestions as to Development Frameworks (R&D programmes, policy, regulations, market supports, funding and other initiatives) that will facilitate commercial exploitation.		
Dr Declan J Bolton Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin National University of Ireland Galway	DAFM National Call 2014	**AD-Policy- The comparative public and animal health risks associated with spreading Anaerobic Digestate, animal manure and slurry on land: Science, Policy and Practice.** Anaerobic digestion of animal by-products (ABP), such as manure and slurry, produces digestate that ends up in the environment. A thorough investigation of anaerobic digestion processes is required to assess the risks to human and/or animal health associated with biological components in the original ABP and their AD products. In Ireland most AD biogas fermenters use manure and slurry as one of the primary raw materials but these may be supplemented with additional organic components such as food wastes to achieve the C:N ratio that is optimal for methane production. Manure, slurry and to a lesser extent food wastes may contain a range of hazards including animal pathogens and zoonotic agents (bacterial, viral and parasitic) which must be effectively inactivated during the process. Pathogen survival will be effected by initial concentration and AD conditions. Non-spore-forming bacteria, most viruses and some parasites can be inactivated by temperatures in the range of 50 to 100°C (Fayer 1994) but thermostable viruses and spore-forming bacteria require temperatures above 70 and 100°C, respectively. Many of these organisms are also sensitive to low and high pH, however some parasitic species, such as ascaris eggs, are tolerant to extreme pH values. On the basis of the temperatures and pH reached during processing, it would appear that the conditions during AD are not sufficient to ensure the destruction of bacterial, viral and parasitic pathogens. Biogas reactors in Ireland operate within different temperature ranges; mesophilic (between 35 and 40°C) and thermophilic (between 45 to 55°C) and pH values between 7 and 8.5	€815,050.20	14SF847 **Final Report not available.**

		generally prevail (the pH should not decrease below pH 6.8 otherwise the metabolic activity of methanogenic bacteria is adversely affected and biogas production severely reduced). If these conditions of temperature and pH under anaerobic conditions are not sufficient to ensure pathogen destruction then the raw materials or digestate should be pasteurised, but again there is insufficient data to validate this pre/post AD thermal treatment. This project will investigate the survival of important human and animal bacterial, viral and parasitic pathogens during AD (with and without pre and/or post-AD pasteurisation), and examine the comparative risks to public and animal health associated with spreading digestate versus manure and/or slurry on land with an overall aim of providing the data/knowledge required to develop policy and practice that minimises the risks associated with anaerobic digestion.		
Dr. Fiona Walsh National University of Ireland Maynooth. Maynooth Co. Kildare. **Lead Institution:** National University of Ireland Maynooth. **Collaborating Institutions:**	ERANET 2014	**PRAHAD- Prevalence and optimised detection of resistance to antibiotics vital for animal and human health.** The arsenal of antibiotics for use in medicine is ever decreasing, while the rates of resistance are ever increasing. There is a great need to identify and control all sources of antibiotic resistance, and minimise the transfer of resistance genes and/or bacteria within animals and between animals and humans. The aims of this collaborative project are to address resistance to three critically important classes of antibiotic classes; polymyxins (colistin), aminoglycosides and carbapenems among gut microflora from pigs and cattle. Colistin is an important antibiotic in the treatment of animals with intestinal infections i.e. Escherichia coli and Salmonella species. Carbapenemases were thought to be restricted to human pathogens, since carbapenems are not used in veterinary medicine. However, they have recently been identified in food animals. This project will evaluate the rates of resistance (or reduced susceptibility) to colistin, aminoglycosides and carbapenems and among Gram-negative enteric bacteria from pigs and cattle, and compare these with the levels of prescribing in the different countries. We will identify the mechanisms leading to the resistance or reduced susceptibility to those antibiotics, and decipher their genetic environment. In cases where no known resistance mechanism can be identified we will utilise whole genome sequencing and functional metagenomics to decipher the novel resistance mechanism. Using this data we can then evaluate the	€246,937.00	14/ANIH WA/1 **Final Report not available.**

		relationship between mobile resistance elements within and between countries. Recently developed rapid diagnostic techniques for cheap identification of carbapenemase-producing isolates will be applied to investigate carbapenem resistance. We will also develop further diagnostic tools for the identification of colistin and aminoglycoside resistances. The use of antibiotics in veterinary medicine, the emergence of antibiotic resistance and the potential transfer of resistance through the food chain to humans are topics of high priority at both the national and EU policy levels. Comprehensive EU-wide scientific data is required to guide future policy in this area and to ensure the maintenance of both animal and human health and welfare. Traceability and transparency within the food industry are required in order to build on the reputation that Ireland has built up over many years as an island of safe food production, with high standards in animal health and welfare. Through this research Ireland will be at the forefront of antibiotic resistance traceability in the pig industry, enabling measures to be instigated to ensure that the pigs of Ireland have the lowest levels of resistance possible while maintaining the high health and welfare standards.		
Food				
Prof Francis Butler University College Dublin Bellfield Dublin. **Lead Institution:** University College Dublin **Collaborating Institutions:** Marine Institute	DAFM National Call 2014	**NoroRisk- Developing a risk assessment framework for norovirus in irish oyster production areas.**Gastroenteritis resulting from consumption of sewage contaminated oysters containing norovirus (NoV) is a significant public health problem. Official food controls in this area are inadequate to prevent illness and no standards exist for NoV in oysters. Largely this is because of a lack of data on the extent of illness associated with oysters containing NoV. This project will develop a risk assessment model incorporating a product pathway analysis to estimate the risk of Norovirus (NoV) related illness following consumption of oysters from specific production areas. The project will generate new NoV prevalence and distribution data for oysters using a recently developed standardised molecular procedure for detecting NoV in oysters. From this data an exposure model will be developed. Existing published data on the dose response for NoV and host susceptibility factors will be combined with the exposure model to develop the risk assessment model. The output from the project will allow risk managers introduce control	€360,842.70	14F852 **Final Report not available.**

		measures in this area based on acceptable limits for NoV in oysters derived from evidence based information. In addition the model will allow producers to assess the impact of potential treatment options to target risk management intervention in a cost effective manner.		
Dr Sarah Culloty University College Dublin Bellfield Co.Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Marine Institute National University of Ireland Galway	DAFM National Call 2014	**REPOSUS- Reducing the impact of Pathogens and disease in the Irish Oyster industry to support the sustainability and growth of the sector.** Food Harvest 2020 forecasts a 78% increase in aquaculture volume production in Ireland by 2020. The shellfish industry is an important part of this sector with the Pacific oyster Crassostrea gigas being the main oyster species produced. The aims of this study are to ameliorate the impact of pathogens and disease in the Irish oyster industry that are threatening our ability to reach these targets. Since 2008, mortalities occurring in Ireland have been associated with a newly emerged herpesvirus variant. Since 2012, pathogenic strains of the bacterium Vibrio aesturianus have also been identified in Irish oysters having already caused mortalities in France. In this study, the role of these pathogens in mortality events will be investigated through field surveys at several culture sites. Any pathogens identified will be characterized using molecular based studies and pathogenicity investigated using diagnostic techniques and laboratory trials. The role of environment and other hosts at culture sites will be determined to help inform management. Modified husbandry methods to help reduce mortalities and other control methods such as the use of antiviral compounds will be assessed. Policy guidelines will be produced to help reduce the impact of losses in this industry, ultimately helping to grow the sector.	€592,140.00	14SF820 **Final Report not available.**
Dr Evin McGovern Marine Institute Rinville Oranmore Co.Galway	DAFM National Call 2014	**AsMARA- Arsenic in Marine Macroalgae and Implications for Commercial Uses.** There is major potential for expanding the exploitation of our natural seaweed resources to provide products and materials for the food sector, for fertiliser and feed, in biotechnology and for many other applications. Arsenic can accumulate to high levels in seaweeds. It is	€252,790.41	14SF860 **Final Report**

Lead Institution: Marine Institute **Collaborating Institutions:** National University of Ireland Galway		typically present as organoarsenicals whose toxicity, though not well characterised is much less than for inorganic arsenic. However, non-compliance of algal-based feed products with EC regulatory limits for total arsenic presents a problem for the industry. Moreover, recent evidence shows high levels of toxic arsenic can occur in certain parts of kelps. This project will establish a reliable and simple analytical methodology for determination of inorganic arsenic in seaweed. Using this method, we will determine the variability of total and inorganic arsenic in various commercially relevant species and investigate intra-plant variation. We will also investigate, for example using transplant studies, the environmental factors that influence total and inorganic arsenic concentrations. Finally, we will investigate the effect of processing and storage on arsenic speciation in brown seaweeds. This information will support industry in developing strategies to minimise arsenic concentrations in products and assist policy makers in risk management and developing practical regulation for consumer protection.		**not available.**
Prof Elke Arendt University College Cork College Road Co.Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Cork Institute of Technology	DAFM National Call 2014	**TASTY - Novel Technological ApproacheS for the developmenT of low-sugar - highlY consumer accepted food and beverage products.**Over 60% of all reported diseases in industrial countries have their origins in poor dietary habits, which include high sugar intake. Sugars fulfil important organoleptic as well as functional properties in a wide range of cereal-derived foods and beverages, but also impact significantly on manufacturing processes in industry. The use of conventional sugar replacers frequently results in poor consumer acceptance due to different mouth-feel and taste perception. In addition, many sugar replacers do not possess sugar's natural ability to provide bulk, reduce water activity and to act as a humectant (maintaining the moisture content of the finished product) and affect gelatinization temperature of starches during baking, thus playing a significant role in structure, volume, and tenderness of a wide variety of food products, such as biscuits, cakes, drinks, sweets and sauces. The TASTY project will address this significant deficit by providing scientific understanding of sweetness perception in complex food and beverages systems and give effective technological solutions using enzymatic and fermentation processes to develop foods and beverages with effective quantifiable reductions in sugar and with improved nutritional qualities. A strong participation of food industry partners in	€486,955.00	14F803 **Final Report not available.**

		this project will help contribute to the feasibility and economic viability of the strategies developed.		
Dr Amalia Scannell University College Dublin Bellfield Dublin. **Lead Institution:** University College Dublin **Collaborating Institutions:** Dublin City University Teagasc	DAFM National Call 2014	**NOSPORES-DFI- Application of Novel food processing and microanalytical technologies to identify and control spores, in dried food ingredients, and of biofilms in food processing environments-a systems microbiology approach to ensuring quality and safety.** Dried Food Ingredients (DFI) e.g. flour, herbs & spices, chocolate and milk powders are widely in domestic, culinary and commercial ready-to-eat product contexts globally. This product category is often contaminated with sporeformers, mould and some enteric pathogens. Control of these bacteria in DFI, and biofilms on food processing surfaces is a considerable challenge to the food industry. In this programme, the base-line microbiome of two baked products production sites, including key DFI will be determined. Bacterial phyla, will be described, using dedicated sampling plans including temporal and geographical comparisons. Microbial population sorting using conventional techniques followed by, metagenomic and metatranscriptomic analysis will provide insights into population-level dynamics of this environment. Microbes with anti-biofilm/ antisporulation activities will be sought to provide a natural control of biofilms and spores in DFI and baked goods contexts and novel food processing technologies will also be evaluated as new HACCP control steps. The effect of these technologies on gene expression of virulence and quorum sensing factors will be assessed. Comprehensive Risk Analysis will interrogate data streams to evolve improved strategy for microbiological control in the production environment. Research outputs will have a significant impact on the food safety improvements of DFI and consequent brand protection.	€879,348.32	14F845 **Final Report not available.**
Dr PJ Cullen Dublin Institute of Technology-TU Kevin Street Co. Dublin	DAFM National Call 2014	**DairyPAT- Process Analytical Technologies for Dairy and Infant Formula powder manufacture.** With the planned abolition of milk quotas from March 2015, it is a priority that a large proportion of the increased dairy output is linked to added value products such as infant formula. Irish dairy processors will be required to demonstrate that they implement systems to enable control of and confidence in the specifications and properties of the powdered products they produce for the infant formula industry. This is	€549,590.00	14F866 **Final Report not available.**

Lead Institution: Dublin Institute of Technology **Collaborating Institutions:** University College Dublin		a major challenge considering the high degree of variation and influencers in dairy processes. Through the introduction of a process analytical technology (PAT) approach which facilitates real-time process monitoring capabilities with spectroscopic sensors, the industry can move from inferential monitoring and control towards continuous measurement of core quality parameters. The overall project objective is to develop and characterise novel PAT technologies for control and optimisation of dairy powder and infant formula manufacturing. Specifically the project will: Develop and characterise new PAT tools, namely Laser Induced Breakdown Spectroscopy (LIBS) and Guided Microwave Spectroscopy(GMS), for dairy processing. • Validate LIBS and GMS PATs for stand-alone use in industrially relevant dairy processing applications. • Investigate sensor and data fusion opportunities, combining new and existing state-of-the-art sensors and data analytics, for enhanced product characterisation and process control		
Dr Kaye Burgess Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** Cork Institute of Technology	DAFM National Call 2014	**SafeMush- Assuring the safety of mushrooms by the introduction of novel processes to reduce Listeria monocytogen es biofilms and environmental contamination in mushroom production facilities.** Mushrooms are Ireland's most valuable horticultural crop, produced in 75 growing facilities. The sector is driven by the export market to the UK. The recent detection of Listeria monocytogenes, a potentially lethal foodborne pathogen, in Irish mushrooms and in mushroom production facilities is a cause of extreme concern to the industry. The ubiquitous nature of Listeria in the environment, coupled with its ability to form biofilm and persist in processing environments, is of particular concern. Safemush will address these concerns by developing new technologies, which can be employed by the mushroom industry, to prevent contamination of the production environment with Listeria by reducing/controlling biofilm formation, thereby enhancing the safety assurance of their crops. Selected bacteriophage, pathogen controlling bacteria and bacteriocins will be examined for suitability as biocontrol agents within the mushroom production	€520,625.00	14F881 **Final Report not available.**

		environment, which can be used in synergy with current disinfection and cleaning methods. The application of such treatments will be guided by an in-depth analysis of the mushroom production chain to determine where the greatest likelihood of contamination occurs. The efficacy of current and novel treatments will be tested on biofilm forming cultures and their utility and impact demonstrated in pilot-scale growing conditions.		
Dr. John Tobin Teagasc Moorepark, Fermoy Co.Cork **Lead Institution:** Teagasc **Collaborating Institutions:** Tyndall Institute(University College Cork)	DAFM National Call 2014	**SACCP- Development of Spore Analysis Critical Control Point (SACCP) charts for application in dairy manufacturing processes.** The background microbiological load of raw milk and processed dairy ingredients supplies presents ongoing challenges for the dairy industry and nutritional product formulators in Ireland and globally, linked particularly to specifications on acceptable limits for high heat resistant spore forming microbes of Bacillus and Clostridium spp. With entry into the milk supply chain associated in the first instance with milk production practices and uncertainty as to their subsequent fate during milk processing, there is concern at the lack of in-process containment measures to limit spore numbers since pasteurisation processes are effective only when the contaminating organisms are present in the vegetative state. Recent events have highlighted the significant reputational damage that arose during a sporeformer-based contamination incident which was further aggravated by mis-identification of the isolated microorganism. In any case, allowable levels of contamination are continually decreasing in-line with end user specifications and a global trend towards higher food safety, particularly in high risk categories such as infant and medical nutrition, which predominantly utilise dairy ingredients within their product. Furthermore, breakdowns in control of food safety and specification management within the supply chain may lead to high levels of out of spec finished and semifinished ingredients resulting in either downgrade or re-work - scenarios which greatly increase the total cost of goods and services (COGS) for the processor. Unfortunately, very little scientific research is available to provide the dairy industry with a platform of inactivation technologies for heat resistant spores, particularly of Bacillus and Clostridium spp., while having due regard to the product's capacity and stability to tolerate the required technological intervention. The SACCP project proposes to (a) identify the key problematic spore-forming bacteria in Irish powdered dairy ingredients, (b) assess existing	€624,729.10	14F883 **Final Report not available.**

		detection systems, and (c) evaluate novel thermal and non-thermal processes as to their efficacy to reduce spore numbers within dairy manufacturing processes. Spore Analysis Critical Control Point (SACCP) is intended to go beyond widely established HACCP (Hazard Analysis Critical Control Point) practices which rely on use of pasteurisation as a Critical Control Point (CCP). SACCP, on the otherhand, will generate process flow diagrams for spore reduction/eradication across the complete dairy portfolio, including liquid milk/whey, dairy isolates/concentrates and sports/medical/infant nutrition by considering and assessing the limitations of thermal and other processes while having due regard to the stability and processability of dairy streams exposed to higher thermal loadings. Additional assessment criteria will include an appraisal of the robustness and feasibility of technology to perform in a commercial installation. This step will be facilitated by breakthrough efforts on the part of Tyndall National Institute with the development of a rapid analytical biosensor for spore detection – prototypes of which will be tested in conjunction with pilot plant study tasks taking place during the course of the project.		
Dr Eoghan Clifford National University of Ireland Galway University Road Co. Galway. **Lead Institution:** National University of Ireland Galway. **Collaborating Institutions:** Athlone Institute of Technology	DAFM National Call 2014	**MOREFISH- Ehancing production and sustainability in Irish aquaculture.** MOREFISH is a timely aquaculture project that proposes to develop and test innovative technologies and novel production processes to significantly improve production output, operational efficiencies and management at inland aquaculture sites in Ireland. These innovations will have key impacts including (i) enhanced production efficiency and sustainability, (ii) reduced environmental emissions and impacts of production and (iii) improved fish health and reduced finfish diseases/mortalities in rearing systems due to improved operating conditions. Achieving these goals is also necessary to reconcile the contrasting demands of the growing National aquaculture industry with meeting the goals of the Water Framework Directive. The multidisciplinary project comprises engineering and scientific expertise, industry stakeholders and policy-makers and commercial operators to respond directly to critical technical and policy gaps identified by stakeholders and this DAFM call. Specifically, MOREFISH targets innovative approaches that will increase fish biomass output, productivity and stocking densities, mitigate contamination and cross-infection, and reduce production costs and waste emissions. The project proposes three pilot sites	€599,486.19	14SF872 **Final Report not available.**

		(in partnership with industry) to test and demonstrate key innovations. These have been strategically chosen to include key production segments and facilities such as trout farming, smolt production for the marine salmon farming industry and Arctic char production.		
Dr Maurice O Sullivan University College Cork College Road Co.Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2014	**SWEETLOW- Development of consumer optimised low carbohydrate Irish confectionary products.** SWEETLOW optimises traditional Confectionary products (cake, muffin and biscuit-type products) through the reduction and or replacement of sugar with respect to product composition, functionality, consumer sensory quality/shelf life and commercial viability. The minimum concentration of sugar will be identified while maintaining the above attributes in order to determine the very limits of removal. Sensory acceptance testing will be employed to optimise each of these approaches. The project will show clear quantitative goals for the sequential reduction of sugar in Confectionary products. The mean industry sugar levels in Confectionary products will be identified in order to benchmark values. Our approach principally uses sensory-affective optimisation coupled with flash descriptive profiling and multivariate data analysis to reduce the levels of sugar in confectionary products in a clean label fashion as well as reducing these components by utilising traditional and new ingredient and baking technologies that can be used to replace sugar in parallel. Multiple factors are linked to consumer perceptions of sweetness and fat. Sweetness is mainly due to the sugar content but it also depends on the fat and moisture content. Therefore sweetener/fat interactions will be optimised to develop the best products. In summary this project will utilise sensory acceptance testing, flash profiling and flavour volatile analysis, linked via multivariate data analysis, to optimise formulations to produce sugar reduced highly accepted end products. Final products will	€559,073.00	14F812 **Final Report not available.**

		be assessed via consumer studies		
Prof Nora O Brien University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2014	**BUCFOODS- Development of Fortified Blended Foods using fermented buttermilk/cereal.** In 2013 it is estimated that 842 million people were food insecure, the vast majority in developing countries. The United Nations World Food Program (WFP) assists almost 100 million food insecure people in over 70 countries and purchases in excess of US$ 1 billion of food annually to meet its objectives. The WFP supplies beneficiaries with Food Baskets containing staples and very often complemented with Special Nutritional Products including Fortified Blended Foods (FBFs) targeted at young children to prevent stunting. Current FBFs are primarily composed of dried legume/cereal blends fortified with micronutrients which are then reconstituted by heating with water and consumed as porridge. This proposal is to develop novel FBFs using Irish-sourced ingredients (sweet buttermilk and cereal) and fortified with micronutrients. Our novel products are based on a traditional dried fermented milk/cereal product Kishk which is widely consumed as porridge across Northern Africa, Middle East and Indian sub-continent. We propose to optimise the manufacture of fermented buttermilk/cereal-based FBFs. We will systematically evaluate the products' compositional, nutritional, sensory, shelf-life and microbiological attributes. The products will be superior nutritionally to existing legume/cereal FBFs used by the WFP as our products will have a dairy/cereal base. Cost analysis will also be conducted.	€594,123.10	14F805 **Final Report not available.**
Prof Catherine Stanton Teagasc Moorepark Fermoy Co.Cork **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2014	**TODDLERFOOD- Foods solutions for replenishing disrupted microbiota in toddlers.** The first two years of life represents the most critical period for dietary interventions to improve child growth/development. This is the period when intestinal microbiota, a vital asset for health and neurodevelopment (Borre et al., 2014) is established. Nutrition influences gut microbiome evolution, with breast feeding in early life the gold standard. Malnutrition is caused not only by nutrient deprivation/imbalance, but also by disrupted gut microbiota, leading to impaired nutrient availability and energy harvesting from the diet (Tilg and Moschen, 2013). Perturbation of optimum microbiota development, arising from preterm birth or antibiotics have likely long-term implications for microbial diversity	€597,246.15	14F821 **Final Report not available.**

University College Cork Cork University Maternity Hospital		and consequent health. Little is known about how early gut microbiome is positively manipulated through nutrition. In ongoing studies, we are assessing optimum gut microbiome development in initially breastfed infants from birth to 2 years (INFANTMET) and impact of perturbed microbiota (due to C-section delivery and antibiotic treatment following birth) on health and neurodevelopment to 2 years in the recently FP7 funded MYNEWGUT study. In TODDLERFOOD, we aim to identify food solutions for replenishing a disrupted microbiota of the latter group towards that of INFANTMET infants, so as to enhance microbial diversity in all children, for better long-term health and neurodevelopment.		
Prof Helen Roche University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2014	**NUTRIMAL- Novel nutritional solutions to combat chronic malnutrition in the elderly.** Context: Chronic malnutrition is highly prevalent, but preventable, in the Irish elderly population. Nutrition-related sarcopenia is a consequence of protein-energy malnutrition. A key feature is "anabolic resistance", wherein muscle protein synthesis (MPS) is reduced due to a blunted anabolic response to insulin and dietary protein. Long chain n-3 polyunsaturated fatty acids (LC n-3 PUFA) supplementation could reduce anabolic resistance to enhance MPS in response to dairy protein and prevent sarcopenia. Hypothesis: (1) Combining protein and LC n-3 PUFA within a novel food may prevent sarcopenia; (2) Older consumers have distinct product requirements relating to sensory, textural and nutrition. Experimental Approach: A survey will define prevalence of sarcopenia. Consumer focus group approaches will define novel food products criteria for subjects >65y. A human intervention study will establish efficacy of dairy protein with LC n-3 PUFA. Potential novel peptides from potato extract on MPS will be defined in vitro.**Impact:** • Define prevalence of chronic malnutrition and sarcopenia. • Stimulate older consumer product innovation beyond current oral nutritional supplements • Demonstrate efficacy of novel nutritional solutions combining protein and LC n-3 PUFA for nutrition-related sarcopenia.	€593,034.10	14F822 **Final Report not available.**

		• Liaise with three Irish SMEs to enhance innovative novel food solutions to prevent malnutrition. • Disseminate novel nutritional science.		
Prof Paul O Toole University College Cork College Road Co. Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Teagasc University College Dublin University of Limerick	DAFM National Call 2014	**IMMUNOMET- Dietary manipulation of microbiota diversity for controlling immune function. Hypotheses**:(1)that gut microbiota diversity can modulate inflammation and susceptibility to enteric infections; (2) that interventions with food ingredients can modulate inflammation, protect against infection and elicit positive effects on metabolism. **Background:** ELDERMET established a relational database of macronutrient--microbiota--health associations, including inflammatory biomarkers. Studies of younger adults also support a microbiota--inflammation axis, and confirm microbiota diversity modulation by diet. The ELDERMET data identifies exploitable links between food ingredients and microbiota diversity. Additionally several nutrients such as fatty acids modulate immune function and metabolism, but if this is effected via the gut microbiota is unknown. The synergy between nutrition and nutrient driven microbiome diversity represents An opportunity for ingredient development for the food industry. **Experimental approach:** We will use a combination of in vitro and pre--clinical models, and human dietary challenge to test the ability of defined food ingredients to modulate microbiota diversity, to promote appropriate innate immune function, and to modulate inflammation-- related disorders like type 2 diabetes. APC colleagues in Teagasc Moorepark and UCC will partner researchers in UCD, UL and NUIG to identify food ingredients that promote microbiota diversity, which can be incorporated by the Irish food industry into novel foods that promote health.	€1,246,995.10	14F828 **Final Report not available.**
Prof Christine Loscher Dublin City University Glasnevin Co. Dublin	DAFM National Call 2014	**MarineMod- Mining marine materials for novel functional ingredients that modulate the immune response for benefit in inflammation and allergy.** Marine protein-derived materials have excellent potential as functional food ingredients. The development of functional “added-value” ingredients is a key priority for the expansion of the Irish Agri-	€557,327.00	14F873 **Final Report**

Lead Institution: Dublin City University **Collaborating Institutions:** University of Limerick		Food sector. NutraMara has already established an extensive research programme mining marine species for ingredients with health benefits. This project will now build on and complement this programme by mining marine species for novel ingredients that can modulate the immune response in inflammation and allergy. This is in response to an identified need amongst Irish ingredient companies for such ingredients for their global customers for functional foods for infants, the elderly and sports participants. The project will involve existing NutraMara Principal Investigators at UL who will extract and hydrolyse the marine materials along with an Immunologist at DCU who is an expert in Immunomodulation and has extensive experience working with food companies. The key objective of the proposed programme is to identify new protein-derived ingredients that can modulate specific immune responses associated with a reduction of either inflammatory or allergic disease. This will be achieved by determining the effects of the marine extracts on key immune cells that mediate these diseases/conditions and assessing them in in vivo models of inflammatory and allergic disease		**not available.**
Dr Anne Nugent University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** University College Cork	DAFM National Call 2014	**RACconvert- Disaggregation of food consumption databases to raw agricultural commodity values for estimation of intakes of pesticide residues.** This proposal seeks to further refine the national food consumption databases of adults and preschool children to underpin public health risk assessments. Specifically, it will disaggregate and convert these national food consumption databases to raw agricultural commodities (RACs) thereby facilitating assessment of intakes of food chemicals such as pesticide residues. Targeting key food groups, foods consumed in the National Adult Nutrition Survey and National Preschool Nutrition Survey will be disaggregated to ingredient level and subsequently conversion factors will be applied using EFSA's European food conversion model(EFSA, 2013). Dietary intakes of target pesticide residues will be estimated. The project will further develop capacity of Irish researchers to participate in JPI and Horizon 2020. The research outcomes will be disseminated to key stakeholders. The data generated in this project will allow Irish policy makers satisfy national and EU requirements for assessing the safety of intakes of food contaminants such as pesticide residues.	€66,000.00	Final Report Available https://www.gov.ie/en/publication/ce553-research/

