Food
Programme

TEAGASC FOOD INNOVATION GATEWAYS

Climate Smart Technologies for Nutritious and Safe Foods

5th October 2022

teagasc
Agriculture and Food Development Authority

Food Innovation Gateways

Technology

Welcome to Food Innovation Gateways
Climate Smart Technologies for Nutritious and Safe Foods

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Technology

Stand 1 Partnering for Success – Engage with the Technology Transfer Office

Siobhán Jordan, Miriam Walsh, Sarah Cahalane, Karen Dawson and Sharon Sheahan (techtransfer@teagasc.ie)

Industry can partner with Teagasc in multiple ways including joint collaborations with access to state-of the-art technologies, scientific expertise, and world-class facilities. The Technology Transfer Team support a wide range of industry engagements leading to economic and social benefits. Explore how to access collaborative research or consultancy to solve business challenges, adopt intellectual property opportunities, and develop and upskill your workforce. Bring new ideas and talent to your business that will result in new products, processes or services.

For further information, or enquiries on how to partner with Teagasc research, contact techtransfer@teagasc.ie or visit online.

Stand 2 SMARTFACTORY: Digital Solutions to Visualise Energy Efficiency in Food Processes

Norah O'Shea (Norah.oshea@teagasc.ie)
Eoin Murphy (eoin.murphy@teagasc.ie)

Teagasc have recently partnered with SMARTFACTORY to provide a digital dashboard to electronically monitor and manage equipment and products. This will enable data-driven decision making that can optimise the performance of systems and processes. The SMARTFACTORY solution allows us to capture, analyse and visualise key performance indicators from our pilot plant processes resulting in reduced planned and unplanned downtime, increased productivity and maximum efficiency.

Stand 3 U-Protein: Unlocking Protein Potential in Ireland

Sinéad Fitzsimons (sinead.fitzsimons@teagasc.ie)

U-Protein is focused on identifying and exploiting existing and novel protein sources within the Irish agro-ecological system, in particular crop sources (grassland, cereals, legume, oilseed and niche crops) and the marine. Protein is the key driver of human health, growth and development, and by investigating compositional and functional properties of alternative proteins, U-Protein ultimately aims to deliver quality nutrition for consumers, while also supporting the competitiveness of the rural and coastal agri-economies.

Stand 4 Reducing Methane with Feed Additives: Impact on Milk Quality

Jonathan Magan (jonathan.magan@teagasc.ie)

Feed additives, such as 3-NOP, seaweed and plant or oil extracts, have the potential to reduce enteric methane emissions from ruminant animals. Key to the effectiveness and sustainability of such additives in the dairy industry will be the effects, if any, on the milk composition and sensory characteristics. Our current projects focus on milk from cows fed with potential methane-reducing additives, which is analysed for composition, toxicology and functionality to determine any downstream effects on processability, safety or flavour.

Stand 5 Analytical Tools to Support Climate Change Mitigation Strategies

Martin Danaher (martin.danaher@teagasc.ie)

Our analytical chemistry laboratories based in Ashtown provide R&D support and specialist services to the Irish agri-food industry to address chemical residue and toxin challenges in food and environmental samples. Working closely with researchers at Johnstown Castle, we evaluate the safety of new fertiliser additives that mitigate against Greenhouse Gas emissions through the use of bespoke analytical methods developed at out site. The residue research team has extensive experience on the analysis of mycotoxins and we use these methods to monitor the presence of emerging toxins caused by new fungal species. Our laboratories are equipped with a range of sensitive analytical instrumentation required to analyse a wide range of organic and inorganic chemical residues, which are operated by a team of expert scientists.

Stand 6 Technologies to Understand the Impact of Climate Change Mitigation Strategies on Food Safety Risks

Kaye Burgess (kaye.burgess@teagasc.ie)

The impacts of climate change require us to produce and process food differently, to meet the needs of a growing global population in a sustainable manner. Climate change in itself will result in new food safety risks, which need to be addressed. Furthermore, the implementation of new climate smart technologies will need to be validated to provide food safety assurance and enhance market potential. Teagasc has a wealth of experience in microbial and chemical food safety, as well as the facilities and expertise, to support food companies in their R&D activities and the implementation of climate smart technologies in their processes. Our dedicated biocontainment unit allows us to use relevant foodborne pathogens to validate the safety and shelf-life of products, using real food chain conditions.

