

Moorepark News

Research, technology and innovation for the dairy industry

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Viewpoint

Irish Dairy Board and Teagasc – Collaboration baring fruit



Paul and Diarmuid in the Cheese Pilot Plant in MTL

The Dairy Innovation Centre, the result of a public private partnership between Irish Dairy Board and Teagasc that focuses on a collaborative development programme is producing significant results. Launched in 2011 and staffed by 5 full time technologists it draws on the research capability of the Teagasc Food Research Centre at Moorepark which provides key scientific and technological advances in the areas of dairy chemistry and technology through its dedicated research staff and research programmes. This is combined with the IDB's ability to identify market opportunities, to harness consumer insights to drive innovation, and the IDB's considerable market and distribution infrastructure and global reach. The ambition of the collaboration, which is managed by Dr. Diarmuid Sheehan (Teagasc) and Karen Johnson (IDB), has been to develop a pipeline of new innovative products to meet specific consumer and customer needs in key global markets for the IDB.

The first significant commercial output of the collaboration is the application of a technology, that allows an innovative milk protein ingredient to be recombined in-market, to produce fresh cheese types common to markets within the Middle East. It is based on a patented process technology developed by Dr Tim Guinee in conjunction with Dr. Ivo Piska at Teagasc, Moorepark emanating from research supported through Enterprise Ireland's Commercialisation Fund programme. Recently, the IDB unveiled a significant investment in processing facilities linked with the production of this cheese in Saudi Arabia's capital, Riyadh.

Further commercial products emanating through the collaborative development pipeline include a continental type cheese targeted for the key German market and due for launch in 2014 as well as cheeses aimed at health conscious consumers and focused on the UK cheese market which is valued at in excess of £2.5 bn. per annum.

Overall, the IDB-Teagasc partnership highlights the significant potential for harnessing scientific research for commercial success. In addition it opens up considerable market opportunities for utilisation of the potential 2.75 billion litre increase in Irish milk production arising from abolition of milk quotas from 2015.

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Animal &
Grassland Research
and Innovation
Programme

Food
Programme



Is there a role for sexed semen?



With the milk quota era ending in 2015, dairy farmers will be able to expand for the first time in a generation. For many years, sexed semen has been capable of increasing

the likelihood of a heifer calf from 50% to 90%. To date, however, the uptake of sexed semen has been low for a number of reasons. First, published data indicates that conception rates with frozen sexed semen are ~75% of conception rates with conventional semen; this reduction in fertility is unacceptable in pasture based systems. Second, the sexed semen available was mostly imported sires, and typically had poor EBI values. Third, sexed semen is at least twice the price of conventional semen.

In spring 2013, a large sexed semen trial involving over 15,000 inseminations on almost 400 dairy farms was carried out in conjunction with ICBF, Dovea Genetics, Munster AI, NCBC and Progressive Genetics, with financial support from meat processors and the Agricultural Trust. The final results will not be available until next spring, but ultrasound scan results from around a quarter of the animals indicate that frozen sexed semen achieved conception rates that were 85 to 87% of those achieved with conventional semen. This is a substantial improvement over previous performance, and makes sexed semen a viable product for use on Irish dairy farms.

Sexed semen has the potential to alter the profile of both the dairy and the beef industries in Ireland. By breeding more heifer calves, dairy farmers can expand more quickly. The flip side of this is that there will also be a reduction in the number of low value male dairy calves. After generating enough pregnancies with sexed semen for replacement heifers, easy-calving short gestation beef AI sires can be used to increase the value of beef output from the dairy herd.

