VISTAMILK SFI RESEARCH CENTRE

INFORMATION FOR CANDIDATES

About Teagasc

Teagasc, the Agriculture and Food Development Authority, is the national body providing integrated research, advisory and training services to the agriculture and food industry as well as rural communities in Ireland. Teagasc's future success depends on attracting and identifying the best candidates and, to help achieve this, our employment policies and practices are of the highest standard. Teagasc is committed to ensuring that our recruitment and selection practices are fair, consistent and in line with legislative requirements and that they follow best practice recruitment procedures. All appointments are made on merit and through fair and transparent recruitment processes.

Teagasc aims to be an employer of choice and offers a wide-range of challenging career opportunities, merit-based promotions, and excellent learning and development programmes to assist staff members to achieve their full potential. Teagasc offer tuition reimbursement, on-site training courses to enhance job-related skills, access to job-related conferences and seminars and accredited customised Leadership Development and Management Development Programmes. The central focus of Teagasc's new People Strategy (2018-2022) is on supporting our staff members to achieve their highest potential and to successfully develop as individuals and as high-performing team members.

Teagasc has 6 research centres, 4 colleges and 12 regional advisory units located around the country, as outlined on the map below. Further information on Teagasc can be located at www.teagasc.ie and Teagasc's Recruitment Policy can be located at https://www.teagasc.ie/about/opportunities/.

About the VistaMilk SFI Research Centre

The VistaMilk SFI Research Centre is one of 17 Science Foundation Ireland (SFI) – Industry co-funded Centres. Hosted by Teagasc, it is a unique collaboration that brings together Ireland's leading agriculture and food research organisation (Teagasc); with Ireland's major research Centres in smart sensor systems (Tyndall National Institute), networking and communications (Telecommunications Software & Systems Group; TSSG), animal-level databases (Irish Cattle Breeding Federation), and data analytics (Insight). Significant investment into the Centre has also been made by the Department of Agriculture, Food and the Marine (DAFM) through the incorporation of a DAFM funded Centre on Precision Agriculture into the VistaMilk SFI Research Centre.

Vision, Mission and Objectives of the Centre

Vision

The VistaMilk Centre will advance the fundamental science and ICT that will create the future of the global dairy sector. This next generation dairy industry will have the precision to generate new, high-value, traceable products based on its knowledge of the dependencies between the pasture, the cow and the milk processor. It will be an industry that is efficient, while being responsive to the environment, the welfare of the animal, and the health of the consumer.

Mission

The VistaMilk SFI Research Centre aims to be an agent of growth for the Irish dairy industry by being a world leader in fundamental and translational research for precision pasture-based dairying. Globally, agriculture is undergoing seismic disruptions arising from the competing challenges of food security, the environment, and societal needs. Solutions to these disruptive challenges may exist in the parallel revolution occurring in areas of science and technology. These challenges present major threats and opportunities as traditional dairy production needs to urgently transform itself using these new technologies. The proposition is that innovative multi-level analytical approaches, applied to Big Data generated from novel sensor and -omic technologies, can be used to facilitate the sustainable production of a greater volume of consistently higher quality, value-added dairy products and ingredients from a basal, grazed-pasture diet.

Objectives

The overarching objective of the VistaMilk SFI Research Centre is to generate and deploy innovative basic and applied science and technologies to better understand and monitor the complex interactions across a highly inter-dependent food-production chain. The objective will be achieved by exploring 3 inter-dependent thematic areas (i.e., Pasture, Cow and Food) bringing together expertise in the biological sciences, sensor-systems, communications and networking, data analytics, and food processing.

Centre Structure

The VistaMilk SFI Research Centre is unique in bringing together very diverse expertise and technologies from ICT and Agriculture. The Director, Prof Donagh Berry will lead the Centre. The Director will be supported by two deputy directors, Prof. Laurence Shalloo (Teagasc) and Prof. Mark Keane (UCD). There are 4 other Co-Applicants, Prof. Catherine Stanton (Teagasc), Dr. Paul Cotter (Teagasc), Dr. Sasitharan Balasubramaniam (WIT) and Dr. Alan O'Riordan (Tyndall National Institute).

