Welcome to Gateways
AgTech – Feeding Disruption

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Social Science Supporting Innovation

**Presenters:** Áine MackenWalsh, Áine Regan, David Meredith, Sinéad McCarthy and Maeve Henchion

Social science methods are used to research human behaviour. Grounded in disciplines such as sociology and psychology, we use specific techniques to understand the knowledge, values, motivations, priorities and behaviours of actors in the agri-food value chain (consumers, farmers, scientists, advisors etc.). We use evidence-based, participatory approaches to develop solutions which are based on understanding and mediating between the needs and inputs of different actors. Social science methods can be used within inter-disciplinary research projects to help enhance societal uptake and the impact of scientific outcomes. Social science methods which can be applied to digital agriculture include participatory action research, user-centred technology design, socio-economic impact analyses, behaviour change models and good governance approaches.

Demonstrating Sustainable Credentials with Earth Observation

**Presenters:** Stuart Green, Jesko Zimmermann and Shafique Matin

Teagasc Earth Observation methods and outputs are used across government, research and industry to look at agriculture’s impact on the environment and provide impartial evidence on which to build sustainable credentials. We can measure grass growth in a field with a drone or give national scale grass status updates using satellites. The technology can detail grazing across commonages or map underground drainage in a field. The range of applications of earth observation is vast from 3D models of hedgerows to estimate carbon sequestration to early identification of crop disease in one part of a field.

Agri-Innovation Hub Ireland, Advancing Solution in Agri-Tech

**Presenter:** Bernadette O’Brien

Agri-Innovation Hub Ireland, currently in development, will deliver multi-agency support at one location to escalate national agri-tech sectoral advancement in an innovative and synergistic enterprise environment. This agri-tech project includes key specialisms in all Agri4.0 disciplines including pasture-tech, artificial intelligence, IOT, robotics, big data, Virtual Reality/Augmented Reality, cybersecurity and analytics.
Rapid Untargeted Pathogen Diagnostics on the Oxford Nanopore MinION Portable DNA Sequencer

Presenter: Matt McCabe

The Oxford Nanopore MinION is a small pocket-sized DNA sequencing device that plugs into a laptop and can be run anywhere. This device has the potential to allow rapid untargeted pathogen diagnostics by people without molecular biology expertise (e.g. vets, vet techs and farmers) at the point of need.

Supporting Technological Development in the Agri-Food Sector: Project DIVA

Presenter: Thomas Byrne

The DIVA project is funded by the European Commission and aims to support companies who want to apply technology to Agri-food, Forestry and Environmental sectors. Companies are welcome to apply for funding through the DIVA open calls (www.projectdiva.eu) or avail of the Europe-wide networking capabilities of the DIVA group.

Validation of Precision Technology for use on Dairy Farms

Presenter: Laurence Shallo

Precision Dairy aims to assess what sensors could be used on a commercial dairy farm to improve efficiency and profitability. Some of the sensors examined within Precision Dairy aim to automatically monitor body condition score, grazing behaviour and animal location.

Decision Support Tools using Big Data

Presenter: Tara Carthy

Big-data in the Agri-Food sector is presenting new challenges, not least of which is how to encourage smarter and better-informed decisions. Teagasc has assisted in development of decision support tools to assist decision making on-farm that exploit readily available data and are equally applicable in dairy cattle, beef cattle and sheep.
The Genetics of Meat Eating Quality

Presenter: Michelle Judge

Major advancements in meat eating quality have been made in recent years through processes within the abattoir, including animal handling, slow chilling, hip hanging and the dry aging process. Despite improved control of these aspects of beef production, large variability in meat eating quality persists; genetics undoubtedly contributes to this variation. Teagasc is working with Meat Technology Ireland to determine the genetic components of meat eating quality.

Exploiting DNA Information in Irish Livestock

Presenter: Deirdre Purfield

Since the introduction of genomic evaluations in 2009, Teagasc has been at the global forefront in development and implementation of large scale genomic evaluations to enhance the genetic improvement of livestock. Research in this area focuses on enhancing genomic prediction methods and the exploitation of sequence data to identify novel lethal and major genes.