Stand 7 A Sensory Science Toolbox for Food Product Innovation

Emily Crofton (emily.crofton@teagasc.ie)

Sensory science has advanced significantly in the past decade and is quickly evolving to become a key tool for predicting food product success in the marketplace. The Sensory Science Suite, located at Teagasc, Ashtown, is a state-of-the-art facility comprising an array of sophisticated sensory testing techniques to better understand the human sensory response to food products. We have extensive experience in characterising the appearance, flavour and texture profiles of foods using a range of traditional, rapid and temporal sensory methods. Through our facility, companies have access to both trained and consumer taste panels for the assessment of food products for a range of applications including product development, quality control and shelf-life testing. Within our research programme, we are using immersive virtual reality technology and biometric sensors (eyetracking, galvanic skin response, electroencephalography, facial expression) to generate unique insights into consumer sensory preferences and subsequent food choice behaviour.

Stand 8 Sustainable Diets

Sinéad McCarthy (sinead.mccarthy@teagasc.ie)

The foods that we produce and eat have received much attention in recent years not just because they contribute to our health but also because of the impact they have on our environment. It is reported that food production and consumption in the EU is responsible for as much as 30% of EU greenhouse gas emissions. Therefore, our food choices have the potential not only to substantially influence our health but to impact on the environment we live in. Is it possible to consume a diet where we can achieve both healthy eating guidelines and have minimal environmental impacts? This is a difficult question to answer because not all healthy foods have low carbon footprint just as not all foods with a low carbon footprint are considered healthy. Any recommendations to change our current consumption habits should be evidence based and consider the prevailing cultural food consumption patterns of a population. Guidelines developed for sustainability reasons should be holistic in nature, take many parameters into consideration especially health and nutrition, rather than concentrating on one food group or one measure such as emissions.

Stand 9 Ingredients from Marine Resources

Maria Hayes (maria.hayes@teagasc.ie)

Marine resources including seaweeds, microalgae and fisheries and shellfisheries processing co-products are a rich resource of bioactive ingredients. When processed effectively these bioactives have potential for use in feeds, foods, functional foods or nutraceuticals and in agriculture as bio-stimulants. The following projects at Teagasc Ashtown are looking to harness the benefits of marine resources for ingredient development: Algae4IBD indentifying anti-inflammatory, prebiotic and anti-pain ingredients; SeaSolutions developing feed ingredient solutions from Irish seaweeds to enhance ruminant health and reduce methane emissions from cattle, sheep and dairy cows; BioProtein examining the quality of proteins produced from selected seaweeds, microalgae and cereals comparing the impact of processing methods on the protein digestibility and bioavailability; IDEA+ focussing on microalgae as a source of novel ingredients for use in foods, cosmetics and bio-stimulants.

Stand 10 Smart Meat Drying Technologies

Cristina Botinestean (cristina.botinestean@teagasc.ie)

Dry-aging and dry-curing are typically used to obtain premium, shelf-stable meat products with enhanced tenderness and distinctive flavours. Teagasc are working on optimising the conditions to minimise processing costs, whilst maintaining the eating quality of these products, through emerging processing technologies. Our drying technologies combine the advantages of traditional meat drying with state-of-the-art technology. The systems operate under controlled temperature and humidity, ensuring a perfect microclimate. We provide a wide range of equipment of varying drying capacities for different types of meat products that can be dried under these optimal conditions. These drying capabilities, teamed with the expertise of our researchers, provide valuable support to meat and meat products companies.

Stand 11 Novel Approaches to Phosphate Reduction in Meat Products

AnneMaria Mullen (anne.mullen@teagasc.ie)

Teagasc are investigating emerging technologies, in combination with natural fibre-rich ingredients, to reduce the phosphate content in traditional meat products. Two food processing co-products: apple pomace (AP) and coffee silver skin (CSS) were identified as potential phosphate replacers, based on their functional properties and the health benefit provided by their higher dietary fibre content. Emerging technologies: ultrasound (US) and high hydrostatic pressures (HPP), were applied to improve the technical traits of the natural ingredients and the uncooked meat, respectively. This resulted in a positive impact on the water holding capacity (WHC), cook loss, emulsion stability and fibre content values, when compared with formulations incorporating untreated phosphate replacer and untreated meat. The final formulation achieved a phosphate reduction of the 60%, compared to the traditional breakfast sausage with minimal perceived loss in colour and other quality parameters.