The applicant group are supported by 22 funded investigators, 43 academic collaborators and 46 industry collaborators. The Centre will hire 90 researchers consisting of 58 postgraduate students and 32 post-doctoral researchers as well as supporting technical staff. Research and development activities will be carried out within 9 Targeted Projects (TPs) in 3 Thematic Areas (TAs) – Pasture, Cow, Food; underpinned by 8 Platform Technologies.

Platform Technologies

Platform 1: Advanced Sensors & Systems Integration	
Topic 1.1 Electrochemical nanosensor systems. Topic 1.2 Spectroscopic sensors. Topic 1.3 Microelectromechanical systems (MEMS). Topic Area 1.4 Low Power Sensor Interfacing. Topic Area 1.5 Reduced Maintenance Smart Sensor System Integration	

Platform 2: Communications and Networks	
Topic 2.1 Fog computing and edge analytics. Topic 2.2 Molecular communications and Internet of Bio-Nano Things.	

Platform 3: Data, Privacy & Warehousing	
Topic 3.1: Data standards. Topic 3.2 Data warehousing and decision support systems. Topic 3.3 Data security, privacy and access-control.	

Platform 4: Data Analytics	
Topic 4.1 Predictive techniques using temporal and spatial data. Topic 4.2 High-Dimensional Statistical Methods for –omics Data. Topic 4.3 Data Analytics from Converging Modalities.	

Platform 5: -omics	
Topic 5.1 Genomics. Topic 5.2 Metagenomics.	

Platform 6: Experimental Test-Beds	
Topic 6.1 On-farm test-bed facility. Topic 6.2 Processor test-bed facility.	

Platform 7:

Platform 7: Integration	
Topic 7.1 Optimised database structure. Topic 7.2 Integrated data flows.	

Platform 8:

Platform 8: Deployment	
Topic 8.1 Deliver. Topic 8.2 Models. Topic 8.3 Tools. Topic 8.4 Automation and validation of farm-scale habitat mapping.	

Thematic Area 1: PASTURE

Thematic Area 1: TP 1	Soil nutrient dynamics
Objective: *Deliver more accurate predictions of soil nutrient supply to maximise grass growth and minimise losses to the environment.*	

Thematic Area 1: TP2	Sustainable pasture management
Objective*: Capture accurate real-time information on pasture production, canopy structure/quality, and herbage mineral content for grazing dairy-cows and deploy in pasture decision support tool.*	

Thematic Area 1: TP3	Pasture breeding programmes
Objective: *Increase the rate of genetic gain in forage breeding to enhance on-farm profitability.*	

Thematic Area 2: COW

Thematic Area 2: TP4	Animal nutrition and fertility
Objective: *Develop an improved understanding of the rumen environment and its impact on performance as well as exploiting activity monitors to diagnose animal-level events.*	

Thematic Area 2: TP5	Animal Health
Objective*: Provide diagnostic options to support sustainable control of priority diseases in dairy herds.*	

Thematic Area 2: TP6	Sustainable animal breeding programmes
Objective: *Deliver more accurate genomic predictions for performance in dairy cows.*	

Thematic Area 3: FOOD

Thematic Area 3: TP7	Next generation dairy processes and products
Objective*: To optimise and predict the processing performance of future milk by understanding the contribution of pasture and cow-level factors to compositional variability.*	

Thematic Area 3: TP8	Digestive characteristics of dairy products
Objective: *Employ in vitro, ex vivo and in vivo systems to study the (pre-)digestion of new dairy Ingredients and their impact on host cells and the gut microbiota.*	

Thematic Area 3: TP9	Nutrifunctional Milk
Objective: *Quantify nutritional attributes & health benefits of dairy products for human nutrition.*	

Staffing and Resources

The tables below show the number of people in each staff category who will be recruited to the VistaMilk SFI Research Centre. The operations team will be led by the Centre Manager based at Teagasc who reports directly to the Centre Director. Each site will have its own Site Manager who will report directly to the Centre Manager. Other members of the operations team, all located in Teagasc, Moorepark, include a communications and outreach manager, an IP and business manager, and an EU grants manager.