Prof Alan Kelly University College Cork College Road Co.Cork **Lead Institution:** University College Cork **Collaborating Institutions:** University College Dublin Teagasc	DAFM National Call 2014	**(AFGDP)- Agri-Food Graduate Development Programme.** This proposal aims to establish a new Agri-Food Graduate Development Programme (AFGDP) for 2014-2018. The proposed programme builds on both the Food Graduate Development Programme (FGDP) established in 2007, and the Agri-Food Graduate Development Programme (AFGDP) that commenced in 2012. The overall aim of the proposed programme is to provide skills training to postgraduate students in the Agri-Food (including forestry and marine) sector in universities and research institutions in Ireland. Through the delivery of accredited modules on 40 occasions, participants will receive training in topics that are relevant to those pursuing a leadership career in AgriFood. There is a focus on enhancing industrial knowledge, business and personnel management, leadership, communication as well as advanced research and development skills. The programme will foster personnel with skills capable of leading the development of Ireland's knowledge-based bio-economy. The new AFGDP will also explore opportunities to liaise with on-going initiatives to provide cost-effective delivery of Continuing Professional Development. The proposed programme has strong links with industry, to up skill graduates for employment and the rapid adaptation to challenging careers. Ultimately, the Programme will contribute to improved human capital within the Agri-Food sector, contributing to the competitiveness of this key sector of the Irish economy.	€874,354.00	14SF855 **Final Report not available.**
Forest				
Dr. Conor O'Reilly University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin	DAFM National Call 2014	**ForestNet- Forest Research Newtwork.** Genetic improvement of key species and protection against biotic stress are essential to maintain and increase productivity of the forestry sector. This large project will enhance productivity and resistance in key forest species.1. Plans for the production of Forest Reproductive Material (FRM) for key species will be developed. Different provenances of oak, beech and Sitka spruce will be evaluated, and the potential effect of climate change on tree growth and phenology responses will be considered.2. Improved Sitka spruce will be developed through breeding. Relationships between early morphology and resource allocation and later productivity will be explored in families showing contrasting vigour. Physiological variation as a potential cause of growth variation will be investigated,	€800,688.00	14C889 **Final Report not available.**

Collaborating Institutions: Teagasc National University of Ireland Maynooth		and novel phenotyping methods for rapid assessment of large numbers of individual's developed.3. 20-40 genotypes of ash with tolerance to ash dieback disease H. fraxineus will be developed by a combination of locating tolerant genotypes within existing trials in Europe and specifically screening 1,000 genotypes in Lithuania under high disease pressure. Systems for propagating resistant material will be developed using biotechnological approaches to facilitate mass production.4. A multidisciplinary approach to pest risk analysis will be used to determine the risk posed to Sitka spruce forests in Ireland from non-native invasive pests and pathogens. Results will provide a rapid response to short-term threats and advanced capabilities for pest prediction in the long term.		
Dr. Aine Ni Dhubhain University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2014	**WINDRISK- Windthrow risk modelling.** Ireland is subject to normal winter storms annually; occasionally severe storms are experienced. Storms result in the uprooting and breakage of trees, leading to negative economic consequences for forest owners. The aim of this project is to determine the factors that influence the risk of wind damage and generate a model that can be used to assess that risk. How thinning practice and forest design influences risk will also be investigated and recommendations provided as to how to minimise risk. Data from the National Forest Inventory sample plots will be combined with data on wind damage occurrence obtained from RapidEye satellite imagery captured during the summer of 2014. A sample of plots will be selected which will be classified with respect to wind damage. Information on site factors will be derived for these plots and any silvicultural treatments that were applied will be noted for a subset. Using logistic regression the factors that influence the risk of wind damage will be identified; a wind damage risk model will be developed. Tree pulling experiments will be conducted in existing thinning trials to determine how thinning type and intensity and the timing of thinning influence tree stability.	€151,471.76	14C810 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr. Jon Yearsley University College Dublin Bellfield	DAFM National Call 2014	**MASAD- Assessing Ireland's risk to airborne spread of ash dieback disease with Lagrangian stochastic models.** The project will develop a Lagrangian stochastic particle-tracking model that predicts the spatial risk of infection from a known	€67,091.00	14C809 Final

Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**		source of Hymenoscyphus pseudoalbidus fungus (the infective agent of ash die-back disease, Chalara fraxinea). This model will combine the NAME model from the UK's Met Office with meteorological data from Met Eireann and biological details of H. pseudoalbidus's spores to predict the movement of a cloud of fungal spores, emitted from a specified location. Multiple weather scenarios (e.g. different seasons, extreme events) will capture the intrinsic uncertainty in the spore cloud's position. This moving cloud can be used to describe a rain of infective spores on the surrounding environment that can then be used to quantify the risk of an infection taking hold in a new location. The proposal has four components: 1. a literature review of H. pseudoalbidus epidemiology and dispersal ecology. 2. Model development to combine biological and meteorological data. 3. Quantify the risk of new infection by combining model output with host species distribution. 4. Model validation using the past spread of H. pseudoalbidus across Europe and surrogate pathogens that can provide high quality data on their spread and similar biology to H. pseudoalbidus.		Report Available https://www.gov.ie/en/publication/ce553-research/
Dr. Niall Farrely Teagasc Athenry Co. Galway **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2014	**FORECASTMODEL- Improving Timber Forecasting.** The ForecastModel Project is aimed at improving the private sector timber production forecast. Recently there have been numerous advances in the capacity to forecast timber production that can be incorporated into future forecasts with the potential to increase accuracy. This project aims to incorporate these advances. Accuracy of forecasts will be increased by addressing components of the production forecasting chain. These include (a) information on the forest resource, (b) information on the intention of owners in terms of silvicultural regime, rotation length, thinning frequency and intensity, (c) forest growth models which can forecast future volumes in line with owners' intentions and (d) a forecasting model which incorporates all of the required information and any underlying assumptions. Methods will be explored to examine how inventory and management data from future management plans can be utilised as inputs to the national forecasting system. The research will also provide further information on accessibility of private plantations, management	€197,138.00	14C824 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		intentions of private forest owners in order to derive a more robust management regime for forecasting. In the absence of management plan and growth data new research aims to develop methods for predicting productivity estimates for private plantations that can be used as inputs into yield models notably (i.e. Dynamic Yield Models and BFC yield Tables) using measures of forest site productivity and/or remote sensed data. Finally the research will evaluate the sensitivity of forecasts to different forecasting methods, the first using management plan data, and the second using predictive methods incorporating the static British Forestry Commission (BFC) yield models and the Dynamic yield models, this will allow for a robust assessment of the reliability of different methods to be evaluated and provide flexibility in forecasting methods depending on data quality. A cost/benefit analysis of the use of different methods for national forecasting will be conducted. The project will identify the best methodology to use forest management plan (FMP) and related data in the national forecast.		
Dr. Ken Byrne University of Limerick Co. Limerick **Lead Institution:** University of Limerick **Collaborating Institutions:** University College Dublin	DAFM National Call 2014	**CASWOOD- Economic and Environmental Mapping of Cascade Use of Wood.** Previous models of carbon storage in forest ecosystems and harvested wood products have developed independently, as have data on biomass and economic measures of the forest resource-based industry in Ireland. Lacking is a coherent picture of the interaction and interdependence of these various sectors. The CASWOOD model will merge these data streams and supplement with data on the reuse of wood resources to provide a holistic profile of the current position of carbon storage and biomass potential. This will be used to test hypothetical changes to the product stream to establish the parameters influencing the environmental and economic optimisation of forest and forest-based products in Ireland. The data and critical parameters identified in CASWOOD model will provide the foundation for an algorithm-based computer model of forest and forest-based products capable of forecasting alternative scenarios for material flows to optimize carbon storage and biomass while maximizing economic value. This will enable policy makers to develop more strategic, evidence-based guidelines for forest and forest-based	€178,162.00	14C887 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		resource management.		
Mr Tom Kent Waterford Institute of Technology Cork Road Waterford City Co. Waterford **Lead Institution:** Waterford Institute of Technology **Collaborating Institutions:**	DAFM National Call 2014	**STUMPHARV-Pre-Commercial Stump Harvesting in Ireland.** Ireland's demand for wood based biomass is increasing due to the implementation of the European Parliament Directive 2009/28/EC. It is estimated that there will be a shortfall of supply by the year 2020 of approximately 1.6 million cubic metres if only currently employed wood supply chains are used. Stump harvesting may be able supply biomass to contribute to this requirement, but at present no such system is operating in Ireland. Before the adoption of such a system, an evaluation of the biomass recoverable, and productivity and cost of the supply chain in Irish conditions was needed. A collaborative trial between Waterford Institute of Technology and Coillte (the Irish State forestry company) took place in 2012 / 2013 which evaluated the system on 5 trial sites in the south east of Ireland. On each site, relatively small sized trial plots were harvested; circa 1 hectare. Studies on the biomass recovered, and productivity of the supply chain were conducted , and the results disseminated back to Coillte. Coillte has decided to continue stump harvesting with a large scale pre-commercial trial. A contract has been put out to tender for stump harvesting and delivery of the wood fuel from sites in an 80km radius of their end-user. This contract involves three companies: i) Coillte (the land owner), ii) the harvesting contractor, iii) Medite (the end-user).	€805,62.25	**Final Report not available.**
Dr Conor O'Reilly University College Dublin Bellfield Dublin 4. **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2014	**FORM- Forest Management Research.** Genetic improvement of key species and protection against biotic stress are essential to maintain and increase productivity of the forestry sector. This large project will enhance productivity and resistance in key forest species.1. Plans for the production of Forest Reproductive Material (FRM) for key species will be developed. Different provenances of oak, beech and Sitka spruce will be evaluated, and the potential effect of climate change on tree growth and phenology responses will be considered.2. Improved Sitka spruce will be developed through breeding. Relationships between early morphology and resource allocation and later productivity will be explored in families showing contrasting vigour.	€800,688.00	14C889 **Final Report not available.**

		Physiological variation as a potential cause of growth variation will be investigated, and novel phenotyping methods for rapid assessment of large numbers of individuals developed.3. 20-40 genotypes of ash with tolerance to ash dieback disease H. fraxineus will be developed by a combination of locating tolerant genotypes within existing trials in Europe and specifically screening 1,000 genotypes in Lithuania under high disease pressure. Systems for propagating resistant material will be developed using biotechnological approaches to facilitate mass production.4. A multidisciplinary approach to pest risk analysis will be used to determine the risk posed to Sitka spruce forests in Ireland from non-native invasive pests and pathogens. Results will provide a rapid response to short-term threats and advanced capabilities for pest prediction in the long term.		
Research projects funded by DAFM Call 2013				
Coordinator/Lead Institute + Collaborating Institutions funded	**National / TransNational**	**Project Title and Summary**	**Total DAFM Award** (* denotes project co-funded by DAERA	**Final Report**
Agriculture				
Dr. Alan O'Riordan Tyndall Institute, University College Cork alan.oriordan@tyndall.ie **Lead Institution:** Tyndall Institute, University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2013	**FLUKELESS- Innovative control of fluke in Irish livestock leading to sustainable use of anthelmintics and reduced potential for anthelmintic resistance.** Food harvest 2020 (FH2020) has set challenging but realistic goals for the Irish food and agricultural sector. Farmers are taking up this challenge by increasing cow numbers, investigating new technologies and implementing means of improving efficiencies. Parasitic diseases present a substantial risk to achieving FH2020 goals by impacting on animal health and welfare, and farm profitability. Fasciola hepatica, Ostertagia/Teladorsagia species (spp.), Dictyocaulus spp., and Paramhistomum spp. all present difficulties for Irish livestock farmers. Of these, F. hepatica has been estimated to cost Irish farmers €25million annually. Levels of F.hepatica are increasing globally and fasciolosis is also re-emerging as a human disease. This	€878,882.59	13S405 **Final Report Not Available**

University College Dublin Irish Cattle Breeding Federation		proposal aims to develop tools (diagnostics, GIS, immunologicals, genomics) for use by multiple end-users including veterinarians, farmers, and policy makers. FLUKELESS will provide a blueprint for novel on-farm parasite control methodologies thereby allowing farmers to rapidly intervene and correct parasite-related animal health issues. The tools will be applicable to both cattle and sheep allowing effective decision-support at farm level thereby optimising the sustainable use of existing treatments and mitigating against anthelmintic resistance. Pharmacologicals will continue to play an important role in the control of fluke for the foreseeable future. The alternative strategies to be researched in this proposal allow real and measurable progress to be made with regard to fluke control in Ireland while actively promoting sustainable use of anthelmintics.		
Dr Peadar Lawlor Teagasc Moorepark Fermoy County Cork peader.lawlor@teagasc.ie **Lead Institution:** **Teagasc** **Collaborating Institutions:** Agri-Food and Biosciences Institute	DAFM National Call 2013	**OPTIPIG- Optimising annual output per sow by increasing the number of viable piglets born alive and minimising pre-weaning piglet mortality.** Sow output in Ireland is below that in more efficient pig producing countries. If an Irish 500 sow unit could increase output to that achieved in The Netherlands (26.5 pigs/sow/year), net profit p.a. would increase by €35,650. This would further stimulate growth of the national herd. Welfare and ethical concerns mean that genetic selection for hyper-prolificacy has received negative publicity in Denmark where large litters of light, marginally viable pigs are associated with increased mortality. Hence, increases in sow output in Ireland should be achieved in a more sustainable manner. The objective of this project is to increase sow output by: 1. Improving sow nutrition (feed allowance, L-carnitine, L-arginine, fish oil, vitamin D supplementation, fermentable substrates) to maximise the sows' genetic potential for large litters while also increasing viability of the additional pigs born; 2. Improving colostrum quality to reduce piglet mortality; 3. Implementing pre-weaning interventions (nurse sows, rescue decks and energy supplementation) to keep weak piglets alive. Archived databases from sow nutrition studies will be mined and animal experiments conducted. Best practice guidelines for optimisation of sow output will be prepared and results will be disseminated effectively to enable prompt adoption	€507,024.28	13S428 **Final Report Not Available**

		by stakeholders with the aim of realising Harvest 2020 targets.		
Dr Marguerite Clyne University College Dublin Marguerite.clyne@ucd.ie **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2013	**CaMPy- Effect of chicken mucin on Campylobacter jejuni global gene expression and colonisation of poultry.** Campylobacteriosis is the most frequent cause of bacterial gastroenteritis in Ireland and Europe. C. jejuni is a natural commensal in chickens which are an important source of human infection. 83% of Irish chicken flocks are contaminated with Campylobacter. While there is intense interest in how C. jejuni causes disease in humans, knowledge of why the organism exhibits a predilection for poultry and colonises birds so successfully is key to the development of novel strategies aimed at reducing the burden of Campylobacter in chickens. C. jejuni colonises the supramucosal layer of chicken intestines whereas in humans penetration of the mucosal barrier occurs and the organism invades the underlying epithelium. Chicken mucin inhibits C. jejuni invasion of epithelial cells and we have found that the organism exhibits a distinct tropism for chicken mucin which it binds avidly to. We hypothesise that chicken mucin plays a key role in modulating Campylobacter gene expression and colonization of chickens. We aim to examine C. jejuni global gene expression in the presence of chicken mucin and identify bacterial adhesins involved in binding to chicken mucin. This work is an essential step to enable development of strategies to reduce Campylobacter in chickens and to protect public health.	€99,580.00	13S434 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Professor Alexander Evans University College Dublin alex.evans@ucd.ie **Lead Institution:** University College Dublin	DAFM National Call 2013	**ENRICH- Early diagnosis of postpartum uterine disease for enhancement of reproduction and improved cow health.** Compromised fertility is the biggest threat to expansion of the Irish dairy sector and there is an urgent requirement to address the issue of postpartum uterine infection. Together with ICBF and NIBRT, this novel multidisciplinary proposal will target subfertility by validating early diagnostic markers of uterine disease on Day 7 postpartum, and developing new management tools for postpartum cows. We have recently identified novel cellular, molecular and	€1,224,817.30	13S472 **Final Report Not Available**

Collaborating Institutions: Teagasc Trinity College Dublin National Institute for bioprocessing, Research and Training Irish Cattle Breeding Federation		microbiological biomarkers for diagnosis of uterine disease in cattle on Day 7 postpartum; much earlier than currently available diagnostics. However, the integration of multiple layers of information is more effective in advancing the systems-level understanding of reproduction and in identifying robust novel diagnostics and therapeutic targets. This project brings together leaders in bovine reproduction, microbiology, physiology, glycobiology and immunology to validate these putative markers in a large cohort of postpartum cows. A panel of core diagnostic biomarkers will be applied, together with a targeted intervention strategy, to reduce the incidence of postpartum uterine disease and thereby increase fertility on Irish farms. Thus, we will demonstrate the efficacy of these novel biomarkers for reducing losses associated with poor reproductive performance on Irish dairy farms.		
Dr Frank Buckley Teagasc Moorepark Fermoy County Cork frank.buckley@teagasc.ie **Lead Institution:** **Teagasc** **Collaborating Institutions:** Irish Cattle Breeding Federation University College Dublin	DAFM National Call 2013	**RAPIDFEED- Development, calibration and validation of feed intake methology to rapidly screen dairy , beef and sheep for feed intake and efficiency.** With competition between livestock and humans for land to produce food for a rapidly growing human population, FCE within our livestock production systems has never been more important. The potential for genetic improvement of FCE in ruminants has been demonstrated under research conditions, but the means to attain large quantities of feed intake information on individual animals, particularly grazing livestock, has to date proven elusive. To derive genetic evaluations for FCE, the ability to capture accurate information pertaining to feed (energy) intake routinely must be possible. The primary focus of this research proposal is to develop, calibrate and validate novel low-cost methods of measuring feed intake (feed efficiency) in dairy, beef and sheep. Feed intake is chosen as our target, rather than FCE per se, because data on most energy sinks is already available. Once feed intake observations are available, FCE is obtainable. Three recently constructed genetically divergent research herds (flock) in dairy, beef (plus the national beef performance test station) and sheep will be used to develop the methodology. A further three independent research herds (flock) will be used for validation. The resulting	€679,905.78	13S496 **Final Report Not Available**

		technology will be implemented at a reduced scale at commercial farm level (representing national roll out) to evaluate feasibility. Genetic evaluations and genomic predictions for feed intake will finally be estimated. Two secondary objectives of the current proposal are 1) to verify the impact of current breeding goals in dairy, beef and sheep on genetic gain in feed intake and efficiency, and 2) to evaluate the appropriateness of measuring FCE or intake indoors on an energy-rich diet as an indication of FCE or intake in grazing beef animals.		
Dr. David Kenny Teagasc, Grange,Dunsany, Co. Meath david.kenny@teagasc.ie **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin AgriFood and Biosciences Institute Irish Cattle Breeding Federation Department of Agriculture,Food & Marine.	DAFM National Call 2013	**BEEFCOW- An intigrated multidisciplinary approach to improving the reproductive efficiency of seasonal calving beef cow herds in Ireland.** There is clear evidence of a decline in the reproductive efficiency of Irish beef cow herds. For example, annually <0.8 calves are born per cow, and <25% of cows produce a calf every 365 d; calving interval is increasing (averages 407 d) and <10% of heifers calve for the first time at 24 months of age. Furthermore, only 17% of calves born to beef cows are bred through AI. We propose to examine key intrinsic and extrinsic factors critical to the reproductive efficiency of beef cows. New knowledge on obstacles to reproductive efficiency, as well as clear industry guidelines to improve reproductive management will be generated. Specifically, we will (i) establish genotype specific target growth trajectories to ensure early onset of puberty and optimum age at first calving; (ii) identify key gene expression profiles within adipose tissue, consistent with early onset of puberty; (iii) develop a robust oestrous synchronisation regimen to facilitate increased usage of AI; (iv) establish and quantify the contribution of various on farm factors, including endemic infectious diseases to the reproductive performance of beef cows; and (v) develop a robust bio-economic model to optimise beef cow reproductive management and national beef cattle genetic evaluations.	€1,178,119.90	13S515 **Final Report Not Available**

Dr. Mark McGee Teagasc, Grange Dunsany, Co. Meath **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin National University of Ireland Galway Irish Cattle Breeding Federation	DAFM National Call 2013	**DentiFEED - A multidisciplinary approach for the development of accurate biologicalmarkers of feed efficiency in cattle and pigs.** Feed efficient animals are central to profitable, sustainable and efficient Irish beef and pig production. A major constraint to genetic progress in feed efficiency (FE) is the difficulty and enormous expense of measuring it directly. Therefore, robust cost-effective molecular-based biomarkers of FE are necessary. This multidisciplinary study aims to: 1) determine the existence of genotype x environment interactions and the repeatability of FE measures in growing beef cattle both within and across diet types, 2) Identify key gene expression profiles and biological pathways underlying improved FE and 3) Discover robust DNA-based biomarkers for FE, in both beef cattle and pigs. Bovine (both within & across diet type) and porcine models divergent in FE will be developed. Transcriptomic next generation sequencing analysis will be conducted on key biological samples to identify differential gene expression profiles between efficient and inefficient animals. Data will be combined with complementary physiological and proteomic analyses, and interpreted using bioinformatical tools under a systems biology framework. Key genes regulating FE will be identified for polymorphism discovery and will be sequenced to identify genetic variants. These variants will be tested within large, well-phenotyped populations for association with FE. DNA-based biomarkers for FE in beef and pigs will result.	€1,219,444.10	13S519 **Final Report Not Available**
Dr. Stephen Butler Teagasc Moorepark, Fermoy County Cork. **Lead Institution:** Teagasc **Collaborating Institutions:** Irish Cattle Breeding Federation	DAFM National Call 2013	**FertileDairy - Genetic, nutritional and management approaches to improve fertility in lactating dairy cattle.** Fertility will be a key driver of dairy farm productivity in the coming decade through effects on calving pattern and capacity for expansion. Improving reproductive performance at farm level requires a combination of strategies to immediately increase submission and conception rates, and longer term strategies to boost the inherent fertility of dairy cattle. This project proposes a multidisciplinary approach to tackle the problem of poor fertility in dairy cows. This will include research on (i) a novel lactating Holstein cow model of fertility to improve our understanding of the basic mechanisms responsible for subfertility; (ii) a genome wide association study to identify new genomic regions putatively	€939,458.30	13S528 **Final Report Not Available**

University College Dublin		associated with fertility, with a view to improving the accuracy of genomic selection; (iii) the role of glucose as a key nutrient to improve cow fertility and health status; and (iv) the effect of progesterone concentrations during dominant follicle development on subsequent embryo development after insemination. The proposed project includes research that will have immediate, medium-term and long-term beneficial effects on dairy cow fertility through (i) improving reproductive and nutritional management at farm level; (ii) increasing the rate of genetic gain for fertility traits; and (iii) improving our understanding of mechanisms responsible for subfertility.		
Dr. Steven Kildea Teagasc Oak Park, County Carlow. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2013	**CoSTM - Controlling septoria tritici blotch through crop management.** Septoria tritici blotch (STB) caused the fungal pathogen *Mycosphaerella graminicola* continues to be the most economically destructive disease of winter wheat in Ireland. For almost three decades fungicides have been relied upon for its control and to prevent the associated yield losses. Unfortunately due to the erosion in efficacy of these fungicides through the emergence of resistance / reduced sensitivity in the Irish *M. graminicola* population, coupled with increased regulations on the usage fungicides with in the EU the future sustainability and profitability of Irish production systems is questioned. It is therefore now essential to re-address STB control strategies. To achieve this goal the proposed project, CoSTM (*Controlling septoria tritici blotch through crop management*) will identify individually how the major practices currently involved in the cultivation of winter wheat (variety choice, fungicide, sowing date, seeding rate, fertilisation) impact upon *M. graminicola* infection and subsequent STB development under Irish conditions. The applied nature of the project, together with its multi-disciplinary and institutional approach will ensure that the relevance of the research findings and their dissemination to farm level.	€477,173.26	13S503 **Final Report Not Available**

Dr Kevin Hanrahan Teagasc Athenry, County Galway. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2013	**AgLandMarket - Analysis of the functioning of Irish agricultural land markets.** Well functioning land markets are a crucial condition for the competitiveness and growth of agriculture and for rural development. Despite the importance of land as a factor of production there is a relative scarcity of recent socio-economic research on the functioning of Irish agricultural land markets and the contribution that enhanced land market mobility could make to improve the productivity and economic and environmental sustainability of Irish agriculture. Irish agricultural land markets are characterised by low volumes of sales transactions, which is not unusual in an international context, and a low proportion of Irish agricultural land that is farmed under lease arrangements (CSO, 2012). This latter characteristic of the Irish agricultural land markets is unusual in an international context (Ciaian, Kancs and Swinnen 2010, Nickerson et al., 2012). To what extent does the functioning of the agricultural land market hinder the future development of an economically and environmentally sustainable agricultural sector in Ireland? In addressing this issue, the project will answer a number of related questions. From an economic perspective what would be the characteristics of a well functioning land market? Measured against this ideal, to what extent can the Irish agricultural land market be characterised as well functioning? What factors influence the participation of farmers and land owners in the Irish agricultural land market? What role do policy, institutional and cultural factors play in explaining the functioning of Irish agricultural land markets? What measures could be taken to address the level of land mobility in Ireland? This research, by improving our understanding of Irish agricultural land markets function, will facilitate the development of policies designed to enhance the functioning of Irish agricultural land markets.	€201,209.35	13S425 **Final Report Not Available**
Dr Gary Lanigan Teagasc Johnston Castle County Wexford. **Lead Institution:**	DAFM National Call 2013	**LowAmmo - Measurement and abatement of ammonia emissions from agriculture**. Agriculture contributes 98 % of the total ammonia (NH3) emissions in Ireland. The cattle sector is by far the largest source of these emissions, comprising 72% of total emissions. Revisions to National NH3 emissions targets will result in Ireland having	€1,246,289.00	13S430 **Final Report Not**

Teagasc **Collaborating Institutions:** University College Dublin Agri-Food and Biosciences Institute		to reduce national emissions while agriculture is expanding to meeting Food Harvest 2020 targets. Reducing emissions will result in improved nitrogen (N) use efficiency and reduce indirect greenhouse gas emissions. Research to date has focused on reducing NH3 emissions through improved land spreading and inorganic fertilizer use. National emissions data from animal housing, manure storage and grazing are few. This project will focus specifically on these gaps in the measurement data available for cattle systems in Ireland. The project will focus on tracking the fractionation and transformations of N in manure from the animal diet through the manure storage cycle, and will investigate the levels of emissions currently occurring during winter housing, and investigate strategies to reduce these emissions using cost effective technologies. Nitrogen emissions from dung and urine excretion at pasture will also be measured and disaggregated. The project will include the development of a model for estimating NH3 on farms based on animal, diet, housing, animal grazing and manure management criteria in place.		**Available**
Dr. Rachel Creamer Teagasc Johnston Castle County Wexford. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin University of Limerick Institute of Technology Sligo.	DAFM National Call 2013	**SQUARE - Soil Quality Assessment and Research.** Soil has been recognized as a vital non-renewable resource that requires sustainable management to ensure the viability of food and fibre production, nutrient retention and cycling and filtration of water into the future. Sustainable management of soil is paramount to ensure that these functions are available. Food Harvest 2020 is promoting the intensification of agricultural productions systems to increase the output of the sector. Greening of the Common Agricultural Policy (CAP) means that this increase in production must be achieved in a sustainable manner. The focus of this project is to; (1) develop a toolbox for farmers to assess soil structural quality and (2) understand what this means in terms of soil functional quality, i.e. the ability of the soil to perform its multiple functions (3) to conduct an inventory of approximately 160 sites across Ireland to evaluate the status of soil structural quality in grassland and tillage soils (4) it will assess the impact of soil structural degradation on the functional capacity of the soil. This work will be completed through a combination of method development, research capacity building and stakeholder engagement to achieve	€1,017,315.00	13S468 **Final Report Not Available**

		the outcomes of this project.		
Dr. Karen Daly Teagasc Johnston Castle County Wexford. **Lead Institution:** Teagasc **Collaborating Institutions:** University of Ulster Agri-Food and Biosciences Institute National University of Ireland Galway	DAFM National Call 2013	**HaRMONy - High Status WateRbodies: Managing and Optimising Nutrients.** The principal objectives of the WFD are to maintain 'High' and 'Good' water quality status where it exists and achieve at least 'Good' status for *all* waters by 2015, however, the EPA has noted a decline in the numbers of high status sites over the past twenty years. Most of these sites are located in upland areas, clustered along the western seaboard with a high proportion of peat soils in their catchments. Agriculture in these areas is typically extensive, however, poor management of nutrient on farms can cause a significant pressure in sensitive catchments. Farmers living in these areas require nutrient management strategies, that take account of the soil and topographical constraints within the landscape. Furthermore, a strong participatory approach to nutrient management from the farming community is necessary if mitigation strategies are to be adopted and successful. This proposal will integrate agri-environmental research with socio-economic tools to provide evidence-based measures for nutrient management that are cost-effective and acceptable to the farming community in these catchments. This project will characterise the catchment characteristics and assess the current nutrient management practices in case-study catchments. New agronomic and hydrology research will address the nutrient efficiency and hydrological constraints on nutrient management in sensitive catchments. A list of potential measures will be proposed arising from the research, and a socio-economic evaluation of their cost-effectiveness and likelihood of adoption will be made across the farming community.	€603,862.60	13S488 **Final Report Not Available**
Prof. Nick Holden University College Dublin Nick.holden@ucd.ie	ICT AGRI ERANET Call 2012	**SILF- SMART INTEGRATED LIVESTOCK FARMING.** In this project we will develop an evaluation platform that demonstrates through research the potential for an Internet of Things (IoT) enabled FMIS with animal-centric ICT, production databases & best practice standards to assist farmers optimize sustainable livestock	€225,000.00	13/RD/ICT-AGRI/1 Final