Stand 12 Insects: Bio-factories for Protein Production

Carlos Alvarez (carlos.alvarez@teagasc.ie)

Approximately 30% of EU consumers are willing to eat insect-based food, a practice also known as entomophagy. Our research aims to enhance such level of perception by improving the quality of insect production and processing, including its environmental impact. Research is being done on the emission of greenhouse gasses, on the impact of the substrate, on food safety and on the shelf life of the food product. So far, several different food co-products and side streams (red cells, feather meal, catering waste, crops leftovers, etc.) have been used to rear the currently approved species in the EU (mealworm, locust, cricket and grasshopper). This is increasing our understanding of how insects convert unused raw materials into high nutritional quality protein. Improving insect production as well as consumer' attitudes are at the heart of ongoing work which aspires to make insects a crucial part of tomorrow's more sustainable diet for European consumers.

Stand 13 Technology Development Supports

Carol Griffin (carol.griffin@teagasc.ie)
Sara Ramos Barbosa (sara.ramosbarbosa@teagasc.ie)

A key requirement for successful food businesses is the capacity to produce sustainable, high quality and safe food products. Teagasc is committed to assisting the food sector by providing access to applied research knowledge, product development facilities and training programmes. Teagasc's team of highly skilled food technologists, microbiologists, chemists, trainers and consultants can work alongside food companies to develop new and innovative products, provide technical solutions to in-company problems and deliver certified training courses to assist in the skills development of employees.

Stand 14 Plant Based Protein Development

Shivani Pathania (shivani.pathania@teagasc.ie)
Shay Hannon (shay.hannon@teagasc.ie)

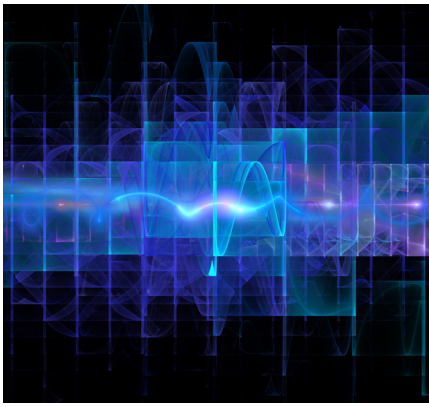
The demand for healthy and tasty alternatives to meat is growing and twin screw extrusion is a key technology for the development of plant-based fibrated protein products that are low in fat, high in protein and fibre content, and rich in nutrients. Under high moisture conditions (HMEC) the technology optimises the production of a wide range of plant protein ingredients into meat analogs with real meat textures including chicken, pork, beef and seafood. Twin Screw Extrusion can also be used to create dry textured vegetable proteins (TVP). Whether you are an established manufacturer with a history of large-scale food processing or a start-up developing a new product, Teagasc can provide support and develop the right process for plant-based protein extrusion.

Stand 15 Efficient Plant Protein Extraction

Xianglu Zhu and Laura Healy (Contact: brijesh.tiwari@teagasc.ie)

Cavitation technologies can be employed for extraction due to their high yield performance and lower energy consumption, when compared with other technologies. Plant cell walls can be easily broken down using hydrodynamic cavitation, which is a non-thermal, energy efficient processing technology. Hydrodynamic cavitation is a versatile cell disruption technique, which can be used to rapidly scale-up protein extraction from a range of plant biomasses. The result is a high quality plant-based protein with potential to enter a number of different markets such as the human food market, animal feed or following further targeted extraction, high-value nutraceutical markets. Hydrodynamic cavitation technology and the protein extracts derived from it opens up huge potential in the field of reformulated food innovation.

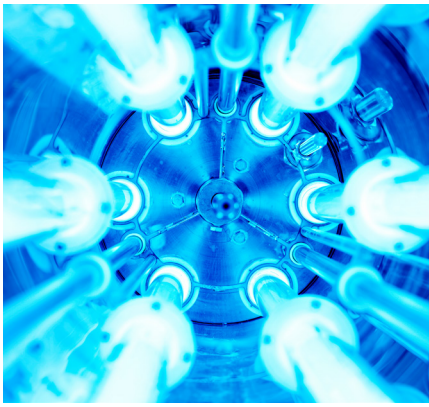
Stand 16 Pulsed Electric Field (PEF): Emerging Technique for Sustainable Food Processing