Staff numbers by category years 1 to 6						
Staff:	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Operations	5	5	5	5	5	5
Technician	9	11	14	14	6	2
Post-Doc	19	31	32	28	23	6
Postgraduate (PhD) students	30	66	68	67	47	8

Teagasc, Moorepark Campus, Fermoy, Co. Cork

The Centre Director (Prof. Donagh Berry), Deputy Director Prof. Laurence Shalloo and two Co-Applicants (Prof. Catherine Stanton and Dr. Paul Cotter) are based at the Teagasc Moorepark Campus. The Moorepark campus is our largest research location and houses Moorepark Animal & Grassland Research and Innovation Centre (Berry & Shalloo); Moorepark Food Research Centre (Cotter and Stanton); and Moorepark Technology Ltd (MTL). The Animal and Grassland Research Centre and Food Research Centres have state-of-the-art research laboratories, including housing the Teagasc/Alimentary Pharmabiotic Centre (APC) Next Generation DNA Sequencing Facility (the largest DNA sequencing facility in Ireland containing Illumina MiSeq (x2) Illumina NextSeq, Ion PGM and Proton DNA sequencers and Oxford Nanopore MinIon platforms). There is an extensive land base with over 100 ha of dedicated farm land and >300 dairy cows on site, with access to 7 additional research dairy farm sites and animals across the country. MTL, - an ultramodern 2,500m² pilot-plant facility which offers a variety of services ranging from pilot plant rental and technical assistance through contract R&D and pre-commercial manufacture, is a joint venture between Teagasc and nine dairy processing companies. The Moorepark campus has extensive conference facilities, offices, lecture rooms and classrooms, in addition to local administration, ICT, finance and research support. Moorepark is one of the world's leading dairy research Centres and specialises in pasture based systems of milk production and processing.

Insight Centre for Data Analytics, Insight @UCD, Dublin

VistaMilk Deputy Director Prof. Mark Keane and a number of academic collaborators and funded investigators are based at Insight, University College Dublin (Insight @UCD), with additional staff at Insight in DCU and NUIG. Insight (https://www.insight-Centre.org/) is Ireland's Data Analytics Centre, an €88 million investment by Science Foundation Ireland and 34 industry partners, with over 350 researchers at four main sites (UCD, UCC, NUIG,

DCU). Insight@UCD has made significant research contributions in data analytics, recommender systems, and decision analytics. Insight has a number of high-end servers at its various sites that run specialised software for data analytics (e.g., a Hadoop cluster, Mongo DB), and for processing streamed data. They also have access to a number of repositories that could provide additional data sources for the Centre's tasks (e.g., spatial databases) and have developed in-house tools for data warehousing, lined-data and privacy management frameworks.

Telecommunications Software & Systems Group (TSSG) at Waterford Institute of Technology (WIT), Carriganore, Waterford

VistaMilk Co-Applicant Dr. Sasitharan Balasubramaniam and several academic collaborators and funded investigators are based at TSSG in WIT. The TSSG (https://www.tssg.org/) is a world class research Centre at the Waterford Institute of Technology (WIT) in communications service and network management solutions with over 100 academic research staff. TSSG carry out a wide spectrum of industry-informed research in ICT, particularly technologies enabling communications and information services. TSSG is based at the Carriganore campus in Waterford. TSSG has infrastructure available for testing and measuring networking protocols; test beds including a mesh WiFi (802.11) networks as well as TelosB sensor platform. The TSSG data Centre currently supports over 160 physical servers, providing more than 1,000 cpu cores for processing and 400 virtual servers. In addition, there is over ½ picabyte of data storage, and ~3,000 network ports. All of which provide a high-level of interconnectivity and flexibility for TSSG's research projects.