Lead Institution: University College Dublin **Collaborating Institutions:**		production. In this respect SILF will take an integrated approach to solving issues with environmental impact and animal welfare during livestock production. Previously developed smart farming sensing systems for lameness detection in dairy production will be "robustified", validated and evaluated against other available systems in different member states. The commercial/environmental benefit of these systems along with 'object-connected ICT' will be realized through specific business-models and lifecycle costing for farming systems. To entice innovation adoption these benefits will be disseminated through different means, e.g. through the use of a virtual farm simulator. To meet the growing appetite for meat and livestock derived products livestock farms across Europe are increasing in size. Therefore farmers must find greater integration of ICT into their production processes so that their farming knowledge can be exploited to better effect. SILF will demonstrate the benefits of integrating different information streams for supporting efficient dairy production. It will also develop know-how on user requirements for practical lameness detection system development through real-farm application, validation and "rubustification" and evaluation of these systems in Belgium, Denmark, Finland and Ireland. It will ease the entry into technology adoption by using virtual farm simulator as a means of dissemination. The impact of the project will be a significant step towards realistic possibility for livestock farmers to integrate object-connected ICT for improvement of sustainable production with improved animal welfare and commercial throughput. As Irish agriculture is so dependent on livestock production systems and products, this project is of great significance. Current national policy, found in Food Harvest 2020 specifies a requirement for Ireland to build on its green credentials through "SMART GREEN GROWTH" based technologies. This project directly focuses on this objective through the demonstration of the technical basis of IoT for sensor based data acquisition on farm (SMART), improved efficiency of farm management (GREEN) needed to increase productivity (GROWTH) in line with the target (50% increase in milk production) with minimal environmental consequences.		Report Available https://www.gov.ie/en/publication/ce553-research/

Dr. James Breen University College Dublin James.breen@ucd.ie **Lead Institution:** University College Dublin **Collaborating Institutions:**	RUR AGRI ERANET Call 2012	**TRUSTEE- Towards RUral Synergies and Trade-offs between Economic development and Ecosystem services.** The main research objective of TRUSTEE is to disentangle the complex relationships between economic development and ecosystem services at different spatial scales. We will use an interdisciplinary approach that will involve economists, geographers, agronomists, and ecologists. At every step of the research process, we will involve scientists, experts, and stakeholders. In doing so, this research will also strengthen the capacity of a range of stakeholders to design sustainable strategies for rural areas. The sub-objectives are: 1 Analyse the multi-scaled determinants of economic development and ecosystem services on a large European gradient of rural and rural/urban areas; 2. Increase our understanding of how to achieve mutual benefits for economic development in rural areas and ecosystem services; 3. Identify and assess the governance mechanisms and policy instruments that enhance sustainable rural vitality in very diverse contexts, 4. Produce synergies among international researchers of varied disciplines and between researchers and various stakeholders at different governance scales.	€99,758.13	13/RURA GRI/1 **Final Report Not Available**
Dr Fiona Walsh National University of Ireland Maynooth Fiona.walsh@mu.ie **Lead Institution:** National University of Ireland Maynooth. **Collaborating Institutions:**	Aniwha ERANET Call 2013	**PRAHAD- Prevalence and optimised detection of resistance to antibiotics vital for animal and human health.** The arsenal of antibiotics for use in medicine is ever decreasing, while the rates of resistance are ever increasing. There is a great need to identify and control all sources of antibiotic resistance, and minimise the transfer of resistance genes and/or bacteria within animals and between animals and humans. The aims of this collaborative project are to address resistance to three critically important classes of antibiotic classes; polymyxins (colistin), aminoglycosides and carbapenems among gut microflora from pigs and cattle. Colistin is an important antibiotic in the treatment of animals with intestinal infections i.e. Escherichia coli and Salmonella species. Carbapenemases were thought to be restricted to human pathogens, since carbapenems are not used in veterinary medicine. However, they have recently been identified in food animals. This project will evaluate the rates of resistance (or reduced susceptibility) to colistin, aminoglycosides and carbapenems	€246,937.00	14/ANIH WA/1 **Final Report Not Available**

		and among Gram-negative enteric bacteria from pigs and cattle, and compare these with the levels of prescribing in the different countries. We will identify the mechanisms leading to the resistance or reduced susceptibility to those antibiotics, and decipher their genetic environment. In cases where no known resistance mechanism can be identified we will utilise whole genome sequencing and functional metagenomics to decipher the novel resistance mechanism. Using this data we can then evaluate the relationship between mobile resistance elements within and between countries. Recently developed rapid diagnostic techniques for cheap identification of carbapenemase-producing isolates will be applied to investigate carbapenem resistance. We will also develop further diagnostic tools for the identification of colistin and aminoglycoside resistances. The use of antibiotics in veterinary medicine, the emergence of antibiotic resistance and the potential transfer of resistance through the food chain to humans are topics of high priority at both the national and EU policy levels. Comprehensive EU-wide scientific data is required to guide future policy in this area and to ensure the maintenance of both animal and human health and welfare. Traceability and transparency within the food industry are required in order to build on the reputation that Ireland has built up over many years as an island of safe food production, with high standards in animal health and welfare. Through this research Ireland will be at the forefront of antibiotic resistance traceability in the pig industry, enabling measures to be instigated to ensure that the pigs of Ireland have the lowest levels of resistance possible while maintaining the high health and welfare standards.		
Food				

Dr Aidan Moloney Teagasc Grange Dunsany County Meath **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2013	**GrassBeef-Nutritional composition, human health implications and marketing opportunities for beef from a grass-based production system.** The objectives are to produce and assess beef from grass-based production systems, in the context of human nutrition and health. Using an early maturing heifer beef system, beef will be produced from an exclusively grass or grass products-based diet. This novel beef will be compared with concentrate-finished beef and beef from a grass-silage based finishing system enriched in fatty acid composition by strategic concentrate supplementation. Five individual meat cuts (muscles and adipose tissue) will be collected from each animal at slaughter for analysis of a range of constituents considered to have human health benefits, in particular fatty acids and target micronutrients. The impact of level of consumption of these nutrients on blood markers of human health will be modelled using data within the National Adult Nutrition Survey database. The health effects of feeding grass-fed beef on markers of diabetes and heart disease will be determined in animal models and in an acute intervention/metabolic challenge study in human volunteers. Marketing opportunities and challenges to capture the benefits of grass-fed beef will be examined using a stakeholder workshop format. New information will be provided on: 1. The composition of beef from grass-based production systems for inclusion in food composition databases. 2. Data on the comparative effects of different types of beef on human health from animal and human studies. 3. Strategies to assist the marketing of Irish beef.	€599,808.00	13F514 **Final Report Not Available**

Dr. Donagh Berry Teagasc Moorepark Fermoy County Cork. **Lead Institution:** Teagasc **Collaborating Institutions:** Irish Cattle Breeding Federation	DAFM National Call 2013	**GENOTRACE- Genomic strategies for animal and meat provenance, authenticity and traceability.** The importance of the Irish Agri-Food export market signifies that rapid and accurate product provenance, authenticity and traceability is paramount. Genomic technology is currently used in an ad hoc approach to confirm authenticity of selected meat products. Although sufficient to generate the information asked by the process, considerable more information can be generated by state-of-the-art genomic technologies within a highly integrated information framework. This additional information can provide a world-first marketing tool to further support and improve the already high standard traceability procedures in place. In this pilot project we will establish the key parameters and logistics of food provenance, authenticity and traceability of beef meat products using state-of-the-art genomic technologies within a highly integrated information framework. Genomic information from 7 collaborating feedlot herds will contribute to this participatory research project. The information generated will be streamlined into the national database, validated against recorded parentage where available, parentage imputed where not available, breed proportion of the animal quantified and quality statistics derived. A lower cost genomic tool will also be developed to reduce the cost of acquiring such information. The outcome is a highly integrated, low-cost information system to instil confidence among consumers in Irish meat products.	€99,500.00	13F403 **Final Report Not Available**
Prof Lorraine Brennan University College Dublin Bellfield County Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** University College Cork	DAFM National Call 2013	**JINGO-JPI- European Nutritional Phenotype Database Sharing initiative within the Joint Programme Initiative.** The present proposal is intended to allow Irish nutritionists (9) participate in two pilot actions of the Joint Programming Initiative "A Healthy Diet for a Healthy Life" (11). Four partners (UCD, UCC, TCD, UU) have developed the National Nutrition Phenotype Database (10) which covers a cross sectional sample of 1,500 adults, an acute intervention study of 214 adults and a follow up study of 5,200 elderly adults osteoporosis, 1,700; cognitive impairment; 2,000 with hypertension). The LIPGENE (2) study involving cross sectional and intervention studies and the UCD twin study will also be included. The first specific objective of the project is up load the databases on to the NuGO nutritional	€592,135.00	14F407 Final Report Available https://www.gov.ie/en/publication/ce553-

Trinity College Dublin University of Ulster		phenotype database (12) and to ensure that the transfer process has not compromised the data. In addition to the data transfer, and in keeping with the JPI HDHL call, ("The applicants recognise that the exact structure of the work proposed in the present application might be altered when the project is integrated into a joint programme initiative as proposed by participating member states"), a second specific objective will be new analyses of these databases to strengthen the hand of Irish researchers in the next phase of this JPI, which will use the shared databases in biomarker discovery.		research/
Prof Catherine Stanton Teagasc Moorepark, Fermoy, County Cork **Lead Institution:** Teagasc **Collaborating Institutions:** National University of Ireland Galway University College Cork	DAFM National Call 2013	**SMART FOOD- Science Based 'Intelligent'/Functional and Medical Foods for Optimum Brain Health, Targeting Depression and Cognition.** This proposal aims to investigate the potential of marine-algal-derived omega-3 polyunsaturated fatty acids (PUFA) and marine polyphenols as dietary ingredients with efficacy to enhance mental health and cognition. Cognitive impairment may be a feature of major depression, which is recognised as a risk factor for age-related dementia. Incidence of depression is increasing substantially worldwide and is predicted to be the second leading cause of disability by 2020 (WHO). Novel strategies, both social and biological, to prevent depression are urgently needed. Recent preclinical and some clinical data suggest that nutrition may reduce depressive symptoms and alleviate cognitive decline, but scientific substantiation of efficacious dietary components is required. This project will involve in vitro and in vivo preclinical studies to determine the role of omega-3 PUFA and phytochemicals of marine origin in mood regulation. We propose to use a combination of omega-3 PUFA and sea polyphenols exhibiting antioxidant activity, as a nutritional supplement strategy in an animal model of depression, and should we get positive results, we will unravel the biological mechanisms. The results of this project will lead to functional food ingredients for prevention of depression, and medical foods to increase the potency of conventional antidepressants drugs.	€595,846.00	13F411 **Final Report Not Available**

Dr Catherine Collins Limerick Institute of Technology Limerick. **Lead Institution:** Limerick Institute of Technology **Collaborating Institutions:**	DAFM National Call 2013	**MUFFLER- Mushrooms and Fungi, Functional and Life Enhancing Reservoirs.** Edible mushrooms and fungi are a valuable source of nutrients and bioactive compounds. Recently, edible mushrooms have become increasingly attractive as functional foods for their potential beneficial effects on human health including anti-oxidant, anti-cancer, prebiotic, immunomodulating, anti-inflammatory, cardiovascular, anti-microbial and antihyper-cholesterolemia effects. Having such a repertoire of bioactives, mushrooms and fungi have great potential to provide lead compounds for the pharmaceutical industry. This project aims to evaluate different edible mushroom available to the Irish consumer as functional foods. We propose to examine chemical composition to determine the nutritional value of the mushroom by analysing their crude composition (protein, fat, and carbohydrate), fatty acid, sterol and polyphenol profiles. We will also focus on the biological characterisation of these edible mushrooms by investigating the anti -oxidant activity, immunomodulatory activity, angiotensin I-converting enzyme (ACE) inhibition to lower blood pressure, and HMG-CoA reductase inhibition assay (involved in lowering of cholesterol). We also propose to screen other mushroom and fungi from Irish habitats for the above biological activities in addition to: anti -microbial and laccase activities. Such a study could lead to the isolation of lead compounds for the pharmaceutical industry as well as being of benefit to the Irish mushroom consumer and producers.	€154,828.00	13F418 **Final Report Not Available**
Prof Seamus Fanning University College Dublin Bellfield County Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2013	**SMART-pif- Systems microbiology applied to the reduction and control of bacterial transmission in the powdered infant formula (PIF) production environment – towards scientifically validated improvements in food safety.** The powder infant formula (PIF) industry is a high-added value sector utilising an increasing fraction of the manufacturing milk produced in Ireland. This sector requires the supply of raw milk of high microbiological quality, as the basis of the final food product. Not only is the microbial quality of the milk of importance, the status of the production environment is equally important. UCD-CFS and Danone have been monitoring the production environment for the presence of Cronobacter species. The microbiome of the environment microflora and how it can influence this production environment is	€585,759.42	13F423 **Final Report Not Available**

Teagasc		unknown. In particular the environmental cues, leading to adaptation of bacteria in this ecological niche remain to be determined. In this programme, the base-line microbiome of a PIF production site will be determined. Bacterial phyla will be described, based on a dedicated sampling plan including temporal and geographical comparisons. Following sorting of the microbial populations, metagenomics and metatranscriptomics, will provide insights into the population-level dynamics of this environment. Systems microbiology network connections will be identified. Risk analysis will interrogate these data streams as a strategy for improved biological-based control of the production environment. Research outputs will be translated in terms of improvements in food safety and brand protection.		
Dr Eileen Gibney University College Dublin Bellfield County Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** University College Cork	DAFM National Call 2013	**DietIreland- Development of online dietary assessment tool.** This project aims to develop, validate and test an online 24 hour dietary recall tool that will ensure Ireland remains at the forefront of dietary intake collection within Europe. It will follow guidelines set by European Food Safety Authority (EFSA) and will ensure Ireland future involvement in collaborative programmes such as Joint Programme Initiative (JPI). Once validated this project will undertake a proof of principle study, to ascertain its potential use in future national nutritional surveys. This project builds on existing work and expertise within the research team utilising results and expertise from projects such as NANS (www.iuna.net) and Food4me (www.food4me.org). It will develop technologies to support Ireland's involvement in future European research meeting the requirements of JPI and EFSA. Finally it recognises the economical potential of the proposed tool and aims to investigate and develop this within this project.	€397,024.00	13F424 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr Mark Auty Teagasc Moorepark, Fermoy County Cork **Lead Institution:**	DAFM National Call 2013	**NANOCREAM- Nano-engineered dairy-based beverages with enhanced creaminess.** There is a market for reduced-fat food products promoting health, specifically those that tackle obesity and its related health issues such as cardiovascular disease. However, consumers also want products that taste as good as their full-fat counterparts and reducing fat whilst maintaining positive sensory attributes such as creaminess is a technological challenge. This project builds on recently completed	€80,141.00	13FP440 **Final Report Not Available**

Teagasc **Collaborating Institutions:**		FIRM-funded research, which showed that significant creaminess can be imparted to low fat dairy-based foods through a high dynamic pressure process called microfluidization. The scientific basis of this enhanced creaminess was the creation of unique fat-protein complexes at the nanoand micro-scales. This project will develop microfluidization as a process tool to produce creamier low-fat milks and milk-pectin premixes for incorporation into smoothie-type beverage products. The feasibility of exploiting pectin-rich fruit wastes from the indigenous food industry will also be investigated. These waste products include apple and orange fruit pulps and are rich in pectin, a natural soluble dietary fibre as well as other vegetable wastes. Pectin-rich food wastes will be microfluidized separately and together with the milks to investigate possible synergistic effects on product viscosity, stability and sensory perception. Fruit smoothies made of these two primary ingredients will be formulated, up-scaled to pilot plant and validated for taste and texture using a commercial consumer acceptance panel (n > 100). Taste comparisons with market leading competitor products will be done and data statistically analysed to confirm consumer acceptability and preference. The overall objective will be to produce a range of low fat fruit smoothies with enhanced creaminess and shelf stability.		
Dr. PJ Cullen Dublin Institute of Technology Marlborough street Dublin **Lead Institution:** Dublin Institute of Technology **Collaborating Institutions:**	DAFM National Call 2013	**Watertreat- Cold Plasma treatment of waste water.** This project will design, build and validate an innovative rapid effluent treatment solution for the food and agri sectors. The project will utilise the afterglow (unique reactive species) created during cold plasma discharge to treat process effluent waters from vegative and animal sources. A novel high voltage dielectric discharge barrier will be optimised to maximise the generated reactive oxygen species and diffused immediately within the effluent. The efficacy of the system will be assessed and optimised for reduction of Biological Oxygen Demand (BOD) as well as chemical degradation and pathogen inactivation. Plasma diagnostics, including optical emmission and absorption spectroscopy will be employed to characterise the reactive species generated and correlated to the effluent degradation characteristics in order to elucidate mechanisms. The project involves the development of an innovative solution and	€195,039.00	13F442 **Final Report Not Available**

		validation trials under real-life conditions. The proposal is based upon preliminary work at the DIT Bio-Plasma group and brings together expertise in plasma physics, process engineering, chemistry and microbiology with industry input to provide an environmentally friendly solution for food processing effluent treatment.		
Dr. PJ Cullen Dublin Institute of Technology – TU Marlborough street Dublin **Lead Institution:** Dublin Institute of Technology-TU **Collaborating Institutions:** University College Cork	DAFM National Call 2013	**Innofresh- Innovative process technologies for the fresh produce industry.** This project will develop innovative solutions for fresh and fresh-cut produce decontamination and extension of shelf-life. These solutions will offer an alternative to chlorine washes, provide a technological competitive advantage and open new markets for Irish producers. The project integrates novel dry and wet processing technologies based upon cold plasma discharge to deliver pasteurisation-like capabilities with a quality by design approach for modified atmosphere packaging to assure safety and maximise shelf life. The integration of these technologies is achieved by building a research team combining expertise at Dublin Institute of Technology and University College Cork along with direct industry involvement. The project involves the development of innovative solutions and validation trials under real-life conditions. The project will provide a pioneering capability for the Irish fruit & vegetable sector to maximise value, increase competitiveness and increase market outreach towards exports. Given the novely of the proposed solutions attention will be given to IP development.	€471,794.00	13F444 **Final Report Not Available**
Dr Linda Giblin Teagasc Moorepark Fermoy County Cork. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2013	**WheyGSH- Beverage formulation/reformulation targeted at older population using in vitro assay to design whey protein structure for optimum glutathione (GSH) generation and increased antioxidant potential.** Generally, milk proteins are viewed as a rich source of biologically active components. However in certain instances, the protein itself may be a proactive 'donor' to promote in vivo generation of a biologically active compound during cellular synthesis from its metabolic products. Glutathione (GSH) is a tripeptide present in whey proteins that is understood to be transported poorly into cells. More importantly, the tripeptide is also generated intracellularly from whey protein donor groups to function as an antioxidant that counters cell toxicity and ultimately neuro-degenerative type disorders particularly	€591,509.00	13F454 **Final Report Not Available**

		prevalent among ageing populations. Thus, there is a need for a much better scientific understanding of how whey proteins may be functionalised in order to arrest the decline in in vivo GSH production with increasing age. Thus, the experimental study will employ an in vitro cell line based-assay to monitor GSH production following exposure of cells to whey protein containing substrates. The pilot scale preparation of these whey proteins will be designed with view to constructing a picture of how their physico-chemical adaptations can be linked to the promotion of GSH formation. These experimental preparations will also afford an opportunity to prepare peptide fractions containing elevated levels of whey GSH in order to ascertain whether naturally present GSH may be transported across cells. Peptide fractions selected according to iron binding ability will also be included since high physiological levels of GSH are meant to insulate its cytosolic function in iron metabolism from variations of Fe concentration during redox stresses. Potential synergies between marine and plant-based antioxidants to promote GSH formation will also be explored. Ultimately, it is intended to formulate a model beverage targeted at adult populations using functionalised whey proteins in formulations with a capacity to potentiate overall antioxidant bioactivity and specifically GSH.		
Dr Declan J. Bolton Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2013	**SEA-FISH- Shelf-life Extension ingredient and processing technologies Applied to Fish.** Achieving the 43% increase in the volume and/or value of Irish seafood (Food Harvest 2020) requires a significant contribution from all areas within this sector. Fish processing currently contributes significantly to the €713 million generated in the seafood sector annually including export earnings of €379 million p.a. Increasing the value of the processes fish sector is reliant on the development of new export markets in the UK and continental Europe (as outlined in the report 'Harnessing Our Ocean Wealth'). The major hurdle to achieving this objective is the short shelf-life of processed fish products (9 days max). In full and active collaboration with the main industry stakeholders, this project will investigate the application of clean label ingredients with and without novel processing technologies to consistently achieve a shelf-life of at least 14 days including a full investigation of their impact on the	€583,100.00	13F458 **Final Report Not Available**

		sensory and nutritional quality of the products. It will also deliver a rapid method for assessing fish freshness and shelf-life predictor tools as well as light technologies (UV, HILP, blue light) for the control of microbial contaminants in critical areas within fish processing plants and on food contact equipment surfaces.		
Prof Patrick Wall University College Dublin Bellfield County Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2013	**FORC- Food Reformulation for Consumers: Understanding barriers to consumer acceptance of reformulated food products.** The successful integration of reformulated food products onto the market will likely aid in combating societal and public health challenges presented by diet-related diseases; they also represent an exciting opportunity for the Irish agri-food sector to lead the way in the production of healthy food options for consumers. Although reformulated food products are currently on the market, the level of and factors influencing acceptance towards these foods is relatively unknown. The current project proposes to identify the factors influencing consumer acceptance of reformulated food products so that future strategies employed in introducing reformulated products onto the market will align with consumer perceptions and needs. A number of consumer-centred research tasks are proposed including a web-based survey with a large representative sample of Irish consumers. The current project will also employ Vizzata; a revolutionary methodology in the field of consumer research which enables the formation of a two-way stream of dialogue to fully capture the breadth of consumers' comments and questions relating to reformulated food products. It is envisioned that the findings from this project will feed into the development of targeted communication of reformulated food products to consumers which will align with the specific needs of different consumer segments.	€83,573.00	13F460 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr. Paul Cotter Teagasc Moorepark Fermoy County Cork **Lead Institution:**	DAFM National Call 2013	**peptidesProtectants- Natural peptides to enhance food quality and safety.** Food processors are facing an extraordinary dilemma as they try to address consumer demands for healthy, minimally-processed foods, while, paradoxically, being required to meet ever-increasing microbial safety standards. Antimicrobial peptides (AMPs), such as novel bacteriocins and defensins, offer viable solutions to the development of natural food biopreseratives to replace the current market leader Nisin A, by	€997,139.00	13F462 **Final Report Not Available**

Teagasc **Collaborating Institutions:** University College Cork Trinity College Dublin		providing better activity against food spoilage and pathogenic bacteria. The participants of the proposed research project have patented a number of novel peptides including variants of Nisin A, Bactofencin LS1, and human α-defensin 3 (HBD3) which display potent activity against several Gram positive and negative bacteria, including Listeria and Staphylococcus, Lactobacillus and Pediococcus species. Recent studies establish that the combined use of the powerful bacteriocin, Lacticin 3147, with other antimicrobials can address major microbe-related food safety issues. Additionally HBD3 produced in situ has been shown to prevent bacterial contamination during the brewing process. The proposed research expands on these findings and aims to characterise the available AMPs through combination-based approaches and to identify additional antimicrobial peptides. Other tasks focused on larger food-based studies, scaling up of peptide production and the formation of a steering group to advise with respect to regulatory issues are required to facilitate commercialisation of these novel AMPs.		
Dr Gary Jones Leeds Beckett University Leeds West Yorkshire England **Lead Institution:** National University of Ireland Maynooth **Collaborating Institutions:**	DAFM National Call 2013	**ERGOYEAST- Developing budding yeast as a factory for production of the antioxidant ergothioneine.** The addition of beneficial biochemicals to foodstuffs is well established. A variety of antioxidant compounds are used as food preservatives and are also thought to provide potential health benefits for consumers. Hence, the cheap production of stable and powerful antioxidants, which have potential usage as a beneficial food additive, is highly desirable. Ergothioneine is a naturally occurring modified amino acid that has a high redox potential and is more stable and active compared to other antioxidant additives that are currently used in the food industry. Presently the only way to commercially produce ergothioneine is through a complex and expensive chemical process. In this project we will engineer the Generally Regarded As Safe (GRAS) organism Saccharomyces cerevisae (baker's yeast) as a "cell factory" to produce ergothioneine. We will assess and optimize the levels of ergothioneine production and test feasibility of commercial scale-up. Additionally we will test the biological activity of ergothioneine produced in baker's yeast. This project offers real potential for development of a cheap production strategy for this	€100,100.00	13F463 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		potentially commercially important antioxidant molecule. The project will result in the training of an MSc-level postgraduate with skills required by the Irish food science research sector and offers excellent value for money.		
Prof R.J. (Dick) FitzGerald University of Limerick County Limerick **Lead Institution:** University of Limerick **Collaborating Institutions:** University of Ulster	DAFM National Call 2013	**MARAPEP- Marine Sourced Peptides for Glycaemic Management.** Marine sources such as macroalgae (Palmaria palmata), fish which will now be landed (Blue whiting/boarfish) due to recent changes in EU Common Fisheries Policy and fish by-products (salmon skin) represent good sustainable candidate raw materials for the mining of bioactive peptides with applications as biofunctional ingredients. This project will assess the ability of marine protein-derived peptides to modulate biomarkers associated with glycaemic function and satiety. In the first instance the potential of blue whiting and boarfish as sustainable sources of marine protein will be assessed. Laboratory-scale protein hydrolysate generation will be performed to optimise the release of peptides with potent antidiabetic activity from these marine protein sources. Selected marine protein hydrolysates showing stability to simulated gastrointestinal digestion and significant insulinotropic activity in pancreatic BRIN-BD11 cells grown in culture will be further assessed in vivo using an ob/ob diabetic mouse model. Selected optimised hydrolysis protocols will be transferred to semi-pilot scale for prototype ingredient manufacture. Finally, the effect of marine hydrolysates ingestion on biomarkers associated with diabetes and satiety will be investigated in a human intervention study. This proposal aims to validate the hypothesis that protein hydrolysates from marine sources have potential as glycaemic management and satiety enhancing agents.	€581,116.00	13F467 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr Michael Cairns National University of Ireland Galway University Road Galway County Galway **Lead Institution:** National University of Ireland Galway **Collaborating Institutions:** Teagasc	DAFM National Call 2013	**SIALenz- Enzymatic generation of sialylated lactose from waste whey using marine-derived sialyltransferases.** Many biological functions have been attributed to sialylated human milk oligosaccharides (HMOs) which account for about 20% of all HMOs. These oligosaccharides can act as binding sites for specific pathogens and toxins, are thought to play a role in brain development and can regulate the immune response. However, the large amounts of HMOs which are required for clinical intervention are unavailable. Although many of these same MOs are present in bovine milk their levels are very low. This project therefore focuses on alternative sources and methods of producing two major sialylated HMOs, 3' and 6'sialyllactose. Sialylated derivatives of oligosaccharides are difficult to prepare using chemical synthesis methods. Common practice is to adopt an enzyme reaction for this modification. However, existing commercial purified enzymes are prohibitively expensive. In order to up-scale production, it is necessary to produce inexpensive enzymes that can convert lactose to sialyllactose. Enzymes derived from marine bacteria and marine animal sources will be exploited. Lactose is a waste product in whey permeate, a by-product obtained during cheese whey processing. The process will be up-scaled to produce high yields of the sialylated oligosaccharides which will be in turn assessed for activity using bioassays already developed in house.	€507,244.00	13F477 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr Martin Danaher Teagasc Ashtown Dublin 15 **Lead Institution:** Teagasc **Collaborating Institutions:** Cork Institute of Technology	DAFM National Call 2013	**DuCATi- Detection of Cephalosporins and quATernary ammonium compounds in food.** This project will carry out research into residues of two groups of substances, namely, Cephalosporin antibiotics and Quaternary Ammonium Compounds (QACs). QACs are an emerging group of contaminants originating from disinfectants and are currently of concern for the dairy industry. Cephalosporins are a key antibiotic used in the treatment of bacterial infections in both humans and farm animals. There is ongoing concern about their use in agriculture because of the potential development of antimicrobial resistance (AMR). There have been reports of cephalosporin residues in milk, poultry and aquaculture products due to inappropriate treatments. No confirmatory chemical tests are available on the island to detect these cephalosporin residues in food. This project will address this gap, by	€389,199.00	13F484 **Final Report Not Available**

		application and validation of a multiresidue cephalosporin LC-MS/MS method, which will be transferred to the official testing laboratory in Ireland, Veterinary Public Health Regulatory Laboratory (VPHRL, Backweston). In addition, methods will also be established at Teagasc to measure QAC residues in milk. Methods applied during this project will lead to new knowledge on the persistence of residues in milk. Residue stabilities during dairy product manufacture will also be investigated. Project research will provide new knowledge and tests to support the Irish Agri-food industry.		
Dr Anne Molloy Trinity College Dublin Pearse St Dublin **Lead Institution:** Trinity College Dublin **Collaborating Institutions:**	DAFM National Call 2013	**BIO-Tilda study- The Irish Longitudinal Ageing Study (TILDA) Nutritional Biomarker Database Enhancement Initiative.** In the first wave of recruitment into the Irish Longitudinal Study on Ageing (TILDA), bloods were collected and stored from approximately 5000 people aged 50+. No funding was provided for blood biomarker analysis and so samples were stored at -80°C for future analysis of metabolites that are important determinants of healthy ageing. The present proposal will deliver baseline blood concentration data into the TILDA database for three micronutrients and an inflammation marker that are highly relevant to ageing and age related social policy – folate, vitamin B12, vitamin D and C-reactive protein 9crp). Low status of the three vitamins has been associated with multiple adverse health outcomes in older persons in both prospective and case control studies. This project will allow the prevalence of inadequate status of these micronutrients to be assessed on this unique national cohort and the relationship between inadequate status and adverse health conditions, including inflammation, to be explored. The data will also provide an invaluable resource for prospective studies in the later waves of this longitudinal study and will provide evidence for policy makers and the food industry in relation to future policies for food fortification and disease prevention.	€198,780.00	13F492 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr Maria Jose Sousa-Gallagher University College Cork College Road Cork	DAFM National Call 2013	**RiskTools- Development of risk assessment tools of package/product systems for a safe and sustainable food chain.** This desktop project will develop risk assessment tools of perishable food products through supply chains. Using predictive models of product metabolisms, molecular mass transfer and microbial growth, a software based system can predict the composition of the atmosphere	€129,000.00	13F505 **Final Report Not**