Shaba Noore and Rahel Suchintita Das (Contact: brijesh.tiwari@teagasc.ie)

The National Prepared Consumer Food Centre (PCFC) at our Ashtown facility includes a Pulsed Electric Field (PEF) unit (batch and continuous system). PEF technology uses short pulses of high voltage electric current that leads to physical disruption of biological cells through electroporation of cell membranes. This technique enhances the efficiency of many processes, such as extraction of valuable cellular constituents, osmotic dehydration, and cold pasteurisation of liquid and semi-liquid foods including juices, soups, and milk. PEF treatment being very short does not cause an increase in product temperature and hence stands out as a non-thermal technique with no or minimal changes on the product's nutritional, sensory or bioactive characteristics.

Stand 17 Ultraviolet Light (UV) for Decontamination of Foods

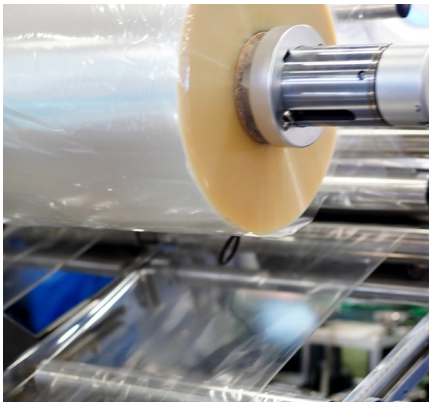


Bhavya Mysore Lokesh and Laura Hinds (Contact: brijesh.tiwari@teagasc.ie)

Ultraviolet (UV) light has been widely used in many fields from sterilization of medical devices to water decontamination. UV light has been explored as a non-thermal decontamination technique for a range of foods to enhance food quality, safety and shelf-life. UV is a versatile technology which can be applied to low moisture (e.g. dried products) as well as high moisture (e.g. fresh produce) food products. Continuous UV and batch UV systems available at Teagasc have been widely employed for surface decontamination of chickens, fresh produce, dried ingredients and packaging materials. UV light can ensure microbial inactivation in a short time without having detrimental effects on the quality of food products. The application of UV has resulted in the inactivation of more than 90% of bacteria in various matrices. UV light can be effective in inactivating food spoilage microorganisms in solid and liquid foods and has potential as a food decontamination tool in the food industry.

Stand 18

Sustainable Food Packaging Solutions



Monjurul Hoque and Animesh Sengar (Contact: shivani.pathania@teagasc.ie)

Food packaging systems have the potential to reduce unintentional food waste, which equates to 3.3 billion tonnes of CO_2 equivalent per year with an economic value of €88 million. The European Plastic Strategy and UN Sustainable Development Goals have highlighted the importance of the use of novel sustainable packaging solutions to reduce resource consumption and support the circular economy. The National Prepared Consumer Food Centre showcases the capabilities available including packaging film development units, packaging machinery and packaging materials produced from virgin plastic, recycled plastics as well as bio-based compostable materials.

Additional Exhibitors

Enterprise Ireland

Enterprise Ireland is the government organisation responsible for the development and growth of Irish enterprises in world markets. In this way, we support sustainable economic growth, regional development and secure employment. We have international locations facilitating access to countries worldwide and all of our services are geared toward helping Irish companies build an international business. We work in partnership with Irish food entrepreneurs and food companies to help them to develop an export led business, expand, innovate, become more competitive and develop their management capability so they are well placed to win export sales on global markets and in turn create new jobs in Ireland. Enterprise Ireland have a range of supports available to companies to develop their business, including collaborative R&D with Teagasc and third-level institutes.

Holmac (Roboqbos)

Holmach Ltd was founded in 1974 as Peter Holland Food Machinery for the provision of processing solutions – mainly in thermal and vegetable processing. In the last ten years, Holmach has specialised to become the leading provider of thermal processing solutions in Great Britain under the leadership of Chris and Niki Holland. The company focuses on seeking out the most innovative and efficient food processing technology on the international market to provide the best possible solutions to the UK food and pharmaceuticals industries. From installing retorts at Griffith Labs for marinade production to a scraped surface heat exchanger for Naturediet pet food, Holmach's experience in thermal processing covers baby food, ready meals, condiments, nut sterilising and more. New developments for the company include becoming the new agent for Roboqbo of Italy.