Tyndall National Institute, Cork

VistaMilk Co-Applicant Dr. Alan O'Riordan and several academic collaborators and funded investigators are based at Tyndall National Institute (https://www.tyndall.ie/), one of Europe's leading research Centres in ICT research and development. Tyndall is a globally leading institute in photonics, microsystems, micro/ nanoelectronics and theory modelling & design. Tyndall has 460 scientists, engineers, and students. The National Nanofabrication Facility at Tyndall is a state-of-the-art laboratory that contains some of the most sophisticated nanofabrication technology globally, and the facility is open to the VistaMilk Centre for the fabrication of on-chip novel nanoscale structures. These include fully serviced wet chemistry laboratory and an electrochemical detection suite. Fabrication processing capabilities includes both 100 mm and 150 mm process lines, E-beam lithography as well as Microelectromechanical systems (MEMs) and complementary metal–oxide–semiconductor - compatible tools located in over 350 m^2 class 100 clean room space and facilities. Tyndall also has fully quipped nanofabrication facilities as well as electrical test and characterisation capabilities. Tyndall has a unique range of fabrication, processing and characterisation infrastructure valued >€100M, which will underpin its activities in the functionalization, characterisation and finite element modelling of all platform technologies in the Centre. This includes nanowire sensor devices, MEMs resonant devices, spectroscopic sensor systems as well as our microfluidics platform. This infrastructure will be used to develop all the different sensor systems required in VistaMilk.

Drivers of Change

Future research in the Centre will be driven by a commitment to excellence coupled with industry and stakeholder dialogue and informed by the following strategy documents:

- Teagasc Statement of Strategy 2017-20
- Teagasc Technology Foresight 2030
- SHARP; the DAFM Strategic Research and Innovation Agenda
- Food Wise 2025 – DAFM
- Agenda 2020 - SFI Strategic plan
- Innovation 2020 -DBEI
- Precision agriculture and the future of farming in Europe, EU, European Parliament Scientific Foresight Study
- Precision agriculture in Europe: Legal, social and ethical considerations, EU, Science and Technology Options Assessment
- The EU Bioeconomy Strategy 2012
- The FOOD 2030 SWD, EU Staff Working Document
- The UN Sustainable Development Goals

Industry Collaboration

The VistaMilk SFI Research Centre has significant Industry funding commitment and nurturing and developing Industry collaboration is a key focus of the Centre. Industry cash funding commitment currently accounts for greater than the required 10% stipulated in the SFI requirements. There are 46 industry collaborators representing sectors dealing with grass-seed breeding, animal and human nutrition, animal health, animal breeding, dairy-food processing, data analytics, sensor development, communications and networks, and –omics technologies. Each targeted project has one or more Industry participant.

The VistaMilk approach will focus on:

- Creating a positive experience for our industry partners
- Growing industry engagement
- A friendly and proactive approach on IP
- Delivering spinout companies
- Fostering a culture of innovation & entrepreneurship
- Diversifying funding

Outreach

Outreach activities of the VistaMilk SFI Research Centre will address objective C of SFI's Agenda 2020 Strategic plan to "have the most engaged and scientifically informed public." Outreach initiatives developed in VistaMilk will be undertaken in conjunction with the SFI Discover program as well as with other national initiatives. This engagement will be monitored via KPIs. The mission statement of the VistaMilk outreach program will be to "promote an understanding and appreciation of the role of ICT and other sciences in the sustainable delivery of consistently high quality, safe dairy products through engagement with stakeholders and the general public". The strategy of engagement will

help the general public to judge the importance and relevance of science in achieving the goal of more sustainable and safe food production systems.

Four target audiences have been identified:

- Research community and peers - Outreach to the research community will entail the publication of papers in relevant high impact scientific journals and conferences as well as the presentation of results to (inter)national scientific audiences.

- Industry stakeholders – The ultimate objective of engaging with end-user industry stakeholders is to increase the adoption of the Centre's technologies, achieved through empowering and enabling more stakeholders to use the new technologies and ultimately, to support innovation on a significant number of farms and processing units. The strategy aims to ensure that knowledge transfer agents engage with end users to promote the use of the technology, whilst providing training and support in the use of the new technologies. Industry stakeholders here include both indigenous and multi-national Agri-Food and ICT companies. The largest stakeholder group, however, will be the farmer as end-user.