Lead Institution: University College Cork **Collaborating Institutions:** Dublin Institute of Technology		inside a package in real-life conditions and the consequences in terms of quality and, especially, safety. This can be used for challenge testing, to identify the most critical elements of the chain, and answer what-if scenarios. It will be possible to develop robust product/package/supply chain systems, that is, packages that serve as redundancy safety systems by ensuring that failures in the chain do not result in dramatic loss of safety, or of quality. This is essential to develop sustainable chains and minimise produce loss. Predictive models have been developed for various individual applications, but there is no platform such as the one proposed here that can integrate and provide global analysis. Substantial effort has been put into developing safe and efficient manufacturing processes, but at present most of that efficiency wears out at the factory gates. The tools developed by this project will allow food manufacturers, retailers and regulators to go beyond the factory and ensure quality and safety for the consumer.		**Available**
Dr Xinmin Zhan National University of Ireland Galway University Road Galway County Galway **Lead Institution:** National University of Ireland Galway **Collaborating Institutions:** University College Cork Trinity College Dublin Athlone Institute of Technology Teagasc	DAFM National Call 2013	**DairyWater- Development of a Water Use and Waste Management Framework for the Dairy Processing Industry.** The abolition of EU milk quotas in 2015 will offer increased prospects for the Irish dairy industry. A growth of 50% in milk production by 2020 is expected. This will challenge the dairy industry and significant improvements of resource efficiency in water and energy, and waste management are required. This project aims to identify effective and sustainable technologies, which will treat dairy waste and reduce water usage in the dairy processing sector. We propose to examine NUIG-developed intermittently aerated sequencing batch reactor (IASBR) technology and TCD-developed nanomaterials for removing biochemical oxygen demand, nitrogen and phosphorus from the dairy effluent to reach the discharge standard. Water reuse and rainwater harvesting technologies, integrated with pulsed UV systems developed by Athlone IT and NUIG, will be investigated to enable water use reduction. Life cycle analysis of water use and dairy waste management will be conducted and will assess the advantage of using the proposed technologies. A cost-benefit analysis will also be undertaken. Results from this project will be disseminated enabling adoption by stakeholders. This	€999,595.50	13F505 **Final Report Not Available**

		project will be alignment with national and international policies by turning wastes into resources.		
Dr Carl Sullivan Dublin Institute of Technology Marlborough Street Dublin **Lead Institution:** Dublin Institute of Technology **Collaborating Institutions:** University College Dublin	DAFM National Call 2013	**MeatSense- Novel spectral and spatial process analytical tools for meat quality and safety assessment.** This project will develop novel process spectral based systems to predict meat quality and ensure that the product is not contaminated. A prototype area scanning NIR Hyperspectral Imaging (HSI) system with high spatial and spectral resolution will be developed and assessed for detailed meat inspection and referenced against current line scanning HSI systems available to the consortium. Secondly, a novel real-time multi-point NIR system will be developed for "quasi" imaging of meats, offering full speed on-line assessment from varying fields of view. Also, a novel portable HSI system with high spatial resolution features will be assessed and compared to the lab based systems. Finally, a novel guided wave microwave spectrometry technology will be assessed for on-line monitoring of ground meat products. Quantification and classification algorithms will be developed for the prediction and mapping of meat quality indices including major beef constituents (e.g. moisture, protein and fat), physical properties (pH, colour, water holding capacity, and slice shear force) and consumer assessed eating quality (odour, flavour, juiciness and tenderness). The high resolution HSI systems will also be assessed for their efficacy to detect gross contamination and assure product quality. This project will enable the transfer from the laboratory to the processing plant of novel platform technologies to improve the competitiveness, sustainability and international reputation of the Irish meat industry.	€451,195.00	13F508 **Final Report Not Available**
Dr Jesus Frias Dublin Institute of Technology-TU Marlborough Street Dublin **Lead Institution:**	DAFM National Call 2013	**SELNUTR- Fungal biofactories: Improved delivery of natural selenium from the cultivated mushroom (Agaricus bisporus).** The proposal uses a "smart" economy approach to a strategic sector of the Irish food industry by exploiting "spilling-over" (DAFF, 2010) Irish-based research know-how from the pharmaceutical drug delivery area to make oral nutraceutical formulations of natural selenium (Se) derived from mushrooms. Se has a number of approved EU health benefits. However, it is poorly absorbed in the small intestinal epithelium and has a narrow therapeutic	€474,628.00	**13F510** **Final Report Not Available**

Dublin Institute of Technology-TU **Collaborating Institutions:** University College Dublin		index. The aim of this is proposal to isolate and purify mushroom Se by-products for oral formulation of nano enabled drug delivery technologies in order to improve permeability, bioavailability and reduce toxicity. In order to achieve this aim, the following methodologies will be used: (1) Development of Graphite Furnace Atomic Absorption Spectroscopy (GFAAS) and Gas Chromatography/Mass Spectroscopy (GC/MS) analysis to characterise differential effects of cultivation and processing relating to the content of selenium organic compounds in mushroom extracts. (2) Evaluation of the delivery properties of Se extracts from mushrooms formulated using response surface methodology and robust in-vitro experimental protocols to identify (a) mushroom-derived components that can enhance Se transport (chitosan) and (b) additional ingredients (sodium caprate and maltodextrin) and technologies (nanoencapsulation). Using the results, (1) and (2) formulations of Se with optimal transport properties will be designed and tested ex-vivo employing Using chambers and in vivo by oral gavage delivery to a Se deficient rat model. The human health impacts will be assessed by monitoring the cytotoxicity of the active ingredients and nano formulations in vitro. Also, there is a long history of chitosan use in man as a dietary slimming agent and no human toxicology has been apparent over many years. While it is not approved as an official excipient, its known safety is one of the reasons it is used by the pharmaceutical industry as a component of oral nanoparticle formulations.		
Prof Catherine Stanton Teagasc Moorepark Fermoy Co.Cork **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2013	**PREMARA- Seaweeds as a source of non-digestible complex polysaccharide components for the development of novel prebiotic ingredients for the functional food.** Seaweeds contain a high proportion of fibre (up to 50% dry mass) as a diverse range of polysaccharides (including xylan, fucoidan, alginate, laminarin, carrageenan and ulvan) which have been suggested to have potential prebiotic activity. This project will develop a low-cost industrial scale extraction process for polysaccharides from a range of sustainable Irish seaweeds (Fucus vesiculosus, Palmaria palmata, Ulva intestinalis and Laminaria digitata) for the purposes of developing a marine based prebiotic for incorporation into functional foods.	€600,325.00	13F511 **Final Report Not Available**

National University of Ireland Galway University of Ulster University College Cork		Polysaccharide extraction protocols developed in the NutraMara programme will be modified for industrial scale application. Three extracts will be produced from each seaweed species – 1) relatively crude seaweed extract, 2) a polysaccharide-rich extract and 3) a depolymerised polysaccharide-rich extract. The prebiotic activity of these extracts will be screened using ex-vivo batch culture methods and the most suitable candidate selected for incorporation into an appropriate organoleptically tested food vehicle. Subsequently the candidate prebiotic will undergo validation using a human intervention study to provide information on the effect on the microbiota (including effect on bifidobacteria, a prime property of prebiotics) and generate data on other potential health benefits in the gut such as improvements in stool formation (laxation) in addition to beneficial effects on plasma lipid profiles and blood glucose levels.		
Prof Torres Sweeney University College Dublin Bellfield Co. Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** University College Cork	DAFM National Call 2013	**MARINE – IBD- The anti-inflammatory and microbial modulating effects of marine derived laminarin and omega-3 fatty acids on inflammatory bowel disease in an experimental porcine model.** Inflammatory Bowel Disease (IBD) refers to a debilitating set of conditions in humans including Ulcerative Colitis, and Crohn's Disease. The incidence of IBD is rapidly increasing in both adults and children. The identification of natural bioactives which can alleviate the recurrence of these debilitating conditions is of great importance. Recent research has identified that marine-derived laminarin and omega-3 fatty acids (omega-3) have diverse anti-inflammatory and microbial-modulating properties in-vitro and in-vivo. Our hypothesis is that a combination of laminarin and omega-3 fatty acids will remediate colitis-type inflammation via divergent mechanisms, including modification of the enteric microbiota and suppression of the dis-regulated colonic inflammatory transcriptome. A porcine model of IBD will be used. Two experiments will be conducted whereby the bioactives will be given: 1) directly in the diet to a mature pig, or 2) via the maternal route during gestation/suckling. Following exposure to the bioactives for a period of time, colitis will be induced using dextran sulphate. Serological markers of epithelial permeability, colonic histopathology and immune	€493,064.00	13F516 **Final Report Not Available**

		cell infiltrate profiles shall be assessed. Treatments which provide a significant improvement in severity of colitis will be selected for detailed transcriptome analysis and microbiome profiling. This collaboration will bring together disciplines encompassing histopathology, immunology, genomics, and microbiology to develop a bioactive that will reduce the recurrence of IBD, and will establish links with medics treating IBD on a daily basis.		
Dr Sinéad McCarthy Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork	DAFM National Call 2013	**ReVisData- Data mining of existing consumer behaviour and attitudes databases to inform consumer led NPD.** Food choices are the most frequent human behaviour, are complex and determined by many interacting factors shaped by our environment. While choices are shaped by history and context, ongoing experiences offer a significant backdrop to understanding current choice motives and support the prediction of future preferences. Therefore extensive and up to date consumer insights and market knowledge to respond quickly to ever changing consumer patterns, trends and food preferences are essential to increase likelihood of market success. Hence, the aim of this research is to exploit existing consumer databases to profile new consumer segments and drivers of consumer trends such as health and sustainability, which will provide deeper insights into NPD marketing opportunities in both domestic and UK export markets. Analysis of NANS data will be two directional to maximise profile information (including demographic characteristics) for both motivational and behavioural based consumer segments. These analyses will generate NPD marketing profiles and insights for the domestic market. Analysis of PERIscope data will provide the food industry with deeper insights into consumer trends and identify opportunities for NPD for the UK export market target. To ensure uptake by food companies a wide-reaching and practical dissemination programme will be conducted through various national workshops and reports.	€188,046.00	13F527 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr James Lyng University College Dublin Bellfield Dublin **Lead Institution:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2013	**QualCrust- Adding value to ready to eat crustacean products by improving their quality, safety and shelf life using enhanced conventional and novel processing methods.** The majority of crab landed in Ireland is exported within the EU, though there is increasing demand from outside the EU (particularly from China) for this product. 2011 figures show 42% exported fresh, 58% frozen and only 1% prepared. Thus great potential exists to add value to this product. In-port crab processing involves procedures in existence for generations. Considerable scope for process optimisation (and quality enhancement) exists at 3 stages: 1. Initial processing (e.g. minimising cook-loss through clean-label-ingredient incorporation and novel methods for cook-loss-exudate removal during boiling, potential eliminating post-cook-washing and subsequent pasteurisation); 2. Heat processing (optimising conditions to ensure microbiologically safe products while reducing heat-induced negative impact on quality); 3. Packaging.The project will optimise the above stages and will focus on (a) entire unfrozen-crab and (b) a particulate-crab foodstuff (e.g. crab chowder/stock/pate/soup). Current Irish products will be compared to state-of-the-art competitor products in terms of instrumental/sensory/nutritional quality, shelf life, microbial safety. The effectiveness of optimisation of the 3 stages above will be assessed to ascertain the gains over current and aspirational products. The main outcomes will be optimised readily adoptable manufacturing protocols which will maximise the quality of Irish exported crab and an improvement in the industry/science interface.	€594,742.00	13F529 **Final Report Not Available**
Dr Dagmar Stengel National University of Ireland Galway University Road Galway	DAFM National Call 2013	**PRO-Sea-Veg- Profiling and Optimising chemical composition of red Sea Vegetables for enhanced bioactive yields.** This project will characterise the bioactive profile of two edible red seaweeds (seavegetables), Carrageen Moss (Chondrus crispus) and Nori (Porphyra sp.), commercially available in Ireland. It will further investigate the potential to enhance, through optimised cultivation, specific bioactivities (anti-oxidant, anti-diabetic, cardioprotective) in these species which at present are only harvested from the wild. A significant potential exists to include	€578,523.00	13F536 **Final Report Not Available**

Lead Institution: National University of Ireland Galway **Collaborating Institutions:** University of Limerick		these species as functional food ingredients in Ireland, based on their availability and familiarity. Red algal proteins (including phycobilins) and mycosporine-like amino acids (MAAs) have proven antioxidant capacities, and in other countries both species are cultivated at large scale. Although traditionally harvested and accepted by Irish consumers into food products as Irish Moss and sushi, respectively, the biochemical composition of naturally collected materials, as currently available on Irish markets, and their related bioactivity has never been assessed. Building upon, and extending, expertise developed under NutraMara at NUI Galway (bioactive variability, biomass optimisation) and UL (peptide and protein extraction, bioactivity assessment), the natural variability of bioactive composition in these two species be quantified. Research outputs will identify processes that will allow the optimisation of these commonly available species for the Irish food market and underpin the future development of high value food products.		
Dr Alice Lucey University College Cork College Road Cork **Lead Institution:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2013	**CardioRUBUS- Beneficial effects of blackberry (Rubus) polyphenols on cardiovascular and metabolic health.** Ireland has a long tradition for growing Blackberry (Rubus) fruits both traditionally as wild brambles and through commercial cultivation. Blackberry is a fruit of interest as it is rich in bioactive polyphenol compounds contributing to its high antioxidant capacity and protective effects on cardiovascular and bone health, age-related neuro-degeneration and suppression of tumour formation (Kaume et al. 2011). Cardiovascular disease (CVD), the metabolic syndrome, and type 2 diabetes mellitus place the body under chronic oxidative stress and are influenced by interactions between genetic and lifestyle factors (Yusuf et al. 2004). Dietary interventions are central to healthy aging and for reducing the risk of chronic disease, indicating a clear need and a substantial market opportunity to develop novel foods with proven benefits for cardiovascular and metabolic health. The adoption of a Farm to Fork approach is the core ethos underlying this research, which proposes to: • Assimilate published data on polyphenol profile and biological effects of blackberries to the eBASIS database;	€590,919.53	13F539 **Final Report Not Available**

		• Develop and characterise a novel functional blackberry polyphenol-enriched fruit beverage; • Implement a human intervention study investigating the effects of blackberry-derived polyphenols on cardiovascular risk; • Evaluate the impact of increased consumption of this functional blackberry beverage on polyphenol intakes in Irish population groups with a view to future commercialisation;		
Prof Dolores O'Riordan University College Dublin Bellfield Dublin. **Lead Institution:** University College Dublin **Collaborating Institutions:** University College Cork	DAFM National Call 2013	**NUTRIDATA- National nutrition databases for public health and new product development.** It is proposed to carry out analysis of the IUNA national food consumption databases to develop new knowledge to underpin public health policy and to inform new product development for Irish food companies in the context of life stage nutrition. The research will identify dietary strategies for achieving nutrition goals in preschool children and older adults and will underpin the development of healthy eating guidelines for these population groups. It will also carry out a risk – benefit analysis of food fortification and food supplements in older adults. The relationship of whole grain intake to health in adults will be investigated and modelling studies will be performed to identify potential strategies to enhance whole grain consumption. Analysis will be carried out to identify dietary behaviours associated with CVD risk in Irish adults which will inform healthy eating guidelines and product development in the food industry. Estimation of food chemical intake in Irish preschool children will be carried out in collaboration with the FSAI using the Irish National Food Ingredient Database. The project will further develop the capacity of Irish researchers to participate in JPI and Horizon 2020. The research outcomes will be disseminated to key stakeholders.	€596,942.00	13F542 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr Eimear Gallagher Teagasc Ashtown Dublin 15.	DAFM National Call 2013	**EasyBakePlus- Healthy-to-bake: Ready-to-bake mixes containing healthy flours generated from food processing by-products.** This project aims to add value, through further research to increase the commercial value/relevance of the outputs of an ongoing FIRM project (Healthy cereal-based snacks from by-products of the milling, malting, brewing and cider industries). In the current project to date, the	€95,536.00	13FP471 **Final Report Not**

Lead Institution: Teagasc **Collaborating Institutions:**		nutritional and technological properties of the food byproducts have been characterised and successfully incorporated into novel bakery formulations. The final step now is to bring this work to a pre-commercial level and make it more applicable and relevant to industry. To do this, the aim is to apply these new formulations in an easy to use, healthy, ready-mix form, which would be commercially exploitable by relevant industry. These flour mixes will produce baked products (sweet and savoury) requiring minimum addition of ingredients, equipment and time by the end user. The idea is based on the commercially available ready-to-bake-mixes such as soda bread mix, cake mix etc, and this Research Plus project will give the opportunity to offer a distinct advantage of producing baked products with enhanced nutritional quality (rich in dietary fibre and bioactive compounds) using natural functional ingredients. The nutritional value of brewer's spent grain, apple pomace and orange pomace has been determined during the current FIRM project, throughout which the suitability of these by-products for healthy baked goods has been explored. A number of different end products have already been created (e.g. breadsticks, scones, extruded products, breads, biscuits) that were of high nutritional value and were deemed to be highly acceptable by sensory panellists. This EasyBakePlus project will investigate the blending of the flours (e.g. apple pomace) with the other dry baking ingredients (e.g. sugar, salt, wheat flour etc) into ready-to-bake mixes. The blends will be validated with respect to the sensory and nutritional properties of the resultant baked products. The challenges that will be addressed in this project will include the stability and the shelf-life of these flours when stored under different conditions (temperature, relative humidity, and packaging). During storage, critical properties such as moisture content, water activity and peroxide value will be monitored. In addition, the flour mixes will be evaluated for microbiological safety, sensory properties and nutrient stability. The effect of storage of the flour mixes on the quality of the baked products will also be studied. The expertise and methodologies developed during the original FIRM project will be applied and further enhanced in this proposed Research Plus project. Outputs will involve the production of fully		**Available**

		characterised optimised novel bakery mixes ready for evaluation/validation/scale-up by flour/baking companies at a commercial level, while generating a potential profitable market for waste products for the beverage industry.		
Dr Phil Kelly Teagasc Oak Park, County Carlow. **Lead Institution:** Teagasc **Collaborating Institutions:**	DAFM National Call 2013	**PROBar- Development of high protein bars as vehicles for functional ingredient delivery.** This FIRMplus proposal builds on the outcomes of an outgoing FIRM-funded project 'Water activity control and texture stabilisation of high protein snack bars'. The latter project highlighted the complexity underlying ingredient interactions in a highly concentrated environment and particularly how it impacts on textural change (hardening) during storage. The inclusion of hydrolysed proteins in the bar formulations was identified a means of slowing the development of hardening. Extensive profiling of these and a wide range of milk proteins provided significant insights into the possible mechanisms influencing hardness development. The project also demonstrated that sugar syrups used in bar formulations may be partially substituted using prebiotic mixtures such as fructooligosaccharides (FOS) and galactooligosaccharides (GOS) without any negative effect. FIRMplus, thus, provides a further opportunity to examine how probiotic bacteria would survive in the typical intermediate moisture matrix of these bars. In general, survival of probiotic cultures is impaired in dehydrated environments, such as milk powders, due to cell wall damage. However, intermediate moisture foods are regarded as microbially stable due to their controlled water activity (aw). The challenge in this instance is to establish whether a balance between survival i.e. culture maintenance with minimal cell loss and growth in the presence of prebiotics is likely. In any case, a synbiotic-enriched high protein bar formulation could be envisaged as a useful delivery system for such functional ingredients. Progress and outcomes of this work would be promoted to Irish dairy companies engaged in the manufacture and supply of customised ingredients to food companies engaged in such applications. IP generation following demonstration of synbiosis in an intermediate moisture food matrix during FIRMplus could be sub-licensed to Irish dairy ingredient suppliers who, in turn, could tailor product offerings that include a combination of ingredients and	€99,351.00	13FFP513 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		technical know-how. A registered symbol or trade mark will also be considered with the input of Teagasc TTO as a means by which the uniqueness of innovation may be exploited in the final product packaging.		
Dr Eimear Gallagher Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork Agri-Food and Biosciences Institute University College Dublin Dublin Institute of Technology University of Ulster St. Angela's College Limerick Institute of Technology Galway Mayo Institute of Technology College of Agriculture, Food and Rural Enterprise	DAFM National Call 2013	**SensoryNetIreland- Sensory Network Ireland.** Recognising the importance of sensory science in the food industry has evolved from the increasing need for a scientifically sound and systematic approach to the sensory evaluation of foods. In the past number of years, the field has made substantial progress in developing new methods and approaches, and in advancing our understanding of consumer responses to foods. In food companies, sensory food science has become of considerable value to both tactical and strategic research goals. Currently throughout the island of Ireland, all aspects of sensory science and sensory services to industry are being addressed in research and 3rd-level organizations, albeit in a fragmented and non-uniform way. With the development of SensoryNetIreland, the sensory facilities of ten national institutions will be integrated and promoted as an advanced service to the food industry which is underpinned by a comprehensive research programme. This will be accomplished initially through collaborative networking activities to enhance the knowledge base relating to our current collective critical mass in the field. The proposed network promises enormous potential, as it combines all existing sensory services, expertise and capabilities in the country, which will work as a sustainable unit to address documented needs/gaps by the food industry in relation to sensory science. It will also ensure that good practice and the highest level of service will be assured to industry. The network will actively encourage and facilitate collaboration between industry and research groups. SensoryNetIreland will form an integral part of food and beverage industry to support new product development, product matching, flavour development and enhancing understanding of consumer behaviour within specific market segments. As well as a first class service to industry, an ultimate goal of the network is to aspire to the highest level of scientific excellence in research in sensory food science. The network is dedicated to developing and improving research into sensory and consumer testing	€664,104.00	13SN401 **Final Report Not Available**

		methodologies, with the aim of launching Ireland on the international map in this field. The objectives of the proposed research programme are; • To strengthen existing sensory capability within the network through research into specific sensory sciences and associated sciences; flavour chemistry and statistical sensometric expertise involving foods of particular relevance to the Irish economy. • UCD will lead a task investigating emerging sensory methodologies designed to achieve validated research using rapid cost effect techniques in association with Teagasc. The associated student will be registered in UCD. • Teagasc will lead a task with a student registered in UCC investigate the utilization of a chemometrics/sensometrics approach to relate sensory and chemical data in order to create a flavour map of a food that can be related to consumer perception. • AFBI will lead task in association with UCC and Teagasc, investigating consumer preference in beef using cross cultural studies in the UK and Ireland. The associated student will be registered in UCC.		
Dr Martin Danaher Teagasc Ashtown Dublin 15. **Lead Institution:** Teagasc **Collaborating Institutions:** University College Cork Queen's University Belfast	DAFM National Call 2013	**MycoRed- Reducing Mycotoxin levels in plant derived foods and beverages.** Fungal contamination is problematic in a wide range of food products. Fungal growth, leading to spoilage, is the main cause of product and concomitant economic losses. Furthermore, fungal mycotoxin production can cause serious public health hazards in foods. The objective of this project is to; (i) reduce mould contamination and growth; (ii) detoxify contaminated grains; (iii) prevent mycotoxin absorption from cereal-derived foods and beverages, for a sustainable bio-based Irish economy. A range of methods will be used to reduce fungal growth and subsequent mycotoxin production. The impact of fungal contamination at a raw-material level will be evaluated using naturally-contaminated/fungal-challenged grains, with barley and wheat model systems. The impact of fungal contamination on grains (grain storage) and selected foods quality (malt and bread) will be analysed. Special emphasis will be placed on mycotoxin analyses. A range of physical (high-pressure, thermal), chemical (H2O2, NaOCl, quaternary salts, electrolysed water) and biological (anti-fungal lactic acid bacteria) methods will be applied to reduce fungal growth and detoxify mycotoxins.	€499,987.00	13F497 **Final Report Not Available**

