



FEATURE

VistaMilk

VistaMilk is a new Science Foundation Ireland agri-tech research centre led by **TEAGASC**. It will digitalise dairy production systems through the development and deployment of value-creating information and communications technology.

Globally, agriculture is undergoing seismic disruptions arising from the competing challenges of food security, the environment, and societal needs. The dairy sector is not exempt from this disruption as it faces a confluence of challenges including the rapidly expanding global demand for dairy products, the growing concern over the impact of cattle production on climate change, and the long-term volatility of global dairy markets. Fortunately, the solutions to these challenges are emerging from a parallel revolution in smart and precision agriculture.

Though the early promise of precision agriculture has arguably not been met, recent advances linking novel sensors, networking, and data analytics technologies suggest that successful solutions are imminent.

For Ireland, this disruption presents major threats and opportunities, as traditional dairy production needs to quickly transform itself using these new technologies. Since the abolition of EU milk quotas in 2015, Irish dairy farmers can, for the first time in 30 years, exploit Ireland's international competitive advantage in milk production from low-cost grazed grass. However, the abolition of milk quotas also exposes the sector to global volatility in milk prices, creating a competitive environment necessitating improved farm efficiency, improved processor efficiency and a strategic transition to higher-value-added products. The increased production in the Irish dairy sector will be achieved through expanding the national herd (growing at 3% per annum) but also through the development

and deployment of new knowledge, technologies and decision support systems to maximise the efficiency and effectiveness of the entire production chain.

VistaMilk SFI Research Centre

The €40m VistaMilk Science Foundation Ireland (SFI) Research Centre, which started in September 2018 with a team of over 200 scientists, 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. Internationally, the advances developed in the Centre will apply to dairy systems in many countries and will be a catalyst for global growth in the agri-tech sector. The VistaMilk SFI Research Centre represents a unique collaboration between agri-food and information and communications technology (ICT) research institutes and leading Irish/multinational food and ICT companies.

The Centre, under the directorship of Donagh Berry, is hosted by Teagasc in partnership with the Tyndall National Institute (Ireland's national microelectronics institute), the Telecommunications Software & Systems Group (TSSG) at Waterford Institute of Technology, the Irish Cattle Breeding Federation and the Insight Centre for Data Analytics. The value-added partnerships in the VistaMilk SFI Research Centre will go beyond the state of the art in agri-tech programmes globally, which tend to lack critical mass or focus on only one or, at best, a few components of the dairy production chain.

Innovation and sustainability

The vision of the VistaMilk SFI Research Centre is to be a world leader in the agri-food technology sector through innovation and enhanced sustainability across the dairy supply chain, positively impacting the environment, animal well-being and consumer health. This will be achieved by greatly improving the soil-to-gut supply chain connectivity, thereby improving resource efficiency, better meeting consumers' expectations, and improving profitability and resilience. To achieve the vision for the Centre, the resources, capabilities and expertise of the partners will be brought together, to create new innovation opportunities at the interface between agri-food and ICT. It will, for the first time, link the Irish agri-food industry with Ireland's leading technology research institutes in a large-scale innovation ecosystem. The opportunities that arise at the interface between agri-food and ICT will be the basis for the competitive advantage and international reputation of the centre.

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Research themes

To advance the state of the art in agri-food and information sciences, VistaMilk has divided the problem domain into three main thematic areas of consideration, namely:

- soil and pasture: knowledge and tools to sustainably grow a greater quantity of consistently higher quality herbage for consumption by grazing cows;
- cow: achieving a greater volume of constantly higher quality milk through scientifically supported optimised management and breeding strategies; and,
- food: developing higher-value-added dairy products for human consumption, optimised for the predicted milk supply and quality based on predicted grass growth profiles and cow performance from earlier thematic areas.

In addressing these areas, the centre will combine biological sciences with cutting-edge ICT areas:

- sensors: the development of robust, highly sensitive sensor infrastructure based on nano-electrochemical, spectroscopic and/or mechanical sensors integrated with control electronics, firmware, edge computing data analytics and data communications;

- communications and networks: the development of efficient and reliable end-to-end communication protocols for transporting information from various sensors all the way to the fog and cloud computing infrastructure;
- data and data analytics: the development and application of machine learning and statistical modelling techniques, across the dairy supply chain, to predict optimal outcomes for pasture, for cows, and eventually for food production; and,
- decision support: developing and deploying modular-based decision-support resources informed by the multi-level data and associated analytics for use by producers in the pursuit of consistently better performance.

One-stop shop

The research programme will develop new technologies, and advance existing electronic monitoring and actuation technologies, to transform an already world-class dairy sector into a global leader in sustainable agri-tech, specifically addressing 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 datasets delivered by advanced network and communication technologies. As well as generating novel knowledge-based products, the VistaMilk SFI Research Centre will be a one-stop shop for agri-tech companies in dairying, providing research services, evaluation and integration of technologies in dairy production. The novel combination of the expertise and critical mass in the VistaMilk SFI Research Centre will also enhance Ireland's international reputation as a leader in agri-tech, facilitating new international partnerships as well as attracting new foreign direct investment.

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