Predicting Grass Growth with the MoSt Grass Growth Model

Presenter: Elodie Ruelle

The Moorepark St-Gilles Grass Growth (MoSt GG) model is using weather (historical and forecast), soil type and management (fertiliser, grazing and cutting) to predict grass growth, grass nitrogen content and nitrogen leaching. Before its integration into Pasture Base Ireland, the model is currently used on 40 farms to predict grass growth weekly.

The Next Generation Herd

Presenters: Frank Buckley, Orlaith Quigley

Ireland’s Economic Breeding Index (EBI) ranks dairy cattle on their genetic merit for profit in the context of seasonal pasture-based production. Genetic gain has been fuelled by a national breeding programme underpinned by genomic selection. Teagasc’s Next Generation Herd clearly demonstrates that high EBI genetics deliver superior performance and profit.
RAPIDFEED
Presenter: Ben Lahart
Feed efficiency is an important component of grazing ruminant livestock systems. The factor preventing the genetic improvement of feed efficiency is routine access to large amounts of individual animal feed intake data. The objective of this project is to develop methods that can be deployed on commercial livestock farms to predict feed intake.

Development of a ‘Real Time’ Grass Quality Measurement System for Grassland Management Optimisation
Presenter: Darren Murphy
Accurate estimation of grass quality is essential for optimising grass utilisation and increasing profit margins for pasture based livestock farming. This project focuses on prototyping and optimising state of the art and existing measurement technologies to determine grass quality parameters. Geo-referenced data measured on the grazing platform will be processed via an online cloud based decision support tool, to optimise grassland and feed management decision making.

Remote Collection of Hydrologic Data
Presenters: Pat Tuohy, James O’Loughlin
The efficacy of land drainage systems is widely variable and needs to be quantified. A major aim of the Teagasc Heavy Soils programme is to characterise drainage system performance to improve our understanding of these systems. Performance analysis involves a remote monitoring regime to quantify the effects of land drainage on field scale water balances and hydrology. All farms on the Heavy Soils programme are recording data related to field scale hydrology (Weather, drain discharge, water table depth, soil moisture). All data logged is then delivered remotely to the research team for analysis.

The Rumen Microbiome and Methane Emissions
Presenters: Paul Smith, Sinead Waters, David Kenny, Matthew McCabe, Alan Kelly (UCD) and Dr Stephen Conroy (ICBF)
Teagasc, in collaboration with UCD and ICBF, aim to better understand the relationship of host genetics and the rumen microbiome with methane emissions and feed efficiency in beef cattle. Findings from this study will enhance the sustainability of Irish beef production by selecting for efficient animals with reduced environmental output.
FAIRshare Digital Tools for Farm Advisors

Presenters: Tom Kelly, John Hyland, Áine Regan

FAIRshare will develop an open inventory of the shareable digital farm advisory tools and services used internationally. It will help advisors to use the online inventory. The FAIRshare will fund 40 different advisory cases to help advisors to address the challenge of embedding digital tools in different advisory and farming contexts.

Vistamilk – SFI Research Centre for Digitalising Dairy Production and Processing

Presenters: Donagh Berry, Francis Kearney, Eimear Ferguson, Guillaume Le Palud

Vistamilk is a world leading SFI Research Centre for innovative precision pasture-based dairying. Vistamilk is leading the Agri-Food technology sector through innovation and enhanced sustainability across the dairy supply chain. Vistamilk’s research will develop new, and advance existing electronic monitoring and actuation technologies to transform an already world-class dairy sector into a global leader in sustainable Agri-Tech. It will specifically address pasture-based dairy production, improved processability and the generation of novel, higher-value-added products. In addition to the creation of new sensing and actuation paradigms, particular focus will be given to developing state-of-the-art analytical techniques applied to large-scale; sensor data-sets delivered by advanced network and communication technologies.