JenAct (UV System)

JenAct Limited specialises in UV Disinfection, UV Surface Sterilisation Systems and Microwave UV Technology, as well as Pulsed UV. Designing and manufacturing bespoke and specialist machines for businesses, combining our technical expertise with a scientific approach, enables us to recommend and design the most appropriate UV equipment for wide range of applications. Our customers benefit from state-of-the-art UV disinfection modelling software, which we have developed to achieve efficient sizing of UV Air Disinfection Systems. Jenact also develops UV Technologies for the JentonUV range of products, providing UV Curing/Drying solutions. JentonUV also offers UV Radiometers for both UV Curing and UV Disinfection applications.

Food Physics (PEF System)

Food Physics was established in 2012 with the purpose of identifying and maximizing the potential of new technologies and innovations in the food and beverage industry. We devote our time to studying and implementing our technology in North America, the Caribbean, UK, and Ireland. We conduct our operations from our facilities in Boise, Idaho, USA and Chelmsford, Essex, UK.

We work closely with our partner Elea to develop new Pulsed Electric Field (PEF) applications, create R&D projects, and conduct on-site and pilot hall testing to bring innovative Pulsed Electric Field solutions and installations to your business.

We strive to provide systems that create high-quality food with greater yield and greater stability. Beyond establishing our own commercial PEF applications, we work to help other products find commercial success.

We use our knowledge and expertise to enable new products ranging from freeze-dried foods to paints to reach the market in an efficient and creative way. We have developed an R&D program to continuously identify a growing range of PEF applications ready for further commercialization.

Cuddon (Freeze Drying)

Cuddon Freeze Dry have been designing and building quality freeze dryers since 1963. Installed globally, they are the gold standard in drying specialised dairy products, and our freeze drying solutions are highly respected in all industries for delivering premium freeze dried products which retain their nutrience, enzyme activity, smell and taste, even in raw products like pet food. Cuddon freeze dryers are fully compliant with food manufacturing and dairy specifications. Easy to clean (CIP) with 2 doors allows for either wet/dry zoning or loading / unloading from both ends. Built entirely of stainless steel; you can be sure of a hygienic environment for quality products. With our small equipment foot print and easy integration into existing or new facilities, a Cuddon freeze dryer is low maintenance, simple to operate and cost effective. Our turn-key solution includes build, installation, commissioning, training and 12 months warranty. Designed and built in-house, our design team can personalise the specification to meet your requirement and layout. We provide technical support for Cuddon freeze dryers worldwide for life. Coming in 2023, Cuddon Freeze Dry are excited to announce the launch of their new CO_2 range of freeze dryers. With the tightening regulation around the use of refrigerant gases, the Cuddon CO_2 Freeze Dryer will provide a clean green solution to the freeze dry market.

Liquid Technologies/MicroThermics

MicroThermics design and build small scale processors used for pasteurisation and UHT treatment of fluid food products. The equipment is used in R & D applications across all sectors of the food and beverage industries including consumer products, food ingredients and flavours. Product applications include most fluid food products e.g. beverages, dairy products, juices, smoothies, plant based beverages, protein drinks, nutritional products, sauces. The thermal processing technology enables the user to process multiple formulations quickly and go directly to the plant with a working formula. Benefits include faster turnaround in NPD pipeline, reduced materials usage, reduced energy cost compared to factory trials, gets products to the market faster.

Robot Coupe

Robot-Coupe has designed, developed and manufactured food preparation equipment in France since 1961. Within a few decades, the brand developed its expertise in kitchens around the world. We commit to offering high performance, durable products that exceed the current norms, with technical and industrial choices designed to guarantee the durability, maintenance of our products.

Our team have a wide variety of industry expertise and are focused on assisting you with food waste and labour saving methods. We have this year opened our first Ireland based showroom in County Kildare with a service centre and the option of both physical and virtual demonstrations .

Corcoran Food Equipment

Corcoran Food Equipment is one of Ireland's largest providers of Design Services, Equipment and Supplies to the Food Service Industry.

We supply quality branded products, specialist design, project management, installation and training. We have completed installations all over Ireland and in the U.K. We work closely with our customers in providing the complete solution for their requirements from the initial detailed designs to the finished product.

Our experience and knowledge enables our Design Team to function effectively and efficiently whether working on a new development or upgrading an existing facility.

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www.teagasc.ie