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Stocking rate and animal health and fertility

Good reproductive performance is essential to allow turnout to pasture at the onset of spring grass growth, matching the time of greatest food demand with the greatest food supply. In a post-quota herd expansion scenario, one strategy to increase output while keeping costs low is to increase the stocking rate on the farm. There are inherent risks associated with this, however, as the cows are more nutritionally restricted. This could lead to greater body condition score (BCS) loss, which may be detrimental to cow welfare and fertility. A study was conducted at Curtins farm to examine the effect of stocking rate (high = 3.3 LU/ha; medium = 2.9 LU/ha; low = 2.5 LU/ha) on reproductive performance, sub-clinical endometritis, metabolic status and immune function in lactating dairy cows. There was no major effect of stocking rate on any of these measurements. The results indicate that high stocking rates can achieve acceptable cow health and welfare status, but excellent grassland management and animal husbandry skills are essential.

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Land drainage project on the Heavy Soils Programme

Approximately 30% of milk produced in Ireland originates from farms where the soils can be classified as heavy. Heavy soils add complexities to the production system that are aggravated by inclement weather conditions like those experienced in 2012 and spring 2013. The heavy soils programme was initiated in 2009 to investigate the challenges facing farmers on heavy soils. Farms in Macroom, Kishkeam, Castleisland, Listowel, Athea, Rossmore and Doonbeg were selected, representing a range of challenging soil types. All are participants in the Heavy Soils Programme, and can be followed on: www.teagasc.ie/heavysoils/

Average grass production in 2011 on the seven farms was 11.6 tonnes of grass dry matter per Ha. This was reduced to 7.8 tonnes per Ha in 2012, highlighting the huge effect the wet summer of 2012 had on pasture growth on these farms. Two significant factors were identified as limiting grass production and utilisation on these farms: (1) suboptimal soil fertility (P, K and pH); and (2) poor drainage infrastructure on soil types with inherently poor drainage characteristics.

The continuing downward trend in soil fertility nationally is also evident on the farms in the heavy soils programme, with recent soil analysis indicating suboptimal soil fertility results. The soil results for 2013 (2010 results in brackets) were pH 5.73 (5.54), P 4.16 mg/L (5.54 mg/L) and K 84.04 mg/L (116



mg/L). To establish and maintain good ryegrass swards, soil fertility has to be maintained at optimal levels (pH 6.2; P 5.1 – 8 mg/L; K 101 – 150 mg/L). A programme has been put in place on each farm to increase soil fertility to recommended levels.

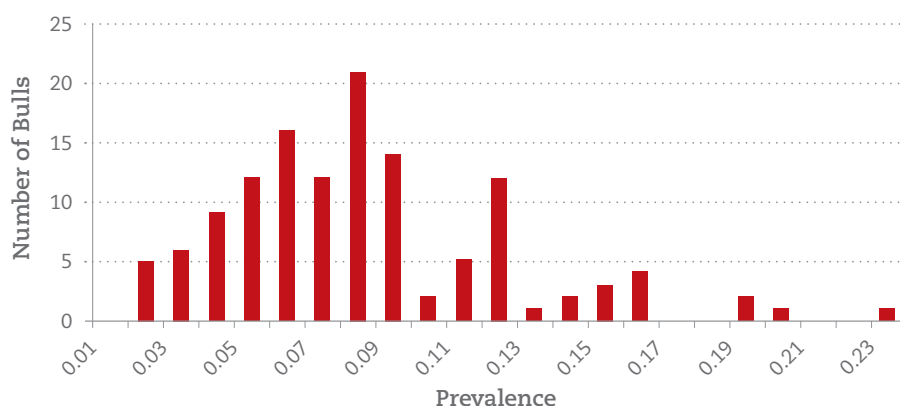
On each of the seven participating farms 2 Ha of land was identified to be drained. Soil type ranged from peat to carboniferous shale to red sandstone till. After site investigation, the most appropriate drainage solution was selected. Deep drains (1.7 m), shallow drains (0.9 m), mole drains and gravel mole drains were installed and ripping was carried out where necessary on the farms during the summer of 2013 when weather conditions were ideal. Measurements of milk and grass production combined with metrological and drainage flow rates are ongoing and will be used to evaluate the effectiveness of the drainage work.