- Young general public – The VistaMilk Centre outreach efforts will be undertaken, where possible, in strong collaboration with already established entities (e.g., AgriAware) and outreach initiatives including those already in operation by SFI (e.g., science week, smart futures, discover primary science and maths, science.ie). At least, two BT Young Scientist projects are to be submitted annually (after year 3) in collaboration with the Centre's staff. Emphasis will also be placed on encouraging more women and girls into STEMs.

- Older members of the general public - Particular focus for this category will involve inviting citizens to engage with the importance of the Agri-Food sector for ensuring global food security in an environmentally and socially responsible manner, and on the importance of dairy for health; covering topics such as bone health, calcium intake, vitamin D status, sarcopenia, fatty acid intake, cardiometabolic disease, and diabetes.

Governance and Advisory Structures

Executive Committee

The VistaMilk Executive Committee is the operational core of the management structure for the VistaMilk Centre and the Centre Manager will participate in these meetings every 2-weeks. The role of the Executive Committee is:

- Develop and maintain a long-term strategic plan for the VistaMilk Centre within the vision of the original proposal objectives and in-line with national priorities
- Set the tone for the day-to-day running of the research centre through the implementation of the long-term strategies
- Determine the technology transfer and commercialisation strategy of the centre by liaising with the IP & commercialisation committee
- Translate the advice of the governance committee, scientific advisory board and industry advisory board into operational plans
- Identify and target new opportunities informed by our advisory boards

- Assist the centre director in making decisions and fulfilling his duties
- Monitor progress against targets and KPIs on a quarterly basis
- Manage the allocation of centre overheads between projects/groups within the centre, depending on needs and opportunities
- Ensure that the industry cost-share requirements for the centre are met and maintained on an on-going basis (based on actual cash payments)
- Ensure that all reporting requirements to SFI are met in a timely fashion
- Establish and implement a strategy for securing funding from non-Exchequer sources including foreign direct investment, and in particular from industry sources as well as through the EU H2020 programme
- Ensure that day-to-day conflict of interest and research integrity issues (including compliance with animal ethics) are managed appropriately
- Ensure appropriate communication amongst staff in the VistaMilk Centre
- Ensure that an effective stakeholder management plan is in place that is reviewed quarterly to update stakeholder positions and interests
- Resolve any conflicts not already solved by the standard conflict resolution process (described later)
- Ensure an appropriate risk and issue management process in place and is routinely reviewed.

Governance Committee

The Teagasc director, Professor Gerry Boyle, takes overall responsibility for governance of the VistaMilk Centre. To assist him in this role, a VistaMilk Governance Committee will be established to provide oversight functions.

Scientific Advisory Committee

A 7-person international Scientific Advisory Committee (SAC) will provide informed, impartial scientific advice to the Centre director and Executive Committee on an on-going basis. The SAC will consist of international experts and opinion leaders in the field of dairy production systems including pasture based dairying, plant and animal genetics and genomics, food processing, food digestion, sensors, networking and communications and data analytics of big data.

Industry Advisory Committee

The Industry Advisory Committee (IAC) will provide industry opinion and guidance to the Centre Director and Executive Committee on the strategy, operations, and industry engagement of the Centre. The IAC will advise the Centre Director and the Executive Committee on industry trends and research needs, and in particular on the research needs of the industry partners in the VistaMilk SFI Research Centre. The IAC will also advise on the commercial impact of the IP developed in the VistaMilk SFI Research Centre and help to identify potential additional industry partners.

Intellectual Property and Commercialisation Committee (IPCC)

The Intellectual Property and Commercialisation Committee (IPCC) will ensure best practice is applied in the capture and commercialisation of Intellectual Property (IP), and will advise the Governance Committee and Centre Director on matters related to IP management and the commercialisation of outputs from the VistaMilk SFI Research Centre. Members of the IPCC will include an independent chair of international standing in the area of Intellectual

property/Commercialisation; the VistaMilk IP and business manager (OP2); the VistaMilk assistant director, and a nominee from the TTO offices of 4 partner institutes.

Communication and Public Engagement Committee (CPEC)

The Communication and Public Engagement Committee (CPEC) will bring together the best talents in public engagement from across the VistaMilk SFI Research Centre to develop and implement the public engagement plan.