		Effective treatments will be applied to achieve the most efficient, economically and technologically viable reductions in fungal growth and mycotoxin levels. The impact of these treatments on food and beverage processability and product quality will be assessed.		
Forest				
Dr. Conor O'Reilly University College Dublin Bellfield Dublin. **Lead Institution:** University College Dublin **Collaborating Institutions:** Waterford Institute of Technology Teagasc University of Limerick Trinity College Dublin	DAFM National Call 2013	**SHORTFOR- Biomass and renewable energy from Short Rotation Forestry.** This research project is exploring the potential of short rotation forestry (SRF) to contribute to biomass production and renewable energy targets in Ireland. To this end, information and is needed in relation to existing SRF stands and on silvicultural methods that might be used to improve the productivity of stands, while maximising the quality of the biomass produced. Recently established plantations of eucalyptus have been identified from data provided by the Coillte GIS division, totalling over 300 ha. The oldest of these plantations is 8 years of age. Site visits have been completed on three of these sites, and will continue into 2016. A number of SRF trials have been established in the past and sample material has been collected and analysed to build up a data set of the characteristics of the SRF species. A SRF experimental trial was established on a Coillte reforestation site in Brownswood, Portlaw, Co. Waterford. The trial contains four species (grand fir, Sitka spruce, Eucalyptus and Italian alder) planted at three different spacings. Measurements of height, diameter and survival were recorded in December 2015. Phenological and physiological measurements have commenced at the Johnstown Castle trial, which was established in 2014 and tree growth was monitored periodically during 2015, but there has been little inter-tree competition. A new potted experiment was set up in a polytunnel in Kinsealy with the aim of studying competition effects more intensively than is possible in the field (i.e. environmental variation is so large that detecting treatment effects is difficult). Seedlings of eucalyptus, Italian alder and Sitka spruce were grown in pots at three different densities. In addition, measurement protocols for use in the field trials are being developed using the material in the potted trial. A review of internationally has revealed that at the present time, cut-to-length harvesting, integrated harvesting,	€933,857.00	13C498 **Final Report Not Available**

		and residue bundling are the recommended supply chains. Data has been gathered from international studies on the harvesting of SRF that will be implemented into a financial model. A survey of potential SRF markets has been completed, which consisted of 30 face-to-face interviews of wood purchasers in the energy, panel board and sawmill sectors. The data will be used to identify the applicability of SRF to wood markets in Ireland, and identify the value of SRF, which will be used to evaluate the return on investment. Soil sampling for estimation of soil carbon stocks at SRF sites commenced in summer 2015 and will be completed in February 2016. This work is being supported by two undergraduate research projects. A fulltime postgraduate research student has been appointed to the project from November 2015 and a site survey to determine the suitability of the Johnstown Castle trial site for nutrient and hydrological monitoring has been completed. The project website has been maintained and updated during the reporting period. Dissemination materials submitted from project partners have been uploaded as pdf files.		
Prof. John O'Halloran University College Cork College Road Cork. **Lead Institution:** University College Cork **Collaborating Institutions:** BirdWatch Ireland Kilcoole, Greystones Co. Wicklow	DAFM National Call 2013	**ADAPT- Avian Diversity and Afforestation Planning Tools.** This project set out to investigate the risks posed to vulnerable habitats and birds in Ireland by afforestation, with a view to informing strategic planning of forest expansion. Information on recent planting was examined to identify pre-planting habitat types and afforestation trends. This analysis was used to identify likely areas for forest expansion in Ireland and to align this information with areas protected by the EU Habitats Directive and also to inform the selection of sites for the collection of new data on bird communities on this project. This collation of data will address for the first time the potential conflict between the complete suite of birds of conservation concern in Ireland that are associated with the variety of vulnerable habitats which have already been afforested or are likely to be afforested in the future and a manuscript has been produced for publication. Bird species vulnerable to afforestation, and those with an unfavourable conservation status in Ireland, were reviewed. The habitats where bird species of conservation concern were most likely to be found were chosen for new data collection two criteria; (1) relatively recent and	€201,509.00	13/C/452 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		projected afforestation trends within selected open habitats, (2) abundance of birds of conservation concern within selected habitats. Thus, four habitats (improved grassland/ intensively managed farmland, wet grassland, blanket bog and raised bog) were selected for investigation of the impact of forest proximity on different bird species. Ninety four study sites were selected across these habitat types. In order to determine whether species richness and abundance were affected by the presence of adjacent forest, paired field sites were selected in each of the vulnerable habitats, in the absence and the presence of adjacent forest. Surveys of bird communities were undertaken in each of the selected sites by experienced ornithologists and bird densities were calculated for recorded species at different proximities from forests. This information was used to identify the most appropriate ways to focus planting effort, in terms of block size and number and pre-planting habitat type. This information will allow the most important habitats for birds of conservation concern to be identified and a manuscript reporting the findings is being prepared. The literature review undertaken to inform this study identified a knowledge gap regarding stakeholder perceptions and goals for forests in Ireland. Thus, a survey of members of the public was undertaken to address this gap and further identify habitats likely to be afforested in the future. 1132 responses were received and analysis of this information yielded an additional manuscript, the findings of which will inform forest policy and practice. Furthermore this project set out to conduct a case study on the habitat use of Merlin in relation to forest habitats in Ireland. To this end, 22 years of data on Merlin breeding from across Ireland, collected by a number of individuals and research groups, have been collated and standardised and will be used to determine the role of forests in Merlin breeding and to identify potential risks of afforestation for this bird species.		
Prof Maarten Nieuwenhuis University College Dublin Bellfield Dublin.	DAFM National Call 2013	**MARTT- Developing a GIS based Agreed Routes Map for Sustainable Timber Transport in Ireland and Mobile App "RouteTagger".** As the scoping text suggested, there will be an increase in the timber traffic on public roads in accordance with the forecasted increase in timber supply. Therefore, a more	€200,500.00	13/C/487 Final Report

Lead Institution: University College Dublin **Collaborating Institutions:** Waterford Institute of Technology		sustainable, safer and cost effective approach in the form of a GIS based agreed routes map is needed to manage the transport of this increased woodflow. This map will be used by timber hauliers as part of the timber extraction planning process. The routes will be agreed between local authorities and district forest managers and private forest owners, identifying the strongest and safest routes so as to avoid increased congestion around small towns and villages, reduce excess wear and tear on vulnerable roads and avoid excessive weight across roads. The development of the road database and GIS map will look at developing a road cost matrix to determine whether timber access routes are either fail or around based on 4 main criteria – agreed routes, consultation routes, severely restricted routes and excluded routes. In addition, this map will be used to identify important routes that need maintenance and upgrading work. A mobile app RouteTagger will also be developed to help build a database of road conditions, primarily for the lower class timber access routes for use by all state and private planned harvesting sites.		Available https://www.gov.ie/en/publication/ce553-research/
Dr. Mike Gormally National University of Ireland Galway. **Lead Institution:** National University of Ireland Galway. **Collaborating Institutions:**	DAFM National Call 2013	**GEOFOREST- Impacts of forest clearing on Kerry Slug (Geomalacus maculosus) populations with the development of mitigation measures based on preferred diet of species.** The Kerry Slug is listed as a protected species in the EU Habitats Directive and by the Wildlife Act 1976. Due to its protected status, its presence in commercial conifer plantations can impact forestry operations because of a gap in the knowledge regarding the impacts of clear-felling on the species. This project is using (for the first time) mark-recapture methods to quantify Kerry Slug populations in mature commercial conifer plantations scheduled for clear-felling. In addition, Kerry Slug population sizes are being estimated concurrently in adjacent conifer and blanket bog sites which act as controls in this investigation. This allows the investigators to separate the effects of other environmental factors such as weather from possible clear-felling impacts on the species. Food preference trials are also being analysed using animal behaviour software to determine the plant species most preferred by the slug. The results of these experiments can then be used by the forestry sector for determining the most appropriate forest areas for retention based	€139,724.00	13/C/474 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		on food plant availability. The project outcomes will form the basis for Advice Notes to relevant stakeholders on the management of forests where the Kerry Slug is found.		
Prof. Maarten Nieuwenhuis University College Dublin Bellfield Dublin. **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2013	**BETTERFOR- Evaluation and refinement of timber forecasting tools using national forest inventory.** Accurate forecasts of the Irish timber supply are required to inform policy and management decisions relating to sustainable forest resource utilisation, assessments of product supply to the processing industry and to meet EU and international reporting requirements such as setting national carbon accounting projected reference levels. The National Forest Inventory (NFI) is a statistically produced database of the forest estate in Ireland. The second cycle of measurements in the NFI has recently been completed and together with the first set of measurements, growth increments and change in the forest estate may be obtained. Two forecasting systems, GROWFOR and CARBWARE, have both been developed using Coillte's Permanent Sample Plot (PSP). Using the NFI and NATFOREX2 data, the two systems will be validated. The validation will highlight where the constituent models of the systems can be refined. The NFI data will allow for more accurate growth models, improved volume and assortment functions. There will be an investigation into the use of GROWFOR and CARBWARE models for mixed species and uneven-aged stands. Improvements to the single tree models would facilitate a more accurate assessment of timber assortment forecasts by capturing site to site variations in diameter distributions and stem taper. The comparison of the improved GROWFOR and CARBWARE models will result in recommendations on which models should be used for different stand types. However, no actual changes to the GROWFOR and CARBWARE systems will be made during the project; the project outcome will consist of recommendations for improvements and additions to the two systems and their constituent models.	€164,860.00	13/C/451 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Research projects funded by DAFM Call 2011				

Coordinator/Lead Institute + Collaborating Institutions funded	National / TransNational	Project Title and Summary	Total DAFM Award (* denotes project co-funded by DAERA	Final Report
Agriculture				
Dr. Karl Richards Teagasc, Johnstown Castle karl.richards@teagasc.ie **Lead Institute:** Teagasc, Johnstown Castle **Collaborating Institutions:** Teagasc Moorepark Agri-Food and Biosciences Institute University College Dublin	DAFM National Call 2011	**SUDEN-Sustainable Nitrogen Fertiliser Use and Disaggregated Emissions of Nitrogen**. Fertiliser use is the largest variable cost on Irish farms, currently accounting for over €400m annually. Nitrogen fertiliser is the critical nutrient limiting crop growth. It is also an important source of nitrous oxide, a potent greenhouse gas, which accounts for 15% of total Irish agricultural emissions. The dominant N fertiliser used in Ireland is Calcium Ammonium Nitrate (CAN). Increasing nitrogen use efficiency is an important factor for achieving the Food Harvest 2020 targets to ensure sustainability, both financially and environmentally. Under wet temperate Irish conditions, CAN fertiliser may increase annual greenhouse gas emissions three fold compared to urea. Switching from CAN to urea fertiliser reduces on farm costs but may result in reduced yields due to ammonia volatilization. Urea amended with the urease inhibitor Agrotain can decrease ammonia emissions by up to 70%, resulting in similar yield responses to CAN. In addition, using a nitrification inhibitor could further increase yields and reduce nitrate leaching and greenhouse gas emissions. Reducing national CAN use by 36%, by substitution with urea and inhibitors, could ultimately save Irish farmers €9.5m annually. This represents a win-win solution in reducing fertiliser costs, greenhouse gas emissions and lowering the farm carbon footprint. This proposal focuses on assessing the potential of replacing CAN with urea fertiliser (with inhibitors) to: 1. Reduce direct farm costs 2. Lower nitrogen emissions to the environment 3. Maintain or increase grassland and spring barley productivity on a range of soil types/climates in Ireland. The project will: 1. Establish the relationship between the rate and form of nitrogen fertiliser applied; 2. Establish the effect this	€640,177.00	11S138 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		relationship has on yield and N losses; 3. Assess the cost implications of the fertiliser strategies; 4. Provide essential information to support the sustainable expansion of the grassland and tillage sectors.		
Dr. James Humphreys Teagasc Moorepark Fermoy Co. Cork **Lead Institute:** Teagasc **Collaborating Institutions:** Trinity College Dublin University College Dublin Agri-Food and Biosciences Institute University of Limerick	DAFM National Call 2011	**Soggyland- Improving the productivity of heavy wet grassland for delivery of Food Harvest 2020.** Producing milk and beef from grazed grass is an important part of the Irish Economy. However, grazing on heavy wet soils can be problematical and farms with heavy wet soil have limited productivity and higher costs of production. Wet soil conditions have been identified as the most important factor limiting the utilization of grazed grass on Irish farms. It has been projected that most of the increase in milk production after the abolition of the milk quota will come from existing dairy farms, many of which are on heavy soils in traditional dairying areas in higher rainfall parts of the country. During three consecutive years (2007 to 2009) with exceptionally high rainfall the lack of expertise in Ireland on up-to-date best management practices for farming on heavy wet soils was brought into sharp focus. This project will contribute to building expertise. There are clear productivity gains to be made by solving the problem of wet soil by appropriate grazing management and by artificial drainage once it is done cost effectively and with minimal environmental impact. The tasks in this project will evaluate the impacts of grazing management and artificial drainage of a heavy wet soil on pasture production, the length of the grazing season and the profitability of milk production. Potential impact on the environment will be assessed in terms of greenhouse gas emissions, change in soil carbon storage and nutrient and sediment loss to water. End of pipe solutions to nutrient and sediment loss will be tested and refined. The fifth task will involve a survey of 30 dairy farms on heavy wet soils. The potential for increasing milk output will be assessed in terms of environmental impact and economic returns. Best management practices for increasing the productivity of grassland on heavy wet land with little or no increase in environmental impact will be defined.	€519,925.00	11S152 **Final Report not available.**

Prof John O'Doherty University College Dublin Bellfield Dublin 4 **Lead Institute:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2011	**Sea-guard- Marine compounds to enhance productivity and health in pigs.** 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.	€99,387.00	11/FP/403 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr Helen Sheridan Uinversity College Dublin Bellfield Dublin 4 **Lead Institute:** University College Dublin **Collaborating Institutions:** Teagasc Agri-Food and Biosciences Institute	DAFM National Call 2011	**SmartGrass- Smart Grassland Systems - Innovative Management Systems to Maximise Resource Use Efficiency in Grasslands.** The greatest challenge facing Irish farmers is maximisation of production outputs in a manner which is environmentally and economically viable and sustainable. Singular reliance on high input grass monocultures is becoming less economically viable and socially acceptable. The ability to produce high yields of good quality forage, at minimal cost to farmers and with minimal impact on natural resources, is fundamental to the sustainability of future growth in Irish grass-based farming systems. Research indicates that the production potential of multi-species grasslands, which may require comparatively lower levels of nutrient inputs, has been greatly underestimated. This project will investigate the production potential of a multi-species sward mixtures consisting of three plant functional groups (grasses, legumes and forage herbs) when compared with perennial ryegrass monocultures and perennial ryegrass – white clover swards. Experimental plots will be established at two sites and sward types compared in terms of dry matter yields, nutritive quality, in vitro digestibility and methane production, quality of silage and biodiversity support value, under i) a range of nutrient input levels; ii) different forms of nutrient inputs i.e. inorganic fertiliser versus slurry and iii) grazing regime i.e. actual grazing versus simulated grazing. A comprehensive cost-benefit analysis will be undertaken to identify the optimum combination of sward mixture and management treatment which maximises resource use efficiency and thus output, while minimising costs incurred by farmers, coupled with protection of public goods such as biodiversity.	€633,047.00	11S147 **Final Report not available.**

Dr. Denis Griffin Teagasc Oakpark Co. Carlow **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin University College Cork	DAFM National Call 2011	**RED-Cd-IRL-Strategies for controlling cadmium contamination in Irish food production.** Recent mandatory testing has shown a proportion of Irish horticultural produce and bovine kidneys to be above European maximum levels (MLs) for cadmium (Cd). Cd is a heavy metal and environmental contaminant which is found naturally in soils and at high levels in north Leinster where much of the horticultural industry is based. Proposals by the European Commission to reduce MLs in potatoes and vegetables (from 0.1 to 0.075 mg/kg), and in bovine kidneys, creates an urgent need for research. This project provides research to mitigate threats to the Irish horticultural and beef production industries from Cd contamination and will build a national expertise. Significant gaps in understanding the processes involved will be addressed by fundamental work on how soil chemistry influences Cd uptake in plants and animals and the feasibility of using organic amendments to immobilize Cd in soil. The genetics and physiology of Cd accumulation in plants will be investigated in tandem with identifying suitable low Cd accumulating crop varieties. Focused field surveys of animals and plants in the worst-affected region of the country will quantify the problem and highlight causal soil factors. As part of an overall strategy to support the industry, it will be necessary to provide guidance on Cd reduction strategies and on selection of land for planting and grazing. The quantitative outcomes from the research above will be used to build a risk assessment model and decision tree, based on soil tests that will allow farmers to assess and avoid risk of Cd accumulation.	€800,696.00	11SF309 **Final Report not available.**

Dr. Laurence Shalloo Teagasc Moorepark Fermoy Co. Cork **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin Irish Cattle Breeding Federation	DAFM National Call 2011	**E-Ruminant- Increased environmental efficiency of ruminant production systems through the incorporation of a Life Cycle Assessment into a quality assurance scheme.** The Food Harvest 2020 report highlights the requirement for Ireland to build on its green credentials through "SMART GREEN GROWTH" based technologies. The objective of this proposal is to develop, apply and validate models capable of quantifying, benchmarking and identifying strategies to increase the environmental efficiency (reduce the environmental footprint) of the primary agri-food sector. Whole farm and life cycle assessment models will be developed and used to assess the various components of the environmental sustainability of dairy, beef and sheep systems. Models will be developed around biodiversity, energy and water consumption, greenhouse trans-boundary and eutrophic emissions. Biodiversity, energy and water consumption will be measured on representative dairy, beef and sheep systems, and will provide the parameters necessary to develop country-specific life cycle assessment (LCA) models for these environmental indicators. The models will be developed, calibrated and validated using data collected on 80 dairy, beef and sheep farms. A sustainability audit system will be mapped to the models for implementation of a national quality assurance scheme. Decision support tools will be developed to identify mitigation strategies around the five key environmental indicators included in the LCA. This national quality assurance based sustainability scheme building on the GHG emissions schemes developed between Bord Bia and Teagasc will allow the environmental efficiency of Irish ruminant production systems to be benchmarked, thus ensuring that there is a focus on environmental impact reductions and that focusing on one impact category is not detrimental on another impact category. Outputs from this research will be implemented into the national inventory methodologies (where possible) through consultation with the EPA.	€763,948.00	11S143 **Final Report not available.**

Dr. David Meredith Teagasc Ashtown Dublin 15. **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2011	**ProDSE- Profitable dry stock enterprise development: Pathways to growth.** Dry stock, specifically cattle production, remains the dominant form of farming in Ireland, this is despite the fact that returns to most farmers engaged in beef production are relatively low, if not negative, even when one allows for the recent increases in market returns. The sector is characterised by its heterogeneous nature with significant differences in the scale, structure, degree of specialisation, intensity, combination with other farm and non-farm economic activities. The Food Harvest 2020 strategy has set ambitious targets for the cattle sector, specifically a 20 percent increase in the value of beef output. It also calls for measures to consider the best route to viability for the largest possible number of beef farmers. If these targets are to be achieved, research is first required to identify ways of improving farm profitability. The study takes as its departure point the heterogeneous nature of dry stock production and the need for targeted initiatives to support the development and enhanced viability of different types of cattle enterprises. Applying interdisciplinary and trans-disciplinary approaches, this research aims to develop a typology of beef enterprises in Ireland, evaluate the implication for the sector of contemporary and potential policy and market development, identify and evaluate sources of variation in costs associated with different groups of farm enterprises and assess means of increasing returns to each type of farm enterprise group through enhanced technical efficiency and adoption of new or novel technologies.	€188,035.00	11S146 **Final Report not available.**

Dr. Kevin Heanue Teagasc Athenry Co. Galway **Lead Institute:** Teagasc **Collaborating Institutions:** National University of Ireland Galway	DAFM National Call 2011	**AgiLe-TECH- Understanding and Facilitating Farmers Adoption of Technologies.** This project seeks not only to improve knowledge of commercial farmers' motivations surrounding technology and best practice adoption but to go further, and through the application of participatory methods, to use that knowledge to affect change for farmers. The overall objective of this study is to use a Participatory Learning and Action (PLA) methodology and techniques (involving farmers, knowledge transfer agents, production scientists) for the co-design of a flexible extension template that will inform groupbased extension methods such as discussion groups targeted at optimising farmers' use of technology and best practice. The outcome of the PLA process will a) help promote farmers' identification/adoption/adaptation of optimal technological solutions for them, and b) reduce the discontinuance of technologies. Learning arising from the PLA process will be transferrable to key Knowledge Transfer programmes critical to achieving the goals of Food Harvest 2020, i.e. the Dairy Efficiency Programme (DEP), and the Beef Technology Adoption Programme (BTAP). The project has three aims. First, to maximise the adoption of key specified production technologies and practices. Second, to reduce the discontinuance of technologies and practices once adopted. Third, from a pragmatic point of view, to facilitate farmers to combine their existing knowledge, technologies and practices with the knowledge, technologies and practices specified by Knowledge Transfer Actors (i.e. farm advisors, technicians, etc.) to increase the usefulness and benefits of technologies to farmer end-users. These integrated aims have the objective of optimising farm-level output and efficiency through enhanced technology/practice adoption among farmers.	€199,463.00	11S148 **Final Report not available.**

Dr. John Spink Teagasc Oakpark Co. Carlow **Lead Institute:** Teagasc **Collaborating Institutions:** Agri-Food and Biosciences Institute University College Dublin	DAFM National Call 2011	**CIVYL- Cereal Improvement through Variety choice and understanding Yield Limitations.** This project will address 2 of the highest ranking SSAPRI research priorities, for the 2 most important tillage crops in Ireland. Through a combination of modelling, data mining and field experimentation, it will provide new understanding of crop growth and development and yield formation, and identify the key varietal characteristics for varieties suited to Irish growing conditions. Together, these will provide the information needed for the sustainable intensification of winter wheat and spring barley production, by providing insights into husbandry, agronomic and varietal improvements targeted to optimise output with targeted inputs matched to the needs of the crop. In parallel, the project will develop novel techniques for quantifying resistance to the economically important Septoria tritici blotch disease of winter wheat. This will be of benefit to plant breeders in the production of more resistant varieties and variety testers in identifying the best varieties. The project uses the best available knowledge in Ireland both north and south of the border, and includes additional international expertise to augment the scientific validity of the proposed workplan. In addition, the project encompasses all of the key players in variety selection and supply, both public and private as partners to ensure the project's outputs are delivered as quickly as possible onto farm.	€1,342,205.00	11S121 **Final Report not available.**

Dr. Deirdre Hennessy Teagasc Moorepark Fermoy Co. Cork **Lead Institute:** Teagasc **Collaborating Institutions:** Cork Institute of Technology National University of Ireland Maynooth	DAFM National Call 2011	**PrecisionGrazing- Modelling for increased grazing management precision on Irish grassland farms.** An analysis of Irish National Farm Survey data has indicated that net profit per hectare is increased by €162/ha for each additional one tonne of grass utilised on Irish dairy farms, with the figure for beef farms being in the region of €90/ha. The average level of grass utilisation on Irish dairy and beef farms at present is approximately 6.5 and 4.8 tonnes/ha, respectively. Information from research and technically efficient commercial farms has indicated that this can be increased to 11 to 13 tonnes DM/ha through the adoption of modern grazing technologies. The Food Harvest 2020 Report proposes a significant increase in both milk and meat output using smart green technologies. Internationally there is an abundance of indoor feeding systems for dairy cows (Feed into Milk, UFL, VEM, NRC, AFRC); however, there is a lack of feeding systems designed for grazing dairy cows. This project will develop precision grazing management technologies that will facilitate increases in milk and meat output from sustainable grass-based systems of animal production. A Grass Growth Predictor model will be developed, allowing better synchronisation of grass supply with grass demand for grass budgeting on grassland farms. The model will be evaluated using data from Teagasc grazing experiments. Ultimately, the Grass Growth Predictor will use forecasted meteorological data in combination with current grazing management to predict grass growth. Similarly a Grass Intake Animal Performance model will be developed to simulate grass DM intake and animal performance from easily obtainable animal, sward, grazing management and supplementation variables. Following evaluation and testing, these two models will be combined with a Grass Quality predictor Model to form an integrated Grazing Management Animal Performance Model. These technologies will be developed into a decision support system and made available to grassland farmers and advisers through web and mobile based applications.	€363,869.00	11S132 **Final Report not available.**

Dr John Finn Teagasc, Johnstown Castle john.finn@teagasc.ie **Lead Institute:** Teagasc, Johnstown Castle **Collaborating Institutions:** Institute of Technology Sligo	DAFM National Call 2011	**IDEAL-HNV- Identifying the Distribution and Extent of Agricultural Land of High Nature Value.** High Nature Value farmland areas are associated with high biodiversity and other public goods; are headline indicators in the Rural Development Programme and are required by EU legislation to be identified and targeted for agri-environment payments. We will develop a geo-spatial analysis to estimate the national extent and distribution of potential HNV farming systems (Task 1). This methodology will use available geo-spatial data on vegetation type, farming systems, designated areas, farming intensity and land use/cover. We will also investigate an innovative methodology that combines new high-resolution satellite imagery with other datasets and will apply this to a case study area (5000 km2) to assess its ability to more directly measure the nature value of farms (Task 2). A ground-truthing exercise will provide training data for the GIS-based models and will assess the accuracy of the project output, based on a combination of manual interpretation of colour aerial photography, existing habitat/farm-survey data, and new surveys of selected case study areas (Task 3). We will develop and validate (using field surveys in case study areas) a decision support system for field- and farm- scale identification of HNV farming systems (Task 4). For representative case study areas, we will describe their primary HNV characteristics and primary pressures. We will also analyse the potential implications (positive and negative) of HNV policies from the perspective of farm socio-economics and consequences for other policies (Task 5). The results of the project will be disseminated to key stakeholders (Task 6). The project will provide a methodology that will contribute to the baseline indicator for HNV farming for Ireland under the Common Monitoring and Evaluation Framework (CMEF)	€371,576.00	11S108 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr. Áine Macken-Walsh Teagasc Athenry, Co.Galway aine.mackenwalsh@teagasc.ie **Lead Institute:** Teagasc Athenry, Co.Galway **Collaborating Institutions:** National University of Ireland Galway University College Cork	DAFM National Call 2011	**JOIN to FARM-Joint Ventures to Enhance the Demographic Profile and Socio-Economic Sustainability of Irish Farming.** It is recognised that a diverse farming population is critical to an innovative agri-food sector. Joint farming ventures such as farm partnerships, share milking and producer groups/farm clusters, are *organisational innovations* capable of enhancing population diversity and achieving a broader strategic public good in improving economic and social gains to farmers. This proposal consists of three integrated research strands with diverse disciplinary inputs: First, a review of international and national *literature and secondary data* will identify the benefits gained from enhancing the diversity of the farming population in terms of age, gender and skill vis-à-vis the achievement of key policy goals as set out in Food Harvest 2020. International state of the art, in how a range of joint farming models are structured and operate, the benefits they have given rise to, and how they have been strategically promoted by policy and novel extension approaches, will be examined. Second, *existing secondary data* and a dedicated *survey tool* will be used to identify numbers and profiles of those participating in joint ventures in Ireland and the factors influencing *farmers' willingness to establish* joint ventures. A *spatially focused tool* will be designed to map areas where the potential lies for joint farming ventures to be stimulated. Third, a qualitative *Participatory Action Research (PAR)* methodology will inform the development of a flexible extension template for the promotion and development of joint farming ventures. The template will provide guidance to practitioners using group-based extension methods in promoting the key benefits of joint ventures and in addressing the key challenges to success.	€198,816.00	11S151 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr. Dermot Forristal Teagasc, Oak Park dermot.forristal@teagasc.ie **Lead Institute:** Teagasc, Oak Park **Collaborating Institutions:** University College Dublin	DAFM National Call 2011	**CROPQUEST-New Crop Choices for Irish Growers**. The CROPQUEST desk study will help identify new crops/products/markets that will facilitate sustainable, viable crop production on Irish arable farms. The current lack of rotation and limited cropping options combine to threaten future viability and production sustainability, as the increasing level of monoculture leads to reduced yields and higher costs over time. Non-cereal crops currently account for just 9.6% of the arable area. New CAP reform proposals may make rotation obligatory. This study will have four elements: 1. A comprehensive review of possible broad-acre cropping options, and their agronomy, will be carried out to address the immediate need for break-crops for large areas (e.g. 20,000ha+). This review will include determination of the grower, processing and market needs for development of these crops (e.g. protein, oilseeds etc). It will include cover crops. 2. Identification and evaluation of crop/market options including further development of existing food and beverage end markets and identification of potential new markets in food, feed and non-food/feed areas. The methodology will include literature review, industry engagement and SWOT analysis to develop a database of crop/product options. 3. Economic assessment of the value to Irish agriculture, that the various crop/product options identified in 1 and 2 above, will be assessed using present value costing models.4. Dissemination to growers and industry using various methods including: a CROPQUEST website which would host a crop choice selector for growers and act as a repository for all the information gathered in the study; a participative workshop for industry and a range of Teagasc advisory channels for growers.	€233,563.80	1S119 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr. Steven Kildea Teagasc Oak Park Carlow stephen.kildea@teagsc.ie **Lead Institute:** Teagasc Oak Park **Collaborating Institutions:** University College Dublin Agri-Food and Biosciences Institute	DAFM National Call 2011	**MonPESC- Monitoring Pathogen Evolution for Sustainable Cropping.** Globally, Ireland consistently achieves some of the highest tillage yields due to a moist maritime climate during the growing season. Yet, volatile commodity prices, increased regulatory constraints and the emergence of highly aggressive, fungicide-resistant strains of the primary crop pathogens threatens the sector's competitiveness. Wheat, barley and potato are the three primary tillage crops on the island of Ireland but all three succumb to significant disease pressures that growers counter with the use of high fungicide inputs. Unsustainable in the long-term, the current strategies have led to an accelerated rate of genetic change in pathogen populations. As a consequence, novel strains of Phytophthora infestans (potato late blight disease), Mycosphaerella graminicola (septoria blotch disease of wheat) and Rhynchosporium commune (barley leaf scald) have emerged, which present a significant challenge to the continued viability of each cropping system. In response, this project aims to counter this issue by completing (i) a robust pathogen monitoring strategy for each disease and (ii) a complementary programme that disseminates in real time to stakeholders viable alternative strategies to mitigate the impact of changing pathogens. Multi-disciplinary and – institutional, through innovation and strategic research MonPESC is designed to support the 'SMART GROWTH' of the Irish tillage sector via sustainable intensification as envisaged under Food Harvest 20201. In parallel, the development of staff competencies in biotechnology-based solutions supports the development of a knowledge economy as per the National Strategy for Science, Technology and Innovation (SSTI)2.	€759,828.00	11S113 **Final Report not available.**