SheepNet – Improving Ewe Productivity and Profitability

Presenters: Tim Keady, Alan Bohan

SheepNet (funded by the European Union’s Horizon 2020 research and innovation programme) is an innovative thematic network which has brought together a wide range of stakeholders from the six main sheep producing countries in Europe (Ireland, France, Italy, Romania, Spain and UK) and from Turkey to improve ewe productivity (number of lambs reared per ewe joined). SheepNet uses a multi-actor approach that engages farmers, farmer organisations, scientists, advisors/consultants, veterinarians etc. involved in the sheep industry. Using a top-down:bottom-up approach SheepNet has identified there are similar challenges to improving sheep productivity across Europe but the order of importance may differ by region. SheepNet has collated and share solutions to problems of one country/region that are available in other regions. SheepNet is about practice-driven innovation, provides solutions to the needs and challenges, and promotes the implementation and dissemination of innovative technologies and practices that positively impact ewe productivity. Teagasc is facilitating SheepNet in Ireland.
Circular Horticulture – Greenhouse Horticulture as a Sustainable Food Production System

Presenters: Dermot Callaghan, Michael Gaffney, Leo Finn

Complex challenges currently exist around sustainable food production with climate change, population growth, increased urbanisation and changing diets as the key drivers. Technologically advanced greenhouse production provides significant opportunities for sustainable intensification and increased production capacity (up to 15 times greater compared to field production). Opportunities exist for extended season production using LED technology and renewable heat sources while harvesting the CO2, for crop enrichment and valorising and recycling the waste streams. The Ashtown Glasshouse research unit contains advanced environmental control systems which mitigate disease pressure and promote integrated pest management and reduced pesticide use. The glasshouse environment lends itself to high value crop production with the capacity to deploy technology (sensor technology or new production system design) and ultimately allow for robotic harvesting in the future.

Next Generation Sequencing & Bioinformatics Facility

Presenters: Fiona Crispie

The Teagasc Next Generation Sequencing and Bioinformatics Facility comprises of several cutting-edge DNA sequencers based at Teagasc Food Research Centre, Moorepark. It can be used to analyse complex microbial communities in foods and other environments, to mine the gut microbiota for probiotics, and to investigate the interplay between diet (including probiotic/prebiotic supplementation) and the microbiota and health. It can also be employed for de novo whole genome sequencing, e.g. to demonstrate the absence of virulence genes in a novel food culture and for identifying food contaminants and their entry point into the food chain.

Department of Agriculture, Food and the Marine

Presenter: Aidan Holohan

The mission of the Department of Agriculture, Food and the Marine (DAFM) is to lead the sustainable development of a competitive, consumer focused agri-food sector and to contribute to a vibrant rural economy and society. Key to achieving these goals and realising Ireland’s potential as a global leader in innovation and technology in the agri-food sector is the fostering of a strong and effective research base. Increasingly, farms and farming systems have seen a rise in the development, uptake and application of digital technologies, ICT and molecular biology to such an extent that, if trends continue, will ultimately lead to the transformation of the farming sector. As the primary funder of Agricultural research in Ireland, DAFM will play a fundamental role in supporting the development of these technologies, thereby driving sustainable growth in production, exports, jobs and the preservation of our natural environment.
Enterprise Ireland

Enterprise Ireland’s Innovation Partnership Programme encourages companies to work with Irish research institutes resulting in mutually beneficial co-operation and interaction. The programme supports eligible companies up to 80% of the cost of research work to develop new and improved products, processes or services, or generate new knowledge and knowhow.

The company must be a registered client of one of the following state development agencies: Enterprise Ireland, IDA Ireland, Údarás na Gaeltachta or Local Enterprise Offices.

For further information please visit www.enterprise-ireland.com/ipp.

Innovation Partnership Programme is co-funded by Enterprise Ireland and the European Regional Development Fund under Ireland’s European Structural and Investment Funds programmes.

IDA Ireland

Ireland’s inward investment promotion agency, the IDA, is a non-commercial, semi-state body promoting Foreign Direct Investment into Ireland through a wide range of services. We partner with potential and existing investors to help them establish or expand their operations in Ireland.

Evaluation of Technologies to Reduce Greenhouse Gas and Ammonia Emissions

Presenters: Dominika Krol, Karl Richards

Agriculture faces the twin challenges of meeting growing demand for food and the need to improve environmental sustainability. Research in Johnstown castle focuses on evaluation of technologies that meet both improving or maintaining yields and reducing losses to the environment. Recently we identified fertiliser technologies that could maintain yield and reduce greenhouse and ammonia emissions by over 70%.