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Genetics and health traits in dairy cattle

The Economic Breeding Index (EBI) was introduced in 2001 to aid identification of genetically elite animals for profitability. To date, one suite of traits largely ignored within the EBI is animal health. Recent research undertaken at Moorepark in collaboration with the ICBF, CEVERA and AHI has clearly shown considerable genetic differences in susceptibility to different diseases. The heritability of susceptibility to TB, Johnes, and IBR in Irish herds is 0.18, 0.10 and 0.34, respectively. The heritability of the existence of persistently infected (PI) BVD calves was 0.10. The Figure below shows the mean prevalence of PI calves per sire restricted to sires that had at least 50 progeny in at least 10 different herds. Up to 26% of the progeny of some sires were PI calves while in the same herds some sires had no PI calves. Research is now underway to evaluate how best to incorporate this health information into the EBI.

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Research Helping to Lower Blood Cholesterol

Blood cholesterol reduction via food, not medicine, is an area of research and commercialisation that has expanded considerably in the last decade. Consumers are aware of the plant stanol esters in a range of products on the supermarket shelves targeting cholesterol lowering. The development of food ingredients for improved heart health and the ability to dramatically lower cholesterol has been the focus of research being performed at the Teagasc Food Research Centre, by Prof. Catherine Stanton and her research team.



The research started out by looking at the proven cholesterol lowering substance beta glucan polysaccharide found in porridge and then searching for a bacterium which produces something with a similar effect. The search ended up with *Lacobacillus mucosae* DPC6426, the polysaccharide it produces is not exactly beta-glucan but it is a very similar soluble fibre.

A study using mice was carried out in order to establish if the soluble fibre would work as a cholesterol lowering agent. Results indicated that there was a 50 per cent reduction in the cholesterol levels of mice that were fed on diet supplemented with *Lacobacillus mucosae*, compared to those mice that were not given it.

The successful cholesterol lowering has led to plans to commercialise this research. Prof. Stanton has received funding from the Enterprise Ireland Commercialisation Fund to help bring a cholesterol reducing product to market.

The product will have to be compared to other competitor products to see how it performs in terms of lowering cholesterol and if it is superior to other products. The final stage will involve carrying out a human intervention study in order to support the data obtained to date. Teagasc have worked in close collaboration on the development of this project with UCC Professor Noel Caplice.

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FHI successfully funded for another 5 years



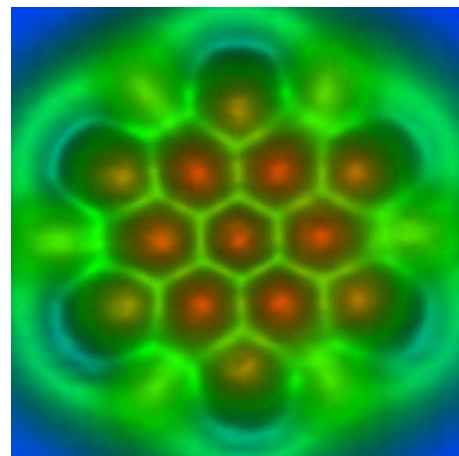
The Teagasc Food Programme is delighted that Food for Health Ireland (FHI) has secured major industrial and Enterprise Ireland funding for the next 5 years. FHI; a consortium involving the leading Irish food research institutions and industry partners Carbery Group, Dairygold Food Ingredients, Glanbia plc, Kerry Group and the Irish Dairy Board, has as its focus the use of milk and dairy foods for the development of nutritional functional ingredients to improve health, wellness and quality of life.

During this new 5 year timeframe the programmed will be matured to deliver

at the commercial level with new products aimed at improvements in areas such as (i) Healthy Ageing and Performance Nutrition, (ii) Glycaemic Management, (iii) Appetite Modulation and (iv) Infant Nutrition and will include a particular focus on determining the health benefits of cheese and the development of technology to facilitate scale up of functional ingredients from milk.

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Innovation for food, feed and pharma



Encapsulation is a technology that protects sensitive bioactive ingredients, organisms or bio-medical compounds during processing, storage and gastric-intestinal transit and delivers these compounds to the target site intact.