Dr Michael O'Donovan Teagasc, Moorepark Fermoy, Co Cork Michael.odonovan@teagasc.ie **Lead Institute:** Teagasc, Moorepark **Collaborating Institutions:** Teagasc Oakpark Agri-Food and Biosciences Institute	DAFM National Call 2011	**Next Generation Grass- Classical and Genotypic methods of increasing grassland productivity through breeding.** Food Harvest 2020 anticipates that milk quota abolition will result in a 50% increase in total milk production, while improved technologies are expected to result in significant increases in the value of the beef (40%) and sheep sectors (20%). This project will focus on underpinning Ireland's competitive advantage in terms of low cost milk and meat production from grazed grass by 1) setting out new selection tools to achieve optimal breeding and evaluation in perennial ryegrass breeding, and 2) establishing a platform to enhance grass breeding progress and expertise through genomic selection. In order to have clear grass breeding goals, grass breeders must have strong, direct links with agronomists, animal nutritionists and animal production research scientists. Such links are vital to ensure breeding objectives are in line with the requirements of grass based animal production systems. Recent research at Teagasc indicates that free leaf lamina, a sward structural characteristic, is an important component of grazed swards, resulting in increased DM intake by grazing livestock and improving the quality of the feed offered. This project will investigate the potential to introduce sward structural characteristics into grass breeding objectives. Cultivar persistency, longevity, and lifetime performance must be quantified to establish the effectiveness of breeding objectives in delivering highly productive, persistent grass cultivars. Investigation of the performance of cultivars and longevity in real commercial farm situations (>100 farms) will provide additional information on the effectiveness of breeding programmes in delivering highly productive persistent cultivars. Genomic selection has been used successfully in dairy cattle breeding in recent years; expertise from dairy cow geneticist will assist in exploring the potential for implementing genomic selection in the perennial ryegrass breeding in Ireland. The introduction genomic selection into perennial ryegrass breeding could potentially increase annual genetic gain by 50%, as this gain is additive it would be expected to achieve significant positive economic implications for the Irish ruminant sector.	€702,274.00	11S109 **Final Report not available.**
Dr Aidan Moloney	DAFM	**ExcessN- Defining optimal pasture composition and its relationship with**	€ 610,165.00	11S105

Teagasc Grange, Dunsany, County Meath aidan.moloney@teagasc.ie **Lead Institute:** Teagasc Agri-Food and Biosciences Institute University College Dublin **Collaborating Institutions:** Teagasc Agri-Food and Biosciences Institute University College Dublin	National Call 2011	**management factors in order to maximise dairy and beef productivity, whilst minimising nitrous oxide emissions (urine N output), methane emissions and product taints.** This work addresses problems of high urine N output in grazing systems that are intensifying as envisaged in Harvest 2020. It will identify grassland managements that maximise intake and productivity, whilst minimising the output and consequences of urine N. There have been few studies of nitrogen partitioning with grass-based diets, which are difficult and costly. In order to target nitrogen partitioning studies and minimise costs, we will assemble and analyse datasets from previous studies to understand its components: herbage composition (what other feed components change when herbage N alters? how are these relationships affected by management?), and herbage intake (how does herbage N affect feed intake?). We will also collate and analyse nitrogen partitioning data from studies with other diets (mainly silages; what factors affect the quantity and concentration of N in urine?). These studies, together with whole-farm modelling, will identify optimal grassland management practices to be evaluated in nitrogen partitioning studies with lactating cows (Hillsborough) and beef cattle (Grange) offered cut herbage across the grazing season. We will check for effects on methane production (chamber measurements) and milk flavour (headspace analysis), and use cutting-edge metagenomics and metabolomics to study effects at the rumen and tissue levels. We will forge links with a parallel Stimulus project proposal on nitrous oxide emissions from urine. Optimal grassland management practices will be evaluated using spot urine sampling on commercial/demonstration farms, providing a platform for dissemination to advisers and farmers, and new predictors for urine N will be incorporated into models of GHG emissions.		**Final Report not available.**

Fiona Doohan University College Dublin Fiona.doohan@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2011	**WheatEnhance- Breeding of wheat in order to enhance yield and disease resistance - mutation of the BRI1 brassinosteroid receptor gene.** This project will bring together Irish and U K industrial and agency expertise in order to improve the yield and disease resistance of wheat. It will do so by a non-GM-based mutational breeding approach. The target for mutational breeding is the hormone receptor BRASSINOSTEROID I N S E N S f l l V E 1 (BRII). The uzu phenotype in barley was originally identified as a spontaneous semi-dwarf mutation in the BRII gene in Japanese germplasm, and it has been widely introgressed into Asian material to improve both lodging, yield and stress resistance. We recently found that the uzu barley, which has a mutation in the BRII cytoplasmic kinase domain, has enhanced yield and resistance to Fusarium head blight disease, relative to its parent genotype. Following on from this, we want to use a technique known as T I L L I NG (Targeting induced Local Lesions in Genomes) to screen for chemicallyinduced BRII mutations in cereal germplasm. Thereafter, we will determine the effect of the BRII mutation on the yield and broad-spectrum field performance of both wheat and barley. Based on this research we will have ensured there is no detrimental trade-off in breeding for brassinosteroid resistance, we will have determined the yield and disease control potential of such an approach, and we will have provided breeders with the basis of material for introgressing such a trait into their breeding lines.	€770,202.00	11S103 **Final Report not available.**
Dr. Kieran Meade Teagasc, Grange, Dunsany, Co. Meath Kieran.meade@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Trinity College Dublin	DAFM National Call 2011	**Reproductive Defensins- Molecular Biomarkers of Fertility - New Tools for the Cattle Industry.** Compromised fertility is the single biggest threat to the Irish agricultural sector and there is a major need for an accurate predictive test, especially given the requirement for compact calving in our grass-based system and the expected increase in the national herd post-quota (2015). In conjunction with the National Cattle Breeding Centre, this novel proposal will target the downward trend in fertility and develop tangible tools for the Industry. We have recently discovered a cluster of 19 ß-defensin genes that are exclusively expressed in the epididymis of the bull and fallopian tube of the cow. Research has shown that these genes regulate fertility in other species, including man, however nothing is known about these genes in cattle.	€1,267,113.55	11S104 **Final Report not available.**

University College Dublin University of Limerick National Cattle Breeding Centre		Our novel findings hold significant promise (1) for improved understanding of the genetics underlying fertility, (2) the development of a genetic test for fertility and (3) as breeding targets for Genomic Selection. With leading researchers in reproduction, genetics and immunology, across 4 research centres (Teagasc, TCD, UCD and UL), this project will structurally and functionally characterise the relationship between defensin haplotype in AI bulls, sperm function and cow fertility using in vitro analyses, a field trial and regression of genotype on field fertility data. One of our novel polymorphisms encodes a truncated defensin peptide, carried by 80% of Holstein-Friesian AI bulls; and our preliminary data shows that sperm from homozygous bulls exhibit significantly reduced motility in vitro. These exciting findings point toward central roles for these genes in determining fertility in cattle.		
Dr. Laura Boyle Teagasc Moorepark, Fermoy County Cork Laura.boyle@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Queens University Belfast University College Dublin College of Agriculture, Food and Rural Enterprise	DAFM National Call 2011	**PIGWELFIND- Development of ante and post mortem meat inspection of pigs as a welfare diagnostic tool.** During ante and post mortem meat inspections (MI) pig carcasses are partially or fully condemned upon detection of lesions that pose a risk to human health or because of severe welfare problems (e.g. fracture). Based on data provided by one pigmeat factory this conservatively equates to financial losses to the Irish pig industry of approximately €6.2m p.a. Boyle et al. (2011) revealed that abscesses are responsible for over 50% of such carcass losses. Abscesses and other reasons for carcass losses (e.g. loin bruises) are closely linked to on-farm welfare problems for pigs. This represents a clear link between poor animal welfare and financial losses to the pig industry as well as a threat to food safety. MI findings, though greatly under-utilised in the EU, can be used to inform herd health plans. By extending such inspections to include welfare related conditions they could act as a valuable diagnostic tool for animal welfare thereby contributing to reduced financial losses as well as to higher pig welfare standards and safer pigmeat for consumers. This project aims to develop MI as an animal welfare diagnostic tool. Teagasc, UCD and Queens will collaborate on a 36mth program of farm and factory based research employing 1 contract researcher and 2 postgraduates to 1) validate on-line MI as a pig welfare diagnostic tool; 2) determine relationship between welfare problems	€ 376,672.10	11S107 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		detected at MI and disease and carcass condemnations; 3) establish protocols for extending on-line MI to include welfare indicators; 4) establish cost/benefit of this strategy and 5) implement and disseminate findings.		
Dr. Donagh Berry Teagasc Moorepark, Fermoy, Co. Cork Donagh.berry@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Irish Cattle Breeding Federation	DAFM National Call 2011	**MultiGS- Multi-breed genomic selection in dairy and beef cattle.** Simulations, undertaken within-breed, suggest that genomic selection can increase genetic gain by >50%. However, interest in alternative dairy cattle breeds and crossbreeding is increasing, necessitating an across-breed genomic evaluation. Beef cattle breeding and sheep breeding are based on many different breeds and crossbreds, which when coupled with their smaller population size, signify a requirement for across-breed genomic evaluations. This project will develop a one-step across-breed genomic selection pipeline which is close to implementation. The pipeline will be sufficiently generic to be exploitable also in other species (e.g., sheep). This project will focus on: 1) imputation, 2) genome-wide genomic predictions (including genome wide association analyses) and 3) breeding programs. All Irish researchers and the only two Irish institutes involved in genomic selection in Ireland are participants. The outcome from this study will be a national across-breed genomic selection breeding program for dairy and beef male and female cattle in Ireland putting Ireland to the fore internationally on genomic selection. The project will exploit and develop further international collaborations and will use resources already available. Increasing genetic gain by 50% expected from this project, is currently worth €5 million and €0.5 million annually to the dairy and beef industry, respectively, which is cumulative and permanent. Higher gains are achievable with a more optimal breeding scheme. Therefore this project is an extremely good return on investment – at least a 14 to 1 return on investment just in one year following completion of the study.	€ 376,735.00	11S112 **Final Report not available.**
Dr. Sean Fair University of Limerick sean.fair@ul.ie **Lead Institute:**	DAFM National Call 2011	**Bull-Max-Maximising the Genetic Potential of Young Elite Bulls - A Multidisciplinary Approach-** Ireland's pasture based dairy production system is highly dependent on calving cows compactly at the beginning of the grass-growing season. Through the Irish Cattle Breeding Federation (ICBF), Ireland has implemented an Economic Breeding Index (EBI) which is a profit index identifying the most elite sires suitable for	€672,597.69	11S116 **Final Report not**

University of Limerick **Collaborating Institutions:** Teagasc University College Dublin National Cattle Breeding Centre		this system. Recently, genomic selection has increased the rate of genetic gain through shortening the generation interval, and young bulls with the potential to be used in artificial insemination (AI) programmes are now being identified at birth and used extensively at 12-15 months of age. Using current protocols, these young bulls produce low volumes of semen and, therefore, their genetic potential cannot be fully exploited. This proposal involves a novel multidisciplinary approach which proposes to develop a blue-print for the rearing of young bulls in order to optimise the onset of puberty in order to maximise semen production in their first breeding season, while not compromising the health status of these animals. In addition, we propose to use a series of in vitro and in vivo studies to maximise the use of fresh semen. Finally, this proposal will assess the impact of using sexed semen in a pasture-based system, and model the impact on heifer availability, on the rate of dairy herd expansion and farm profitability.		**available.**
Dr. Tommy Boland University College Dublin Tommy.boland@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2011	**FEFAN- Feed evaluation for accurate nutrition.** Increasing world population and economic prosperity are driving increased demand for food, including animal products. This increased demand is set against a backdrop of reduced resource availability and legislation to minimise the environmental impact of agricultural systems. At the centre of this conundrum is the issue of efficient nutrient utilisation by the animal, a major driver of sustainable animal production systems. Irish ruminant animal production systems are based on grazed grass and to a lesser extent concentrate feeds while concentrate feeds comprise the total diet in pig systems. There is a lack of accurate information on the nutrient content of these feeds in a number of instances. This leads to major difficulties in accurately formulating diets for optimum animal production. The increased demand for food is placing pressure on the inclusion of cereal grains in animal diets. The potential of cereal by-products to provide a source of nutrients in animal diets merits additional investigation also. This project will use a combination of traditional wet chemistry techniques, NIR, in vivo digestibility measurements and large scale animal performance studies to determine the chemical composition, available nutrients and for a subset of feeds their impact	€ 959,837.00	11S122 **Final Report not available.**

		on animal performance, product quality and nutrient excretion. The objectives of this project are: To characterise the nutrient content of the main feed sources used in animal diets including grazed grass, cereal grains and by-products; To determine the available nutrients (Net Energy for ruminants and pigs plus PDI for ruminants) in a range of commonly fed feedstuffs; To formulate diets/concentrates based on the available nutrient content of byproduct ingredients to determine their impact on animal performance, nutrient excretion and product quality; To develop NIR equations to predict nutrient content of the most commonly used feedstuffs; To disseminate this new knowledge to industry and farmers to promote the accurate nutrition of farm animals.		
Dr. Bernadette Earley Teagasc, Grange, Dunsany, Co.Meath bernadette.earley@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin Agri-food and Biosciences Institute	DAFM National Call 2011	**€ASYCALF- Predisposing factors for disease and immunocompetence in artificially-reared dairy and suckled beef calves from birth to weaning.** Calf health was recently prioritised as one of the most important animal health issues facing the Irish livestock industry in a recent expert Policy Delphi study and farm opinion survey conducted on behalf of Animal Health Ireland (AHI). In Ireland, 5.3% equivalent to ca. 100,000 calves, excluding stillborns, die in their first year of life, with enteritis and pneumonia being the major causes of death. There are no published Irish studies (and few studies internationally) that have i) reported the exposure to and prevalence of infectious disease or morbidity in artificially-reared dairy and suckled beef calves or ii) evaluated on-farm environmental conditions and management practices, associated with calf health status. By means of a large-scale on-farm national observational survey, prevalence of infectious disease, morbidity and mortality will be determined and, environmental conditions, health management practices and passive immune status for artificially-reared dairy and suckled beef calves from birth-to-weaning will be characterised. Case study farms, divergent in calf health status within dairy and suckler herds, will be identified. Predisposing risk factors for disease and, influence of disease on calf pre-weaning performance will be determined using this sub-population. A HACCP-based blueprint targeting critical control points required to ameliorate infectious disease in dairy and beef calves will be developed. Through bio-	€754,719.00	11S131 **Final Report not available**

		economic modelling, costs resulting from different health status and management options will be quantified. Underpinning complementary research will investigate the relationship between passive transfer of immunity, molecular predictors of immune function in colostrum, and the development of immunocompetence in artificially-reared dairy and suckled beef calves.		
Dr. Noirin McHugh Teagasc Moorepark Fermoy Co Cork Noirin.mchugh@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Irish Cattle Breeding Federation University College Dublin Dublin City University	DAFM National Call 2011	**GENCOST- Genetics of costs production traits.** Genetic evaluations for the foreseeable future, even with genomic selection, will still require routine access to high quality phenotypes. The objective here is to develop novel technologies and statistics to aid in the capture of phenotypes and improvement of the genetic evaluations and farm management decision support tools for cost-of-production traits. The principles of genetic improvement across dairy cattle, beef cattle and sheep are similar and therefore all three sectors are addressed here. This project focus on the development of breeding objectives, new phenotypic tools, genetic evaluations, decision support tools, and dissemination. The four key traits are fertility, health, milk yield and feed intake/efficiency. Information generated is necessary to facilitate genetic evaluations and the refinement of breeding objectives more reflective of future requirements by farmers. This project will also increase the recording of such traits at farm level through the use of user-friendly, non-invasive technologies. Increasing the accuracy of selection by 10 percentage units, through a combination of higher heritability estimates (i.e., better defined phenotypes and statistical models) as well as more phenotypic records, is worth an additional €4 million, €485,000 and €88,000 annually to the Irish dairy, beef and sheep sectors, respectively which is cumulative and permanent and an excellent return on the €300,000 budget of this project - 15 to 1 return on investment in just one year. A key outcome using the knowledge generated in this study will be a roadmap to Irish researchers on the priorities for future research in cattle and sheep genetics	€ 290,142.01	11S133 **Final Report not available**

Dr. Bryan Markey University College Dublin bryan.markey@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** University College Dublin Teagasc Cork Instititute of Technology Agri-food and Biosciences Institute	DAFM National Call 2011	**ICONMAP- Multidisciplinary programme to deliver improved diagnosis, on-farm strategies, and economic drivers for the control of Mycobacterium avium subsp. paratuberculosis on Irish farms.** This project will address the major problems faced in any attempt to control infection with Mycobacterium avium subspecies paratuberculosis in Irish cattle (Improved Control of MAP: ICONMAP). This will be achieved through a programme of integrated thematic research areas designed to deliver the informational and infrastructural foundation necessary to support the implementation of a national MAP control programme. The project will underpin the activities of Animal Health Ireland (AHI) in addressing this important disease and its consequences in Ireland. A multi-institutional, multi-disciplinary approach has been chosen in order to deliver a wide range of research outputs and to capitalise on the synergies possible though the pooling of all-Ireland resources and expertise. Industry involvement in the form of Animal Health Ireland and Riverview Veterinary Group will ensure that the research is industry-relevant and appropriately balanced between innovative scientific inquiry and knowledge application. The project has been divided into three work packages, each being led by the most appropriate institution. Each work package is interdependent, relying on supporting actions in the other work packages, in order to deliver the maximum research output and value for money. The three work packages will address (1) Evaluation and validation of the best diagnostic tests currently available; (2) Identification and validation of biomarker(s) capable of indicating the future shedding status of infected animals; (3) Analysis of the factors (economical, logistical, sociological) which will affect the successful implementation of a control programme	€1,496,739.00	11S141 **Final Report not available**
Dr. Eva Lewis Teagasc Moorepark, Fermoy, Co. Cork Eva.lewis@teagasc.ie **Lead Institute:**	DAFM National Call 2011	**PrecisionNutrition- Precision Nutrition for improved animal productivity, product quality and environmental sustainability.** Growth in the global population and changing diets are projected to bring about a 70% increase in global demand for food over the next 40 years; Ireland should capitalize on this potential and position itself as a globally renowned centre for food production. Alongside the need to increase food production there is the challenge of doing so in a manner that does not impact on the	€ 481,459.00	11SF309 **Final Report not available**

Teagasc **Collaborating Institutions:** Agri-food and Biosciences Institute		environment. Food Harvest 2020 proposes a 50% increase in Irish milk production by 2020. The competitive advantage of Irish milk production is based on the efficient production and utilisation of grazed grass; this competitive advantage is increasing in recent years due to rising energy and purchased feed costs. Pasture-derived dairy products have additional nutritional characteristics and are more sustainable in terms of animal welfare and the environment. Spring calving systems will predominate in Ireland for the foreseeable future. However there will be a requirement for higher quality milk to be supplied over a longer period to increase processing plant utilisation and the production of dairy products with higher value, such as cheese and infant formula. Similarly, there will be a requirement to reduce greenhouse gas emissions and nitrate losses to ground water. This project proposes to investigate different nutritional strategies to increase milk production and milk quality for the production of high value-added cheese and infant formula, in the period of grass shortage in spring and autumn. Strategies to reduce methane emissions from enteric fermentation by increasing grass quality and feed conversion efficiency will also be investigated. In light of the importance of grass a more accurate and user-friendly method of predicting grass nutritive value be investigated. Finally, an agreed model for Ireland to calculate dairy cow organic Nitrogen output will be devised		
Dr. Aidan Moloney Teagasc Grange, Dunsany, Co. Meath Aidan.moloney@teagasc..ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin University College Cork	DAFM National Call 2011	**BullBeef- Profitable production of bull beef to market specification while ensuring optimum quality for the consumer.** 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 overarching 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	€1,328,700.70	11SF322 **Final Report not available**

Irish Cattle Breeding Federation		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.		

Prof. Frank Monahan University College Dublin frank.monahan@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** Teagasc Agri-Food and Biosciences Institute	DAFM National Call 2011	**RamLamb-Gender, age and diet effects on lamb meat flavour and sensory quality.** There is concern in the Irish lamb meat industry about the marketability of lamb from uncastrated (ram) lambs, arising from a perception among suppliers, buyers and consumers that the sensory quality of such lamb is inferior to castrate lambs. The project sets out to establish if there is any scientific evidence to support this perception. Thus, the project will investigate the influence of different Irish lamb production systems on the sensory quality and acceptability of lamb meat, focussing specifically on the effect of castration of male lambs, their age at slaughter and diet, and interactions between these factors, on lamb meat quality, particularly flavour quality. To meet the project objectives controlled lamb feeding trials will be conducted over four years in the Republic of Ireland and in Northern Ireland where lambs will be assigned to treatments designed to determine the effect of gender, age at slaughter and pre-slaughter diet (and interactions between these factors) on lamb meat quality measured sensorially and instrumentally. The new information generated will be invaluable to primary producers in devise mitigating strategies to address issues of flavour (taint) if they exist and will underpin the efforts of the lamb meat industry and Bord Bia to increase the sale of lamb at premium prices on national and international markets.	€952,454.00	11SF310 **Final Report not available**
Dr. Donagh Berry Teagasc Moorepark Fermoy, Co. Cork Donagh.berry@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:**	DAFM National Call 2011	**BreedQuality- Genetic selection for improved milk and meat product quality in dairy, beef and sheep.** 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	€1,160,654.00	11SF311 **Final Report not available**

		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.		
Dr. Stephen Gordon University College Dublin stephen.gordon@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:**	EMIDA EraNet Call 2011	**Mycobactdiagnosis- Development of Novel Diagnostic strategies for the anti-mortem immunodiagnosis of bovine tuberculosis and Johne's disease.** Mycobacterial infections of livestock such as bovine tuberculosis (bTB) or Johne's disease (JD) exact a high cost on European agriculture. bTB and JD are chronic inflammatory diseases caused by Mycobacterium bovis (M. bovis) and M. avium paratuberculosis (MAP), respectively. Detection and slaughter of M. bovis infected animals is required under EU law but JD control relies on voluntary cooperation. Both diseases can affect multiple domestic animal and wildlife species. The mainstay of bTB control is the skin test often combined with blood based interferon-γ (IFNG) release assays (IGRA); and serology. Detection of JD relies on serology (ELISAs). The diagnostics based on cellular immunity (CMI) measure responses to bovine, avian and johnin tuberculin (aka PPD), or similar crude cell or antigen extracts which have severe specificity and sensitivity limitations. These preparations share common antigens between different species of mycobacteria and their efficacy in the various tests can vary. With respect to bTB diagnosis, sensitivity and specificity of the comparative tuberculin skin test or the IGRA is severely compromised in animals that are dually infected with M. bovis and MAP as MAP infection results in high avian PPD responses masking bovine tuberculin responses. Vaccination of animals with current commercially available JD vaccines	**€** 281,905.00	EMIDA1 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		similarly produces immune responses that confound the diagnostic tests. Further, due to cross reactivity, PPD-based reagents in M. bovis skin testing elicits immune responses that may confound subsequent immunological detection of both diseases when complex antigen reagents such as whole bacterial extracts are being applied. Clearly there is an urgent need for specific diagnostic reagents for these important diseases and a requirement to validate diagnostic tests multi-nationally against a background of common mycobacterial infections. The overall project aim was to improve the diagnosis of BTB and JD by generating more specific tools not compromised for sensitivity or specificity by co-infection and to increase the knowledge base of these two important livestock disease. The underlying philosophy of our consortium was based on a multi-pronged translational research approach combined with a fundamental and basic research arm. To deliver this goal, a consortium was formed of 11 partners from 7 countries (Czech Republic, France, Germany, Italy, Netherlands, United Kingdom, Republic of Ireland) through this 'MycobactDiagnosis' ERA-NET, with funding from individual national governments. This report will focus on the research work of UCD funded by DAFM.		
Dr. Orla Keane Teagasc Grange, Dunsany, Co. Meath orla.keane@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:**	EMIDA EraNet Call 2011	**CARES- Coping with Anthelmintic Resistance in Ruminants Coping with Anthelmintic Resistance in Ruminants.** Infections with gastrointestinal nematodes (GIN) are a major threat to ruminant health, welfare and production and thus to the viability of the ruminant livestock industries in the EU and worldwide. Anthelmintic resistance (AR) is the single-most important problem facing EU ruminant farmers today in relation to sustainable GIN control. AR is a constantly expanding process, from small ruminants to cattle; from the first commercialised anthelmintics (AH) to the modern ones and from single drug AR to multi-resistant cases. CARES believes that within the foreseeable future the most sustainable strategy is a combination of approaches, namely i) early detection of AR, ii) use of bioactive crops with documented AH properties, iii) improved farm management, feeding and selective use of AH. This applied approach needs support by basic research and a better understanding of mechanisms of development and reversion of AR. The project CARES will address	€ 149,666.00	EMIDA2 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		these key issues through 3 complementary aims: 1) Improving the detection of AR in GINs (WP1). The aims are to improve the usability and reliability of current phenotypic tools but also to develop and validate molecular markers for the early detection of AR development and spread, particularly against macrocyclic lactones (ML).2) Assessing the role of plant resources to replace (WP2) or improve (WP3) the activity of synthetic AHs against AR GINs. The aims are to test the hypothesis of either direct AH effects of plant secondary metabolites (PSMs) against resistant (and susceptible) GINs (WP2); or indirect effects because some PSMs can potentially act as reversing agent for AR against ML (WP3). In vitro studies will provide basic data on the efficacy of active plants against AR GINs, either directly or in combination with AH drugs. In vivo studies will provide results for future exploitation of bioactive plants on-farm. 3) Exploring options for on-farm intervention (WP4). Integration is a key word for the sustainable control of GINs. The aims are to explore how combinations of solutions, adapting herd management systems, the use of natural AH or a selective use of AH can contribute to effective GIN control and slow down the spread of AR. The consortium is built on cross-linking criteria to address the objectives. Indeed, CARES brings together 8 partners from 5 EU countries plus a world leading research partner from Canada. Coping with Anthelmintic RESistance (CARES) is pivotal to all existing and up-coming means of nematode control. This project directly addresses the topic of parasite control/anthelmintic resistance named in the Stimulating Sustainable Agricultural Production through Research and Innovation (SSAPRI) document as a research priority area required to underpin the targets of the Food Harvest 2020 report. This research area aims “to mitigate against the risks of anthelmintic resistance and of new and emerging parasitic diseases - provide for sustainable use of anthelmintics and develop alternative parasite control strategies, with particular emphasis on the sheep sector.” The CARES project directly addresses these aims.		
Food				

Dr. Kieran Jordan Teagasc Moorepark, Fermoy, Co. Cork kieran.jordan@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Cork University of Limerick National University of Ireland Galway University College Dublin	DAFM National Call 2011	**Translisteria- Translating fundamental research on Listeria monocytogenes for the benefit of a multi-sectoral ready-to-eat food industry.** 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.	€1,278,307.00	11F008 **Final Report not available**

Prof Alan Dobson University College Cork a.dobson@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2011	**Mabs- The use of marine derived antibacterial agents to combat the prevalence of Salmonella in pork products.** 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 antiSalmonella 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 antiSalmonella 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.	€490,393.00	11F009 **Final Report not available**
Dr Geraldine Duffy Teagasc, Ashtown Dublin 15. Geraldine.Duffy@teagasc.ie **Lead Institute:** Teagasc	DAFM National Call 2011	**VTEC-SUPVIRT- 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.** 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	€943,566.00	11F051 Final Report Available https://w

Collaborating Institutions: University College Cork Cork County Council		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.		ww.gov.ie/en/publication/ce553-research/
Dr Martin Wilkinson University of Limerick Martin.Wilkinson@ul.ie **Lead Institute:** University of Limerick **Collaborating Institutions:**	DAFM National Call 2011	**RAPIFLO-Enhancing consumer safety by development of a rapid flow cytometric assay for early detection of coagulase positive Staphylococcus aureus in chilled ready meals.** 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	€92,673.00	11FP401 **Final Report not available**

		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.		