Teagasc has invented and patented an innovative method of gel-encapsulation, exploiting natural micro-capsules or beads made of dairy proteins. A proof of concept relating to stable encapsulation of probiotic bacteria within a food matrix was demonstrated in vivo. André Brodkorb is leading this research to further optimise and adapt the technology to meet industry demands. In terms of consumer perception, the advantage of using this method is that micro-capsules are made from dairy ingredients that consumers are familiar with and consider to be natural and healthy.

AnaBio Technology, a start-up company based in Moorepark was recently established by Sinéad Doherty, a former Teagasc Walsh Fellow and one of the co-inventors. The main aim of the company is to provide innovative encapsulation technologies with application for functional food and feed and potentially for pharmaceutical products. She won the 2013 Ignite Graduate Business Innovation Programme's Awards in recognition of her work in this area.

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John Upton

John Upton is a Research Officer with the Livestock Systems Research Department in Moorepark. His research focuses on optimising the use of energy and water in milk production through a combination of on-farm auditing, mathematical modelling and technology development.

John is a graduate of Cork Institute of Technology where he studied Mechanical Engineering, specialising in renewable technology system performance analysis in his final year. After two years with the Glen Dimplex Group in Tralee, he took up his current position at Teagasc in 2008. He has maintained a strong relationship with CIT and collaborates with the Energy Research Group on a number of energy efficiency initiatives. John has also built a strong relationship with the Animal Production Systems Group at Wageningen University, where he is enrolled as a part-time Ph.D. student supervised by Professor Imke de Boer.



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Paddy O'Keefe Innovation Centre



Construction of the Paddy O'Keefe Innovation Centre at Moorepark is underway. It is expected that the building will be completed in September 2014.

Sabbatical for USA Scientist



Professor Matt Lucy from the University of Missouri is undertaking a one year sabbatical at Moorepark. Matt is an internationally recognised expert in dairy cattle reproduction. During his time at Moorepark, he will undertake detailed studies in collaboration with Stephen Butler examining the role of glucose in lactating dairy cows.

Moorepark '13 Open Day



A picture from the Moorepark '13 Open Day 'Harvesting the Potential', which took place on July 3rd. An estimated crowd of 10,000 attended the event.

Visit to India



Pictured at The Model Dairy Plant at NDRI in Karnal, India are Paul Ross, Teagasc on the left and Dr. Amrith Tyagil centre right with Dr. Sumit Arora right.

Recently Paul Ross visited the Indian Dairy Centre which is located north of Delhi. The visit was part of an Irish/India project that Teagasc have with that centre. India has one of the largest Dairy Industries in the world.

Upcoming Events

Milk Quality Conference

December 4th

Teagasc will be holding a Milk Quality Conference on Wed. Dec. 4th in the Horse & Jockey Hotel, Co. Tipperary.

Maintenance and improvement in milk quality will be increasingly challenging in the expanding milk production environment post-quota.

The continued high quality of Irish milk can give Irish dairy products the competitive edge on world markets. The production of such milk and new tools to assist in achievement of premium standards will be discussed at the forthcoming Milk Quality Conference.

The programme includes two renowned international speakers, with sessions on chemical residues, somatic cell count, bacterial counts, milk processing issues and details of the new milk quality assurance scheme.

The conference will provide a unique forum for information and discussion of best practice along the milk production and processing chain. The conference will be of interest to those working in the areas of milk quality control, analysis, management and advisory.

To Register:

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The Teagasc National Dairy Conference 2013

November 12th & 13th

The Teagasc National Dairy Conference 2013 'Strategies for Sustainable Success' will take place on:

- Tuesday November 12th at Limerick Racecourse, Patrickswell, Co. Limerick
- Wednesday November 13th at the Slieve Russell Hotel, Ballyconnell Co. Cavan.

The Conference will outline the key strategic decisions required by farmers in the areas of grassland, breeding and business planning in order to successfully grow their dairy business and to harvest the potential. Pre-booking is essential. For more information see www.teagasc.ie/events

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