Prof Shane Ward University College Dublin shane.ward@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2011	**CyberBar© - Smartfone delivered anti-tamper food food traceability system based on direct food Data Matrix (DM) printing and change integrity sensors.** 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.	€98,749.00	11FP405 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Prof. Torres Sweeney University College Dublin torres.sweeney@ucd.ie **Lead Institute:** torres.sweeney@ucd.ie **Collaborating Institutions:**	DAFM National Call 2011	**SeaCamChic-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.	€95,195.00	11FP406 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr Helen O'Shea Cork Institute of Technology helen.oshea@cit.ie **Lead Institute:** Cork Institute of Technology	DAFM National Call 2011	**MMARE- Mining and modelling: animal rotavirus epidemiology.** 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	€99,868.00	11SF327 Final Report Available https://w

Collaborating Institutions: Dublin City University University College Cork		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.		ww.gov.ie/en/publication/ce553-research/
Dr. Paul Whyte University College Dublin **paul.whyte@ucd.ie** **Lead Institute:** University College Dublin **Collaborating Institutions:** Teagasc	DAFM National Call 2011	**Campy-Control- Campylobacter control on Irish broiler farms.** 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	€183,300.00	11SF328 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		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.		

Dr Geraldine Duffy Teagasc Ashtown , Dublin 15 Geraldine.Duffy@Teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin Waterford Institute Technology	DAFM National Call 2011	**LoCost-SalmPig- Targeted low cost solutions for control of salmonella in pig production.** 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.	€599,845.00	11SF329 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Prof. Dmitri Papkovsky University College Cork d.papkovsky@ucc.ie **Lead Institute:**	DAFM National Call 2011	**SENSOPACK- Smart packaging systems containing novel optochemical O2 and CO2 sensors for the food industry.** 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	€444,493.00	11F015 Final Report Available

University College Cork **Collaborating Institutions:** Queen's University of Belfast		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.		https://www.gov.ie/en/publication/ce553-research/
Dr Douwe van Sinderen University College Cork d.vansinderen@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2011	**Prebiozymes-Novel prebiotics from plant-derived sugars using bifidobacterial enzymes.** Prebiotics such as trans-galacto- 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 - - - 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 pr - - -glucosidases to produce oligosaccharides (OS) from simple sugars from vegetables and cereals as starting materials. These OS will be characterized and successful OSproduction 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	€234,250.00	11F023 **Final Report not available**

		microbiota will be assessed by pyrosequencing and quantitative PCR.		
Dr Malco Cruz-Romero University College Cork m.cruz@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2011	**HP-RTE meat- High Pressure Processing to Control Pathogens in Ready-to-eat-Traditional cooked meat products with reduced-sodium, lower preservatives and no artificial colours or flavours.** Sodium in meat products has a variety of functions: microbiological safety, preservation, taste, flavour, texture, structural integrity, nutrition, and colour (Kuhn, 2010). The reduction of sodium in meat products presents significant challenges to developed meat products maintaining quality attributes in an acceptable and affordable manner (Clemens, 2012). 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 (Barbosa-Cánovas & Bermúdez-Aguirre, 2011), 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 (Rodriguez-Calleja et al., 2012). The objectives of this project are to reformulate traditional meat products (ham and frankfurters) 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 will also be investigated. Through shelf life extension, a reduction in retailer supply chain wastage of these products is foreseen, improving sustainability in the manufacture of these products. Pilot scale processing will be used to determine consumer acceptability, storage shelf-life,	€308,173.00	11F031 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		handling and packaging requirements. Overall production costs per unit will be determined by a commercial HPP.		
Dr. Declan J. Bolton Teagasc Ashtown Dublin 15 declan.bolton@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Cork University College Dublin	DAFM National Call 2011	**Pac-Chill-Tech- Packaging & Chilling technologies to enhance meat quality & safety.** 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.	€565,722.00	11F033 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr Malco Cruz Romera University College Cork m.cruz@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:** University College Dublin	DAFM National Call 2011	**SMARTPACK2- Manufacture, application and assessment of smart packaging concepts consisting of novel nanoparticle technologies (metaland non-metal-based) in conventional food packaging systems.** 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 foodderived-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.	€499,978.00	11F038 **Final Report not available**

Dr Paul Allen Teagasc, Ashtown, Dublin 15 paul.allen@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Cork	DAFM National Call 2011	**PORKQUAL- 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.	€444,908.00	11F057 **Final Report not available**
Dr Paul Allen Teagasc, Ashtown, Dublin 15 paul.allen@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Irish Cattle Breeding Federation	DAFM National Call 2011	**BEEFYIELD- Accurate prediction of saleable yield.** 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	€308,116.00	11F059 **Final Report not available**

		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.		

Dr Paul Allen Teagasc, Ashtown Dublin 15 paul.allen@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Dublin Institute of Technology	DAFM National Call 2011	**BEEFPACK- 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 sellby-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.	€162,500.00	11F060 **Final Report not available**

Dr. Mark Fenelon Teagasc, Moorepark, Fermoy County Cork Mark.fenelon@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Univesity College Cork University College Limerick	DAFM National Call 2011	**'SMART' ingredients- Dehydration/ Rehydration dynamics for development of 'SMART' Dairy ingredients.** 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.	€800,983.00	11F061 **Final Report not available**
Prof Yrjo H. Roos University College Cork yrjo.roos@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:**	DAFM National Call 2011	**SolidFood- Formulation and Design for Food Structure and Stability.** 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	€649,600.00	11F001 **Final Report not available**

Teagasc		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.		
Prof Kevin Cashman University College Cork k.cashman@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:** University College Dublin	DAFM National Call 2011	**EnhanceD Meat- Irish meat and eggs: their fundamental role in promoting vitamin D nutrition and contribution to health and wellbeing.** 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,	€484,562.00	11F021 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		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.		
Dr Maurice O'Sullivan University College Cork Maurice.osullivan@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2011	**PROSSLOW- Development of consumer accepted low salt and low fat Irish traditional processed meats.** 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	€499,721.00	11F026 **Final Report not available**

		industry.		
Dr Mark Fenelon Teagasc Moorepark, Fermoy County Cork Mark.fenelon@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** National University of Ireland, Maynooth Trinity College Dublin	DAFM National Cal 2011	**SuperProtein- Decoupling pH & Ionic Effect in Protein Super-Concentrates.** 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	€401,700.00	11F037 **Final Report not available**

Dr André Brodkorb Teagasc Moorepark, Fermoy, Co. Cork andre.brodkorb@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:**	DAFM National Call 2011	**WheyEncaps- Expanding the potential for whey protein based encapsulation.** 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.	€99,780.00	11FP404 **Final Report not available**
Prof. Frank Monahan University College Dublin frank.monahan@ucd.ie	DAFM National Call 2011	**NutriMeat-Delivering processed meat products with health benefits.** 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	€598,950.00	11F035 **Final Report**

Lead Institute: University College Dublin **Collaborating Institutions:** Teagasc		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.		**not available**
Dr Jesus Frias Dublin Institute of Technology Jesus.Frias@dit.ie **Lead Institute:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2011	**NUTRADEL- Translation of pharmaceutical drug delivery to nutraceutical delivery using in-vitro and in-vivo techniques.** 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	€477,815.00	11F042 **Final Report not available**

		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.		
Dr Anne Maria Mullen Teagasc Ashtown, Dublin 15 Anne.mullen@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Cork University College Dublin National University of Ireland Galway Institute of Technology Tralee	DAFM National Call 2011	**ReValueProtein- Exploration of Irish meat processing streams for recovery of high value protein based ingredients for food & non food uses.** 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: • Characterization of source materials (offal, blood etc), extracts and novel	€1,433,532.00	11F043 **Final Report not available**

		products; • Processing of source materials to generate products (including assessment of novel process technology and working up to pilot scale production); • 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		
Dr Ruth Hamill Teagasc Ashtown, Dublin 15 ruth.hamill@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Cork	DAFM National Call 2011	**Meat4Vitality- Enhancement of texture, flavour and nutritional value of meat products for older people.** 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	€491,306.00	11F045 **Final Report not available**

		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.		
Dr Dilip Rai Teagasc Ashtown Dublin 15 dilip.rai@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin Dublin Institute of Technology	DAFM National Call 2011	**NovTechIng- Technologies for the enrichment & recovery of novel bioactive ingredients from plant food processing wastes.** 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- glucans from brewer's spent grains	€781,483.00	11F050 **Final Report not available**

		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		
Prof Paul O'Toole University College Cork pwotoole@ucc.ie **Lead Institute:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2011	**ELDERFOOD- Novel Food Ingredients for the elderly.** 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 econo.	€500,098.00	11F053 **Final Report not available**
Prof. R.J. (Dick) FitzGerald University of Limerick dick.fitzgerald@ul.ie **Lead Institute:**	DAFM National Call 2011	**AMHEOP- Antioxidant and anti-inflammatory ingredients for health enhancement in the older population.** 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	€330,066.00	11F063 Final Report Available

University of Limerick **Collaborating Institutions:** University College Cork		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.		https://www.gov.ie/en/publication/ce553-research/

Prof. R.J. (Dick) FitzGerald University of Limerick dick.fitzgerald@ul.ie **Lead Institute:** University of Limerick **Collaborating Institutions:** University College Cork	DAFM National Call 2011	**AIOBSG- Extraction and validation of antioxidant and anti-inflammatory ingredients from Brewers Spent Grain.** 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.	€456,586.00	11F064 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr. Eimear Gallagher Teagasc Ashtown Dublin 15 Eimear.Gallagher@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Dublin	DAFM National Call 2011	**NutriCerealIreland- Exploitation of the nutritive properties of safe Irish-grown milled oat and barley varieties as functional ingredients in new healthy food formulations.** 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 cropproducing 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	€732,354.00	11SF317 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		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.		
Forest				
Dr. Annette Harte National University of Ireland Galway annette.harte@nuigalway.ie **Lead Institute:** National University of Ireland Galway **Collaborating Institutions:** Queen's University Belfast	DAFM National Call 2011	**ITRIC- Innovation in Irish Timber Usage.** Due to the increasing focus on the use of sustainable construction materials to meet environmental targets related to efficient energy use and emissions, a significant opportunity exists for the Irish wood products sector. In 2012, the Irish forestry and forest products sector generated €2.2 billion in annual output, representing 1.3% GDP, and employed approximately 12,000 people. Moreover, there exists a substantial potential to expand production. According to COFORD half of the forest estate is less than 25 years old and further expansion of forest cover is planned by policymakers. Forest products to a value of €303 million were exported: including €73 million worth of sawn softwood and €179 million worth of wood-based panels. In general, 89% of the wood-based panels were exported. The supply of roundwood from Irish forests is projected to increase from 3903 million m3 in 2011 to 7110 million m3 in 2028. These figures show the potential of Irish forests to provide increased and sustainable supplies of wood products. Increased sales of existing products and the development of new markets at home and abroad for new added-value wood products will lead to job creation across the sector. In order to increase the utilisation of Irish timber in construction, the mechanical and physical properties of the material must be established. For timber construction products, the fundamental properties are the bending modulus of elasticity, the modulus of rupture, the density and the dimensional stability as these define the structural grade of the material. As part of the project, all of the available historical data on the properties of Irish Sitka spruce, from published and unpublished sources, has being collated. This will be presented at a national conference in Belfast in August 2014.	€484,663.00	11C207 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		Moreover, testing of a large number of samples is being carried out to establish the mechanical and physical properties of the current resource. Links have been established with researchers at the Centre for Wood Science and Technology, Edinburgh Napier University, who have been undertaking similar work on British timber with a view to sharing data. Furthermore, in order to investigate the potential for new add-value timber construction products, the two key research areas are being addressed, namely, Fibre-Reinforced Polymer (FRP) reinforced timber and Cross-Laminated Timber (CLT). Reinforcement of timber beams and connections with lightweight FRP rods will enhance the structural performance of Irish timber for building applications. In this project, the long-term behaviour of FRP reinforced beams in dry and moist environments is being investigated and the design of efficient FRP reinforced joints is being developed. Cross-laminated timber is a relatively new type of solid timber panel product with excellent load-carrying properties and is suitable for large scale commercial buildings. In this project, the potential use of Irish Sitka spruce in the production of CLT is being examined. The project aims to provide industry members with the ability to leverage the expertise and facilities available in Ireland to create new products.		
Prof. Maarten Nieuwenhuis University College Dublin maarten.nieuwenhuis@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** University College Cork University of Limerick Teagasc	DAFM National Call 2011	**CForRep- Additions and refinements to the Irish forest carbon accounting and reporting tool.** Removal of atmospheric CO2 by forest sinks represents a significant contribution towards national compliance with Kyoto Protocol emission reduction targets. Reporting of greenhouse gas (GHG) emissions/reductions is subject to strict international compliance criteria, with national systems designed to facilitate incorporation of new research and improved reporting mechanisms. As part of on-going development of the Irish national forest GHG reporting system (CARBWARE), and in response to the international review process, improvements to three inventory areas have been identified: a) refinement of a spatially explicit soil carbon reporting framework, b) development of a system to track areal changes associated with deforestation and disturbance, and c) improved characterisation of changes in forest carbon stocks associated with disturbance and management interventions. A multi-	€1,485,708.00	11C205 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		disciplinary collaboration between several national institutions will focus on; applying improved estimates of CO2 emission factors to afforested organic soils and organo-mineral soils; refining the modelling of soil carbon stocks and changes in mineral soils using a spatial framework; detecting deforestation and disturbance events from medium resolution hyper hypertemporal optical satellite imagery and characterising them using higher spatial resolution optical and microwave images; developing methodologies to investigate the fate and management of forest deadwood carbon pools after disturbance events; and constructing algorithms to quantify changes to deadwood carbon The combined outputs from these research activities will be assimilated into CARBWARE, thereby improving the national reporting capacity. Close collaboration with the Irish GHG network will ensure standardisation of outputs, with delivery of geodatabases derived from the research to support.		
Dr. Aine Ni Dhubhain University College Dublin aine.nidhubhain@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** University College Cork Teagasc University of Limerick	DAFM National Call 2011	**ECOVALUE- Valuing the Ecosystem Services of Forests in Ireland.** Decisions regarding future environmental land use and forest policy need to be based on robust scientific evidence that can be translated into meaningful management decisions, as per the goal agreed at the Oslo Ministerial conference to value the benefits of ecosystem services provided by forests. The aim of this project is to employ benefit transfer and other non-market evaluation methodologies to model the value of these benefits in an Irish context. To meet this goal it will be necessary to first identify and quantify these services in a scientific manner. To achieve this, the project will review previous Irish and international studies to identify the primary ecosystem services provided by forests. Although the review will provide a comprehensive overview of forest ecosystem services, it will focus primarily on those related to climate change mitigation, biodiversity conservation, forest recreation and human health, and water quality and quantity. Second, the economic consequences of these services will be valued. This will be the primary objective of the study and will be achieved by adapting previous Irish and international valuation studies through appropriate methodologies such as meta-analysis and benefit transfer and by identifying new values where measures of physical processes are available for Ireland. As a desk	€201,755.00	11C204 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		study, the project is somewhat reliant on the existence of relevant Irish and international studies. Nonetheless, it is envisaged that the project will investigate services in relation to existing forest cover, in addition to afforestation.		
Dr. Thomas Cummins University College Dublin Thomas.cummins@ucd.ie **Lead Institute:** University College Dublin **Collaborating Institutions:** University of Limerick Trinity College Dublin Teagasc	DAFM National Call 2011	**FORSITE- Monitoring and Assessment of critical biomass removal in Irish forests.** Critical Biomass Removal is a new concept, the level of biomass removal from forests that can be sustained without causing harm, according to current knowledge. Increased harvesting of forest biomass, such as branches and foliage (in addition to main-stem logs currently removed) is increasing as a source of carbon-neutral biofuel. Removing biomass also removes nutrients, needed for the next growth of trees. The ForSite project is assessing the nutrient impact of increased biomass harvesting in Irish forests, by developing databases of nutrient exchanges, and a tool for forest managers and policymakers to assess biomass-harvesting scenarios using this new concept of critical biomass removal. Nutrients move in a partially-closed cycle in the forest, through organic-matter decomposition and tree growth. Net nutrient inputs to the forest come from atmospheric deposition (mostly precipitation), and from soil-mineral weathering. ForSite is quantifying these inputs, using long-term monitoring of deposition at three sites, and with new surveys and analysis to measure soil-mineral weathering rates for the first time. These measurements will be combined with climate maps, and with new soil maps for Ireland from the recently published Teagasc Soil Information System survey. Nutrients leave the forest in overland flow and drainage water. By monitoring soil-solution composition (based on 20 years data, 1991–2010), and by modelling soil-water flow and runoff (under way), we are quantifying this nutrient exchange. Nutrients removed in managed harvesting operations can be predicted, based on known quantities of plant material, and existing and improved values for the nutrient content of forest components (under way). By calculating the net nutrient balance, it will be possible to guide management planning to avoid exceeding critical biomass removal. The sustainability of residue	€818,001.00	11C208 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		removal has been assessed by modelling these element balances, and published based on information available at end of 2014. Indications are that for the nutrient elements magnesium and potassium, inputs in deposition and weathering balance those removed in harvest. For Calcium, however, increased harvest was predicted to have an impact, though a relatively small one, in view of the uncertainties remaining in these estimates.		
Dr Evelyn Moorkens Trinity College Dublin College Green Dublin 2. **Lead Institute:** Trinity College Dublin **Collaborating Institutions:**	DAFM National Call 2011	**FORMMAR- Forest Restructuring in Freshwater Pearl Mussel catchments.** Eight of Irelands 27 Freshwater Pearl Mussel (FPM) catchments currently contain 80% of the total national FPM population, representing about 37% of the endangered, population. Ireland, thus, has significant international responsibility for the world's remaining, critically conservation of the species and as such these 'Top 8' catchments have recently become prioritised for implementation of forestry measures to help restore FPM to 'favourable' conservation status, as required under the EU Habitats Directive. Forestry is a significant land use in the Top 8, and has been identified, amongst other land uses, as a potential diffuse sources of water pollution which can negatively impact on FPM through the processes of eutrophication and sedimentation. In the absence of specific strategies and measures to improve water quality and FPM habitat, conservation prospects for the species are very poor. To address this deficit, the development of FPM Catchment Strategic Plans for Forestry are now required, As part of that process, the Forest Service recently revised site risk assessment standards for the Top 8 in December 2010. What is currently lacking is an appropriate range of practical mitigation, and future silvicultural and management options to match the identified risks of forestry with the ecological quality objectives for FPM (S.I 296 of 2009). This desk study will provide essential background information on appropriate mitigation and forest management measures to aid the development of FPM Catchment Strategic Plans for Forestry within the Top 8 with the aim of enhancing conservation of FPM.	€78,558.00	11C206 **Final Report not available**

Call 2010				
Coordinator/Lead Institute + Collaborating Institutions funded	**National / TransNational**	**Project Title and Summary**	**Total DAFM Award** (* denotes project co-funded by DAERA	**Final Report**
Agriculture				
Dr. Bernadette O'Brien Teagasc Moorepark Bernadette.obrien@teagasc.ie **Lead Institute:** Teagasc Moorepark **Collaborating Institutions:** University College Cork University College Dublin	DAFM National Call 2010	**QUALITYMILK Review of factors impacting on the processing quality of raw milk produced in Ireland:** The Irish dairy industry will require milk with higher quality standards in the future as processors increase the proportion of output into higher value-added products. This will require improvements in milk composition, processability, bacteriological status and a reduction in residue levels. At farm level, herd size will increase significantly and milk production systems will have to take cognisance of milk price volatility and milk processing capacity. This project proposes to review the current status of milk quality in Ireland and determine strategic influences on milk quality. This will include a comparison of both milk quality criteria and production practises influencing milk quality in Ireland with those of competing EU counties. National trends in milk quality will be updated. The associations between both herd- and cow-level factors and milk quality parameters will be investigated. A review will also be carried out on existing and emerging microbiological pathogens and residue contamination in milk. A survey of cleaning and sanitizing of milking machines on dairy farms will be carried out. The information generated will benchmark current state-of the-art and identify gaps in knowledge requiring further research. The information generated will benchmark current state-of the-art and identify gaps in knowledge requiring further research.	€60,830.00	10S713 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr. Thia Hennessy Teagasc, Athenry, Co. Galway Thia.Hennessy@teagasc.ie **Lead Institute:** Teagasc, Athenry, Co. Galway **Collaborating Institutions:** National University of Ireland Galway	DAFM National Call 2010	**ADOPT-TECH- Examining the drivers of and barriers to the improved economic performance of the dairy sector** The improved economic performance of farms and the adoption of output enhancing technologies are critical to achieving the Food Harvest 2020 target to increase dairy production by 50% by 2020. This project explores the barriers to achieving improved economic performance at the farm level. Specifically, two case studies are examined: animal health practices and genetic improvements in the dairy herd. The study involves both, economic analyses of the costs and benefits of best practice and social science research to identify drivers and barriers of the adoption of best practice in relation to these two case studies. The Moorepark Dairy Systems Model, the FAPRI-Ireland Farm-level Model and the Moorepark Dairy Processing Model will be used to quantify the costs and benefits of technology adoption at the farm, national and processor level. Drivers and barriers of adoption will be identified applying a social-psychology model based on focus groups, quantitative surveys and econometric analyses. The novel component of this research project is its multidisciplinary approach, incorporating economic and social-psychology models. The overall objective of the project is to provide recommendations on how to improve the knowledge transfer programmes for these two technologies with a view to improving overall farm and sector level performance.	€198,441.00	11S714 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr. Seamus O'Mahony University College Cork College Road Co. Cork **Lead Institute:** University College Cork **Collaborating Institutions:** Teagasc	DAFM National Call 2010	**OptiHydro- Development of novel whey ingredients by protein-carbohydrate conjugation.**This project aims to develop next-generation whey protein ingredients/emulsifiers with significantly enhanced physicochemical functionality for application in premium nutritional beverages and powders. The application of whey protein ingredients (e.g., WPC, WPI, demineralised whey) in certain, strategically important, rapidly growing, value-added, nutritional products (such as ready-to-drink beverages and specialised infant formula) has been limited by: (1) poor solubility of whey protein at low pH of RTD beverages (2) poor emulsification properties of hydrolysed whey protein	€348,053.00	10RDUCC702 **Final Report not available**

		(3) physical instability of whey protein during processing Recent scientific research has shown that the techno-functional properties of dairy protein ingredients can be significantly enhanced by covalent linkage (i.e., conjugation) of proteins to carbohydrates. This project will utilise the Maillard reaction (which occurs naturally during thermal processing) to conjugate intact and hydrolysed whey protein to maltodextrin with different dextrose equivalents. Following detailed characterisation, optimal conjugate systems will be identified and scaled-up for application in value-added food systems. Proof-of-concept testing will be conducted in model infant formula and protein-fortified RTD beverage systems to evaluate improvements in solubility, emulsification, thermal stability, mineral sensitivity, spray drying performance, powder physical stability and reconstitution properties. Such research outputs will create new ingredient and product application opportunities for whey protein ingredients.		

Dr. Trevor Donnellan Teagasc, Athenry, Co. Galway trevor.donnellan@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Cork Institute of Technology University College Dublin	DAFM National Call 2010	**AgRisk- Volatility and Risk in Irish Agriculture** A corollary of increased international economic integration is the increased exposure of the Irish economy and Irish agriculture to global agricultural and non-agricultural market price volatility. CAP reform and ongoing multilateral and bilateral international trade negotiations will likely increase the exposure of Irish and EU agriculture markets to world market price volatility. Increased agricultural input and output price volatility leads to increasingly volatile and risky agricultural incomes, agricultural production and trade and possibly volatile levels of government expenditure. In this project research will be conducted that analyses the impact of volatility in Irish agricultural input and output prices on agricultural production and incomes at the farm and aggregate sector levels through the development of stochastic FAPRI-Ireland aggregate sector and farm level models. Time series analysis using higher frequency data will examine the statistical nature of the volatility inherent in Irish agricultural output and input prices and will inform the development of the stochastic aggregate sector and farm level model. The recent European Communication on CAP reform post 2013 suggests that a "risk management toolkit" be developed under Pillar II of the reformed CAP. Analyses of possible market based and public policy mechanisms for dealing with volatility and risk in Irish agriculture will also be examined.	€199,386.00	11S716 Final Report Available https://www.gov.ie/en/publication/ce553-research/f
Dr. Gary Lanigan Teagasc Johnston Castle, Wexford gary.lanigan@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** Trinity College Dublin University College Dublin	DAFM National Call 2010	**GHG – Ireland- Gaseous Emissions - Agriculture and Land Use Network** The EU 2020 Climate Change and Energy Package poses considerable challenges for Irish agriculture, particularly in the context of ambitious production targets envisaged by Food Harvest 2020. Nitrous oxide emissions are the second largest portion of agricultural emissions, but also can be readily mitigated. However, there is currently a high degree of uncertainty surrounding the N2O emission factors, and refinement of these would allow the adoption of 'win-win' strategies, such as greater use of urea, which would in turn allow more flexibility in terms of sectoral expansion. Carbon sequestration is also associated with pastures and improved grassland management could provide a mitigation option without impacting on agricultural production. This project seeks to assess the influence of climate and soil	€1,698,135.00	10S716 **Final Report not available**

Agri-Food and Biosciences Institute University of Limerick		on C sink capacity as well as quantifying effective ways to enhance pasture sequestration. The twin measurement and modelling approach will ultimately lead to more refined and flexible inventories. This will allow thus allow for mitigation research that has been on-going for several years to be inputted into inventories, thus obtaining a net benefit to the sector in terms of reducing its emissions profile.		
FOOD				
Dr. Mary Rea Teagasc Moorepark, Fermoy, Co. Cork. mary.rea@teagasc.ie **Lead Institute:** Teagasc Moorepark **Collaborating Institutions:** University College Cork University of Limerick	DAFM National Call 2010	**PEPENCAP-Protection of bioactive peptides using novel encapsulation technologie.** Even though antimicrobial peptides have significant potential for the positive alteration of gut flora, a significant bottleneck is the bioavailability of the peptides in the gut. We have shown that bacteriocins such as lacticin while highly active against a range of pathogens *in vitro* are inactivated during gastric transit when pigs were used as model for the human GIT (Gardiner *et al* 2007). Therefore the objective of this project is to provide proof of concept that encapsulation of bacteriocins and bioactive peptides such as ACE inhibitory peptides will provide protection of biological activity when orally ingested and therefore can be delivered to targeted sites in the GIT tract. Two differing approaches to encapsulation of the peptides will be employed. It has been previously shown *in vivo* that, using whey protein micro-beads as delivery systems, probiotics were protected during passage through the stomach but controlled release occurred in the porcine intestine (Doherty, et al., submitted in 2010)**.** The first approach will thus use a 'wet based' technology (gel-beads) to entrap the peptide while the second approach will exclusively use advanced drying technology to generated protected forms of the peptides. The efficacy of both technologies will then be determined *in vitro*, and *ex vivo* using simulated models of the GIT. The efficacy of encapsulation will then be tested in vivo using the mouse as a model.	€300,000.00	10RDTMFRC 701 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr Donal O'Callaghan Teagasc Moorepark, Fermoy, Co. Cork donal.ocallaghan@teagasc.ie **Lead Institute:** Teagasc Moorepark **Collaborating Institutions:** University College Dublin University College Cork	DAFM National Call 2010	**NovTech-The use of novel technologies for improving quality and process efficiency in high protein beverage production** There are many technical challenges with thermal processing of high protein beverages (e.g.sports drinks) manufactured using dairy ingredients. Protein destabilisation is associated with high viscosity in the product and fouling in conventional heat treatment systems. This project proposes to investigate new technologies for heat processing (temperatures ≤180°C duration ≤1s) dairy based beverages (protein concentrations ≤10%) namely (1) supersonic steam injection heating (SSIH, ≤180°C) and (2) cooled electrode ohmic heating (CEOH, ≤140°C) with the latter evaluated in the presence/absence of an additional high temperature pulsed electrical field (HTPEF) hurdle. SSIH generates hydrodynamic cavitation which minimises scaling, while CEOH generates heat within the bulk fluid with electrode cooling preventing fouling. PEF is a technique which could be integrated with CEOH in a combined hurdle system with a view to sterilising products at lower temperatures than conventional heat processing. While PEF is generally viewed as a "non-thermal" pasteurisation which inactivates vegetative cells, this project will assess its potential for spore inactivation when applied at higher temperatures in conjunction with CEOH. The project will monitor the microbial and sensory properties of model beverages after processing and project outputs will include fully characterised thermal processes, for processing of high protein beverages with good quality characteristics.	€356,104.00	10RDTMFRC 703 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr Phil Kelly TEAGASC Moorepark, Fermoy, Co. Cork Phil.kelly@teagasc.ie **Lead Institute:** Teagasc Moorepark	DAFM National Call 2010	**CheeseBoard 2015- National Cheese Research Programme 2015-** The Irish Cheese Research Consortium (ICRC) combines the scientific and technological capabilities of its 4 participating institutions TEAGASC, UCC, UL and UCD along with the Agri-Food and Biosciences Institute Northern Ireland (AFBI) to address comprehensively all six strands of the FIRM 2010 Cheese Research Call. The ICRC embraces the Irish dairy industry's forecast (Food Harvest 2020) for substantial expansion in cheese production both in overall volume and in specific varieties over the next 10 years. Drawing on substantial experience of supporting the cheese industry over the past 30 years with the development of robust cheese starter cultures, technological	€1,298,001.00	10RDTMFRC 704 Final Report Available https://www.gov.ie/en/publication/ce

Collaborating Institutions: University Of Limerick University College Cork University College Dublin Agri-Food and Biosciences Institute		underpinning of Irish Cheddar production and development of novel hybrid cheeses, the consortium is well positioned to support immediate work on the production of reduced fat, low salt cheese variants to address growing health concerns, as well as addressing longer term cheese diversification opportunities. New scientific thinking is being brought to bear in order to address the hardness of reduced fat cheese e.g. using soft matter concepts such as 'jammed polymer networks' as a means of opening up the matrix in the first instance before exploring the interaction with new flavour compensating culture techniques. Molecular biological techniques based around the Teagasc Pyrosequencer and UL's Flow Cytometer will be used to characterise and establish the extent to which variation in indigenous microflora affects cheese quality, particularly among non-Cheddar varieties. This is expected to not alone guide the implementation of better microbiological control, but also be the basis for the harvesting of new adjunct cultures for exploitation in cheese diversification. While global per capita cheese consumption has held up well to date, regulatory and other pressures that reflect negative health attributes (e.g. saturated fats, trans fat, salt) are being established as well as some proactive measures in the project.		553-research/
Dr. Catherine Stanton Teagasc, Moorepark Fermoy, Co. Cork catherine.stanton@teagasc.ie **Lead Institute:** Teagasc Moorepark **Collaborating Institutions:** University College Cork	DAFM National Call 2010	**INFANTMET-Infant Nutrition for Programmming the Gut Microbiota in Neonates** Establishment of the intestinal microbiota commences at birth. The microbiota has a major role in protection against pathogens, maturation of the immune system and metabolic welfare of the host. In terms of infant health, it is imperative to understand how early infant nutrition influences the development of a healthy gut microbiota. Breast Milk is the Gold Standard feeding regime for newborn infants and represents a baseline for the functional performance of infant formulae. Interestingly, no studies have yet been reported to reveal the evolving composition and functionality of the intestinal microbiota in infants exclusively fed breast milk, where high throughput sequencing was employed to detail the gut microbial ecology. The objective of this platform study is to define the composition and functional performance of the baseline microbiota in developing breast fed infants	€398,858.00	10RDTMFRC 705 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		over time, using state-of-the-art pryo-sequencing technology. This will provide Infant Milk Formula manufacturers with an essential baseline composition, with which to compare different formulations and ingredients. Thus, the project will provide new opportunities for optimisation of infant milk formula composition, with appropriate new bioactive ingredients such as milk fractions, probiotics and prebiotics to effectively programme the early infant gut microbiota in a manner closer to mothers milk.		

Dr. Mark Fenelon Teagasc, Moorepark Fermoy, Co. Cork Mark.fenelon@teagasc.ie **Lead Institute:** Teagasc Moorepark **Collaborating Institutions:** University College Cork	DAFM National Call 2010	**NextGenIMF- Concept Protein Ingredient for Next Generation Infant Formulation**. The global market for infant milk formula (IMF) is estimated to be worth US$5-6bn, with Ireland producing in t h e region of 10-15% of global exports. Three of the world's major infant formula manufacturers, i.e., Abbott, Danone and Pfizer, have large scale processing facilities located in Ireland. As a result, Ireland is strategically committed to the infant formula sector providing a vital channel for dairy ingredients. The proposed project is targeted at building a leading programme, through the UCC/Teagasc alliance, for development of new ingredients for infant formulation manufacture using minimal processing and with reduced carbon footprint. Current manufacturing practices are energy intense and require transport of ingredients from different locations for formulation, e.g., use of skim milk powder, whey protein ingredients and lactose. The aim is to develop technology to provide a 'one fits all' humanised dairy protein base with molecular conformation designed for greater thermal stability and higher mineral bioavailability, for use in infant formulation. The ultimate aim is to create a formulation base, whereby nutrients (fat, carbohydrate and minerals) can be added to the required solids content for direct drying processing thus reducing the complexity of overall route to manufacture from the farm gate. This concept 'protein base' ingredient will be made using integrated membrane systems coupled with mineral selectivity to confer broad spectrum stability during processing. If successful, the concept ingredient will allow for manufacture of infant formula directly from milk at a single location, changing the current philosophy of how infant formula is manufactured, and placing Ireland at the forefront of ingredient innovations in the world.	€296,164.00	10RDTMFRC706 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Professor Lokesh Joshi National University of Ireland Galway Lokesh.Joshi@nuigalway.ie	DAFM National Call 2010	**Milk glycoproteome- Novel strategy for exploitation of milk glycoproteins in infant formula.** The goal of the infant formula industry is to mimic the composition of human milk and thereby ensure optima nutrition and development of the human infant. Oligosaccharides are the third largest component of human milk and functions include prebiotic activity to promote commensal growth, protecting the gut epithelium from pathogenic invasion, and stimulating development of the	€348,286.00	10RDNUIG707 Final Report Available https://www

Lead Institute: National University of Ireland Galway **Collaborating Institutions:** Teagasc		normal immune system. The oligosaccharide content of cow's milk is less than 5% that of human milk, although both have some similar structures. Many milk proteins are glycosylated and their glycan components share some of the biological activities of the oligosaccharide fraction. However, the glycan component of milk glycoproteins has not been explored in any depth and remains to be exploited. We propose a novel strategy to fractionate glycoproteins from cow's milk, which will facilitate exploitation of specific biological activities. This will involve: (i) Setting up a multiple lectin affinity protocol for fractionation of milk glycoproteins from various processing streams, based on their biologically-active terminal motifs (ii) Characterisation of the resulting fractions in terms of: (a) glycoprotein content, (b) glycan profile using novel lectin array technology, (c) activity in a variety of biological assays to determine the optimal fraction for specified activities.		.gov.ie/en/publication/ce553-research/
Dr Rita Hickey Teagasc Moorepark, Fermoy, Co. Cork rita.hickey@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** National University of Ireland Galway	DAFM National Call 2010	**GlycoMFGM-Targeting the glycome of the milk fat globule membrane for anti-infective Properties.** The glycoproteins in MFGM are thought to act as specific bacterial and viral ligands which, when in the stomach of infants, contribute to the prevention of pathogenic organisms attaching to the intestinal mucosa. The extreme diversity of the glycosylated structures found in MFGM e.g. Mucin 15, is thought to enable the glycoproteins to perform this function in the acidic environment of the stomach. These glycans have homology with epithelial mucus cell surface pathogen receptors in the stomach and intestine and may inhibit infection by competitively binding with the pathogens and clearing them from the infant gut. Therefore, this project aims to investigate the anti-infective nature of the bovine MFGM glycome under circumstances where milk processes induce protein denaturation and complexation with MFGM coated milk fat globules which following ingestion are subject to acidic pH and possible proteolysis before eventual de-emulsification. Hence, a secondary objective is to determine whether alteration to MFGM structure has an effect on their anti-infective behaviour. Glycosylated fractions will be collected after various processing steps and digestion using a simulated gastric	€254,513.00	10RDTMFRC708 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		model. High through-put array technology developed by NUIG will be employed to pre-screen these fractions for anti-infective activity against a range of gastrointestinal pathogens. Fractions displaying bioactivity will be examined at Moorepark where in recent years, optimisation of a number of versatile bioassays for testing the effects of sialyl oligosaccharides on pathogen adhesion to human intestinal cells have been developed. Subsequent scale up initially as an active ingredient, and later when formulated in a prototype beverages in this project will allow their activity be validated using in vivo efficacy trials in a follow on study.		
Dr Phil Kelly Moorepark, Fermoy, Co. Cork Phil.kelly@teagasc.ie **Lead Institute:** Teagasc **Collaborating Institutions:** University College Cork	DAFM National Call 2010	**PHOSPHOMED- Functional and biomedical application of milk fat globule membrane (MFGM) based phospholipid rich fractions.** Building on capability established during a previous FIRM-funded project (DAFF Project Ref No.05/R&D/TD/370) for the characterisation and enrichment of milk fat globule membrane (MFGM) extracts from milk, this proposal addresses knowledge gaps in the functionality of the M F G M phospholipid (PL) dominant Moiety. Having regard to the accumulation of phosphotidylserine in neuronal membranes and phospotidylinositol in cell signalling, animal model studies will be undertaken to study the response of mice in terms of anxiety, mood and cognitive behaviour when fed a diet containing selected PLs. A follow-on study will feature fractionated as well as enriched M F G M PLs. In order to elucidate the mechanism of PL bioactivity, pre-digests of enriched M F G M PLs will be undertaken in order to establish whether the released fatty acid or cleaved diacylglycerols are largely responsible for their bioactivity An in vitro bioassay using a human intestinal cell line for monitoring ganglioside GD3 uptake will be adapted in order to handle the more complex matrix of MFGM-enriched sources. The fate of key ganglioside components such as ceramide will monitored closely as a potential marker during phospholipid digestion and it subsequent uptake during cell culturing. Such a structured approach will be needed in order to deal with matrix complexity when pre-digests of MFGM-enriched dairy sources are used during this bioassay.	€299,650.00	10RDTMFRC 709 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr Ursula Bond Trinity College Dublin ubond@tcd.ie **Lead Institute:** Trinity College Dublin **Collaborating Institutions:** University College Cork	DAFM National Call 2010	**NATDEF- Preventing Beer Spoilage in Lager Fermentations: Optimisation of the production of the antimicrobial defensin peptides in lager strains of yeast, a natural defense against beer-spoiling bacteria.** Beer spoilage is a major concern to every Master Brewer in the world. Contamination of brews with beer spoiling bacteria can lead to loss of entire batches of beer resulting in severe financial losses for the brewery. Product withdrawal or recall can have major implications for Brand and business. In a FIRM-funded research project, we have tested whether the naturally occurring antimicrobial agent β-defensin, which forms part of the innate immune system in humans, could be effective as a bacteriocidal agent against beer spoiling bacteria (BSMs). Having demonstrated the effectiveness of β-defensin against BSMs, we then engineered a lager yeast strain to express β-defensin and to secrete the peptide into the beer. The secreted peptide was capable of killing BSMs seeded during fermentation but not in bottled beer. This novel approach not only provides a prophylactic mechanism to prevent beer-spoilage but additionally provides added neutraceutic value to the product as the small quantities of the antimicrobial peptide remaining in the lager can enhance the natural levels of β-defensin in the oral cavity. Defensins are important in maintaining the natural balance of the normal flora of the oral cavity and to protect against bacterial infections. The purpose of the proposed research is the carry out a number of experiments to determine the optimum conditions for the production of β-defensin during and after fermentations and to determine the effective bacterial load that can be eliminated by β-defensin in contaminated fermentations. Our ultimate goal will be to prepare a patent application to protect and license the yeast strains expressing β-defensin and other subsequent modification. To achieve this, we will instigate a Road to Commercialisation strategy involving preparation of an Invention Disclosure Form, market analysis, identification and engagement with of potential industrial partners with the aim of licensing the technology to stakeholders in the Brewery Industry.	€99,966.00	10RDTCD710 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Prof Dick FitzGerald University of Limerick dick.fitzgerald@ul.ie **Lead Institution:** University of Limerick **Collaborating Institutions:**	DAFM National Call 2010	**RedABNaCN- Low residual antigenicity and reduced bitterness casein hydrolysates.** The commercial potential of casein hydrolysates for incorporation into food products such as infant formulae has been limited by their bitterness and antigenicity, creating a pressing need for the generation of hydrolysates where these undesirable effects have been greatly minimised. Such hydrolysates would further enhance the already very significant commercial value of Irish dairy ingredients and allow Irish food companies generating these hydrolysates to compete more effectively in foreign markets. An existing FIRM project has identified a casein hydrolysate generated with a commercial food grade proteolytic preparation that has bitterness levels comparable to that of a commercially available casein hydrolysate and also has highly significantly reduced residual antigenicity. Under this proposal, the generation procedure used to manufacture this hydrolysate will be refined to further minimise its bitterness and residual antigenicity. This study, undertaken in conjunction with an Irish commercial food ingredients company, would also develop a protocol for industrial scale production of this hydrolysate which would replicate the results observed at laboratory scale. The research would involve bitterness evaluation studies, residual antigenicity quantification and physicochemical characterisation of hydrolysates both at laboratory and semi-pilot scale. In addition, LC-MS/MS will be utilized for detailed peptide profiling of the optimised hydrolysate. This work will result in greater commercial opportunities (e.g. licence agreerhents, the increased ability of Irish food companies to compete in international food markets), secure high level technical jobs as well as raising the knowledge economy profile of Ireland and its food protein ingredients business globally. The relevant expertise and equipment to carry out this project resides within the proposing Institution.	€74,315.00	10RDUL711 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr P J Cullen Dublin Institute of Technology pjcullen@dit.ie **Lead Institution:** Dublin Institute of Technology **Collaborating Institutions:** University College Dublin	DAFM National Call 2010	**Fresh-Pack - A novel packaging system for food safety and shelf-life extension.** Globally, there is an increase in the number of outbreaks of foodborne illness associated with fresh produce, in particular ready-to-eat fruit and vegetables. It is critical that effective decontamination steps are in place to ensure consumer protection and confidence in such healthy produce. This project aims to develop a pre-commercial prototype continuous In-Pack decontamination system for fresh produce. In-package treatment is desired by the food industry as such an approach helps prevent against recontamination and provides increased shelf-life. This proposal exploits expertise acquired from the completed FIRM ozone project to develop and validate a novel non-thermal plasma (NTP) treatment system which generates significant amounts of ozone and other active species within sealed packages. The prototype will be optimised for its antimicrobial efficacy for in-package decontamination of fresh produce. Along with quantifying shelf life extension, the potential for changes in organoleptic and nutritional properties of fresh produce will be evaluated. This project will optimise the plasma discharge produced by non-thermal plasma and attempt to elucidate the role of key reactive species such as ozone and others in the mechanisms of inactivation. The project will result in a precompetitive prototype with detailed information on a range of potential food applications. The technology will be evaluated and optimised for fresh produce, however the approach has potential applications in many other food types to decontaminate or extend shelf life including meat, seafood, fish and eggs within any transparent or opaque plastic, glass or cardboard package.	€90,626.00	10RDDIT712 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr Andre Brodkorb Teagasc Moorepark andre.brodkorb@teagasc.ie **Lead Institution:** Teagasc Moorepark	DAFM National Call 2010	**ProSurf-Controlling surface-activity of protein aggregates for their incorporation into nutritional formulation for optimised processibility.** Whey protein products are important ingredients for a variety of nutritional beverages. How/ever, whey proteins also pose one of the main challenges during processing because of their unstable nature. When exposed to thermal and other processing stresses (pH, salt, shear) they undergo conformational changes, aggregation and precipitation. One of the most widespread, yet insufficiently understood, technical challenges	€333,840.00	10RDTMFRC723 Final Report Available https://www.gov.ie/en/p

Collaborating Institutions: University College Cork		encountered during the processing of nutritional beverages (e.g., infant formula) containing whey protein ingredients, is viscosity development caused by protein denaturation/aggregation. Such viscosity development can lead to issues with inadequate mixing, poor and inefficient heat transfer, fouling of heat exchangers, sedimentation and insolubility. Pretreatment of whey proteins can, under circumstances, improve the control of protein aggregation, mainly by reducing self aggregation of whey proteins or interaction with casein. However, there is a general lack of understanding and predictability of whey protein functionality in nutritional beverages. Therefore, it is the aim of the project to (i) develop predictive models for whey protein denaturation during processing of nutritional beverages and (ii) develop whey protein ingredient manufacturing processes, which can stabilise proteins and provide predictable, controlled aggregation during thermal processing. The approaches will be based upon controlling interactions between whey proteins (P-lactoglobulin, a-lactalbumin, GIVIP etc) and caseins in concentrated systems by optimising formulations and process conditions. Predictions will be based on experimental evidence of model and commercial whey protein products during processing of nutritional formulations, such as infant formula, on both lab and pilot-scale at the Bio-functional engineering facility at Moorepark.		ublication/ce553-research/
FOREST				

Dr. Conor O'Reilly University College Dublin Conor.oreilly@ucd.ie **Lead Institution:** University College Dublin **Collaborating Institutions:** University College Dublin National Botanic Gardens Teagasc	DAFM National Call 2010	**ForGen- Forest Genetics Resources Research Programme.** This proposal addresses the majority of the research needs as outlined as the "sector needs" in the COFORD call for proposals, in a large collaborative programme of research involving UCD, Coillte, the National Botanic Gardens, Teagasc and several experienced research consultants. It will address tree improvement efforts in both broadleaf and conifer species through the selection and propagation of superior individuals using breeding, propagation, and storage techniques as well as developing new varieties that will improve the productivity and quality of selected species. Methods will also be explored to stimulate flowering, predict good seed crops, deal with the impact of climate change and develop a framework for future tree breeding efforts. Finally the programme will develop a strategy for a National Forest Tree Gene Conservation Programme.	€1,600,000.00	10C717 Final Report Available https://www.gov.ie/en/publication/ce553-research/

Dr. Olaf Schmidt University College Dublin olaf.schmidt@ucd.ie **Lead Institution:** University College Dublin **Collaborating Institutions:**	DAFM National Call 2010	**GNAW-Control-'Green' Novel Approach for Weevil Control.** This project will develop a novel protection strategy against herbivorous insect pests of woody plants with particular reference to Pine weevils in coniferous plantations. The approach will exploit the anti-feedant properties of a natural mineral element, silicon (Si), administered as Si-amendments during seedling production or field planting. The bioavailability of Si from different soils and plant uptake from a range of Si-rich sources (including industrial wastes, rock powders, crop residues, soluble Si-compounds) will be assessed using geochemical and isotopic methods. The effects of enhanced Si levels in seedlings (Sitka spruce) on feeding damage by the Large pine weevil (Hylobius abietis) and seedling survival will be assessed under controlled conditions and in commercial field plantations. The project will make a highly innovative contribution to the COFORD Forest Research Programme, potentially leading to the replacement of synthetic insecticides with a radically different, 'green', highly economical, alternative strategy that uses natural source materials or waste products. The core funding for this research project is in place (as a 4-year UCD Innovation Bursary); this application only seeks additional research costs to expand the scope and scale of the research, including external assistance in the form of expert knowledge and field trial expertise.	€28,275.00	10C722 Final Report Available https://www.gov.ie/en/publication/ce553-research/
Dr Colin Lawton National University of Ireland, Galway colin.lawton@nuigalway.ie **Lead Institution:** National University of Ireland, **Collaborating Institutions:**	DAFM National Call 2010	**WIGS (West Ireland Grey Squirrels)- The spread of grey squirrels to the west of Ireland.** 2011 marks the 100th anniversary of the introduction of the grey squirrel Sciurus carolinensis to Ireland. The 2007 Irish Squirrel Survey (Carey et al. 2007) found this invasive species to have spread throughout much of the eastern half of Ireland. Its spread to the west has traditionally been prevented by the river Shannon, which blocks movement by the grey squirrels in that direction. There were some records of sightings of the grey squirrel immediately west of the river, however, in the 2007 survey. This project aims to investigate the grey squirrel's status in the Shannon region, and determine areas likely to play a key role in its spread into the west of Ireland. Data collected on the population ecology of the squirrel and habitat availability in the region will feed into a model examining future	€140,173.00	10C719 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		spread of grey squirrels throughout Ireland. As well as having a negative impact on the native red squirrel, the grey squirrel causes considerable damage to trees through its habit of stripping bark. Woods under particular threat of damage in the west, and in other parts of Ireland, will be determined and a management regime developed to control this problem.		
Prof. John O'Halloran University College Cork j.ohalloran@ucc.ie **Lead Institution:** University College Cork **Collaborating Institutions:** Waterford Institute of Technology	DAFM National Call 2010	**HAPFOR – The use of forests by deer in Ireland (FORDEER).** The FORDEER (The use of forests by deer in Ireland) project will provide a landscape level study of deer populations and behaviour in a mosaic of forest and agricultural habitats in Ireland. Existing information on the use of forests by deer, and in particular the damage caused, has been reviewed to identify gaps in the existing research and policy requirements. This has informed refinement of project design and the data collection phase of this study which is now underway. In order to establish the range of deer densities and deer damage present in different forest sites at local and landscape scale two sets of study sites were selected. The first were two case study sites in the Boggeragh Mountains and the Nagles Mountains in county Cork which were selected to facilitate detailed study of the use of forests by deer at local scale. These sites measure 16km2 and include areas of commercial forest plantations and semi-natural woodlands, of different sizes, ages and tree species composition. The second are a set of 100 national survey sites, 20 in each of five regions in the east, midlands, south-west, west and north-west, which were selected to facilitate a landscape scape study of the use of forests by deer. Methods for recording the presence and impacts of deer in commercial forestry have been developed based on field survey techniques from elsewhere in Europe and recommended good deer management practices. These methods are being used to assess the presence of deer and assess the negative impacts on trees in the project study sites, where habitat and landscape configuration are also being compiled to inform the analyses. These data will be used to identify the ways in which deer impact on forestry and investigate how landscape position, forest configuration and block size, as well as land-use objectives are related to the presence of deer and in turn whether these	€384,195.00	10C718 **Final Report not available.**

		factors may be related to levels of damage to tree crops by deer. The findings of this study will support the development of an appropriate assessment methodology at landscape and local scales that will allow forest managers to consider the likely future impact of deer and to take a proactive approach to deer management and control of deer impacts. Real-time PCR species assays have been designed at Waterford Institute of Technology for the identification of red (Cervus elaphus), sika (Cervus nippon) and fallow (Dama dama) deer species from faecal pellets collected in the wild. These assays have been applied to field samples collected from the two case study sites during the winter baseline population survey. Real-time PCR sex assays, for use on deer faecal pellets, have also been developed and applied to a sub-sample of the winter survey samples. A genotyping panel for individual identification of deer has been developed for use on faecal pellets. Genotyping of field samples will provide a genetic estimate of population densities for the three deer species in the study areas.		
Dr. James Choiseul Department of Agriculture, Food & Marine james.choiseul@agriculture.gov.ie **Lead Institution:** Department of Agriculture, Food & Marine **Collaborating Institutions:** Agri-food and Biotechnology Institute Teagasc	DAFM National Call 2010	**PHYTOFOR- Detection, Epidemiology and Control of *P. ramorum* and *P. kernoviae* in Irish Forests.** The PHYTOFOR project was completed in October, 2015. The total duration of the project was 42 months, including a 6 month extension. The Pest Risk Analysis (PRA) work contributed significantly to our understanding of the risks associated with Phytophthoras. This work is especially important given the lack of expertise in PRA in Ireland at present. The Phytophthora characterisation work has provided us, for the first time, with an accurate view of the Irish P. ramorum population. It also supports the case for maintaining official controls against this organism as incursion by other lineages could result in an escalation of disease severity. At the molecular level, the difficulty in 'tracing' individuals within a disease epidemic is significant in that this concept is often cited as a means of explaining how individual outbreaks occur. The enhanced understanding we now have of the 'plasticity' of P. ramorum that has come from the Project, illustrates the importance of scientifically verified population data to support control activities. The investigation into detection methods has profound consequences for the provision	€494,206.00	10C721 Final Report Available https://www.gov.ie/en/publication/ce553-research/

University College Dublin University of Limerick		of diagnostic services, for Phytophthora specifically, but also more generally. The work has demonstrated that conventional, traditional methods such as plating onto growth medium are likely to decline in favour of molecular based methods. Although there will still be a place for classical methods especially in the case of new or exotic pathogens or as a stop gap while molecular methods are being optimised, for routine analysis molecular methods are more reliable as well as having quicker turn round times and are not dependent on highly specific expert individuals. This should provide a clear focus for the future for all laboratories providing diagnostic services as well as advancing the acceptance of in-field diagnostics. However it is vitally important to have scientists with epidemiological expertise in order to be able to contextualise and interpret molecular data in terms of the risk of establishment and spread. Data from the field trials looking at survival and spread and has strongly indicated that survival on cleared sites is likely to be relatively uncommon. Numerous dissemination activities (popular and scientific press, conferences, posters) have been generated throughout the project. These activities will continue into the future.		
Professor Christine Griffin National University of Maynooth Christine.griffin@nuim.ie **Lead Institution:** National University of Maynooth **Collaborating Institutions:**	DAFM National Call 2010	**MCOP- Multi-agent Control Options for Pine weevil.** The large pine weevil (Hylobius abietis) is the main pest of Irish forestry, and a major obstacle to reforestation. Larvae develop in stumps of recently felled conifers; emerging adults feed on young seedlings, causing their death by girdling. Currently, seedlings are treated with cypermethrin but this will soon be unavailable for this use. Biological control of pine weevil using insect-killing nematodes is under development in Ireland but is not likely to be the full solution. This project investigates the potential of entomopathogenic (insect-killing) fungi (EPF) as a combinable weapon against weevils. In addition to testing pre-existing strains of well-known EPF (Metarhizium anisopliae and Beauveria bassiana) we are conducting a survey of native EPF in the clear-fell forest ecosystem. We have recovered EPF from the bark of tree stumps and from the soil around stumps, and most promisingly, we have also found pine weevil larvae in their natural habitat infected with indigenous EPF. At least two	€317,324.00	10c720 Final Report Available https://www.gov.ie/en/publication/ce553-research/

		native species of Beauveria, including B. caledonica, have been identified by molecular means (sequencing the ITS region). In laboratory bioassay, the mortality of pine weevil larvae due to B. caledonica (isolated from naturally infected weevil larvae) was comparable to that due to existing commercial EPF species. EPF are being tested as stand-alone agents and in combination with nematodes for action against weevil larvae in stumps. In the first year field trials, application of nematodes or a combined treatment of nematodes and the non-native EPF B. bassiana to stumps reduced the number of adult weevils emerging over the subsequent season by about 60% relative to untreated stumps. In certain other pest-pathogen systems, EPF have been found to act synergistically with other control agents – the combination gives higher mortality than expected based on the mortality due to each agent alone - and it has been suggested that EPF weaken the defences of the insect, making it more susceptible to the second agent. In order to understand the interaction of EPF with other control agents and to develop a method of screening for strains that may be most effectively combined with other agents, we are studying the effects of EPF on insect defences, both their cellular defences and protein components of the blood system. Alteration was seen in the levels of certain proteins in the insect blood following treatment with EPF, including several with known involvement in the insect immune response. The project also targets the damaging stage of the pine weevil, the adult. The normal way of using EPF is to apply large numbers of spores into the pest's habitat. However, as spores are relatively short-lived they are best for one-off eradication (as when treating stumps to kill larvae present) but are less useful for longer term plant protection. We have set up greenhouse trials to see if EPF will colonise seedlings to give longer term protection against feeding adults.		