

Moorepark News

Research, technology and innovation for the dairy industry

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Viewpoint

Intensive grassland doesn't HAVE to mean poor water quality



Ireland's derogation from the Nitrate Directive – up to 250 kg nitrogen per ha from livestock manure (equivalent to 2.9 livestock units) on farms with at least 80% grassland – was granted provided we did not counteract the water quality objectives of the Directive. Groundwater nitrate-N concentrations in excess of 11.3 mg per litre are potentially harmful to the environment.

A requirement of the derogation was that a study be carried out to provide scientific information on nitrate leaching under an intensive dairy production system in a vulnerable soil type. This research was done at Moorepark's Curtins farm, which is representative of the highest-risk soils to nitrate leaching in Ireland.

Since 2001, 11 borehole wells have been sampled monthly and this data was used to evaluate the influence of local climatic, hydrogeological and agronomic practices on nitrate concentration in groundwater. From 2001 to 2012, best nutrient management practices were introduced: increased early spring slurry use to replace chemical nitrogen, a reduction in chemical nitrogen application, soiled water application moved to a less vulnerable area of the farm, area

allocation for soiled water increased from 10 to 22 ha, and minimum till cultivation reseeding replaced ploughing.

Over the study period, groundwater nitrate concentrations decreased from a peak of 16.0 mg L⁻¹ in 2002 to a low of 7.3 mg L⁻¹ during 2010 and 6.6 mg L⁻¹ in 2011.

This indicates that intensive dairy production systems in conjunction with appropriate nutrient management practices are consistent with high water quality, even on highly vulnerable free-draining soils.

The results also indicate that sensible nutrient management practices can quickly improve groundwater quality and lead to the achievement of the water quality targets set by, the Water Framework Directive.

This study, funded under the National Dairy Levy, is a cross-disciplinary collaboration between Teagasc Moorepark and Johnstown Castle and Karlsruhe Institute of Technology, Germany.

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More cheese please



Food Harvest 2020 predicts a 50% increase in milk production by 2020 above the 2007/2009 base line. While there is some debate as to whether this target will be achieved or indeed surpassed there is little doubt but that Ireland will be producing significantly more milk by 2020.

There is sufficient production capacity available in terms of a suitable land supply and the grass based system of farming in Ireland. Though this leads to a seasonal milk supply with its associated implications, it results in relatively low cost production thus adding to the competitive advantage of the industry at a global level.

A key factor in Ireland's capacity to achieve the Food Harvest 2020 target will be the price paid to the farmer for milk. This will be fundamental to the profitability of the farm enterprise and will be the platform on which investment and expansion decisions will be made. Farmers can only be provided with a competitive and stable price for milk if milk is converted into value added products demanded by the global economy.

In this regard cheese has become a central product for the industry; testament to this is the fact that during the milk quota period the proportion of milk used in cheese manufacture more than doubled to 30% by 2012. Cheese output grew by over 40% during the ten year period to 2012 when 174,000 tonnes were produced and it is predicted that by 2020 that this will increase to 230,000 tonnes.

Maximising the return from cheese will require that new value added products are developed to meet evolving consumer needs in markets across the UK, EU, USA, North Africa and the Middle East. The Teagasc Cheese Research sub-programme is actively involved with industry in this area but continued investment in R&D is required to ensure that the Irish cheese industry fully realises its potential.

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Adding White Clover to pasture will increase performance

White clover can be an important source of nitrogen (N) for grass growth as it fixes atmospheric N. There is renewed interest in clover because of increased cost of nitrogen fertiliser.

A number of experiments at Moorepark are examining the role of clover in intensive dairy production systems. A grazed plot experiment has shown that including clover in swards receiving 240 kg N/ha/year will, on average, result in an additional 1t DM/ha compared to a grass-only sward at the same N fertiliser level. At a fertiliser N input of 180 kg N/ha/year, the benefit of including clover was 1.8t DM/ha higher.

A grazing experiment was undertaken in 2012 comparing milk production systems from grass-only and grass-clover swards, both receiving 250 kg N/ha/year. Milk and milk solids (MS) yields were greater on the grass clover (18.6 kg milk/cow/day; 1.53 kg MS/cow/day) than on the grass-only swards (17 kg milk/cow/day; 1.41 kg MS/cow/day). Sward clover content was 22% and the grass clover swards grew 14.7t DM/ha compared to 13.6t DM/ha on the grass-only swards.

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TB testing will interfere with Johne's diagnosis



As part of Food Harvest 2020 roadmap, In 2012 Teagasc set up a pilot Johne's disease (JD) control programme with 20 dairy farmers, entailing regular testing of individual milk/blood samples.

At present, diagnosis relies on testing individual animal blood, milk or faeces for evidence of exposure or for JD itself, with bulk milk analysis proving to be less than optimal. Preliminary results show that testing for bovine TB may interfere with blood and milk analysis, and testing for exposure to JD should be delayed until at least 80 days post-TB test.

On a single farm where monthly blood and milk sampling was, and continues to be, conducted, preliminary results show no

significant differences in the proportion of ELISA positives between blood and milk samples, although milk testing consistently yielded a lower proportion of positive results (approx 9% blood vs 7% milk). On this farm, animals yielding positive milk results have always yielded a positive blood result, though not vice versa.

It is essential that Ireland continues to build JD diagnostic capabilities and a database of 'low-risk' animals. In 2013 AHI will establish a voluntary national programme which will greatly assist this process.

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Selection on EBI will increase milk production

The Economic Breeding Index (EBI) increases milk production (milk solids) in three ways through breeding: 1, increased genetic merit for milk solids; 2, increased herd lactation length, and 3, achieving a greater proportion of mature cows in the herd.

Selection for increased genetic merit in milk solids is clearly reflected in improved milk solids yield on-farm. Genetic merit for milk solids yield is increasing by 1% per year. Median lactation length in Ireland is 279 days. Compared to a 305-day lactation length, this equates to approximately 19 kg of milk solids (here defined as fat plus protein yield) in a cow yielding 441 kg milk solids (~6000 litre cow). A second lactation cow yields ~14% more than a first lactation cow while a third or older parity cow yields ~22% more than a first lactation cow.



A difference in sire genetic merit for survival of 1.2% equates to a sire predicted genetic merit of approximately 50 kg of milk yield. More than three-quarters of bulls on the active bull list will increase both milk protein and fat yield in the average Irish herd. Therefore, even in a non-quota environment, increased profit on-farm will be best achieved through increasing milk solids yield without compromising fertility, longevity and health.

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Food solutions for weight management in humans

By 2015, 1.5 billion consumers worldwide will be overweight or obese. In the next two years, the diet and weight management market is expected to be worth over €13.9 billion.

One of the areas of interest to Moorepark is to develop milk-based ingredients that target satiety. Satiety is the feeling of fullness that prevents further food intake in the period between meals. Our satiety research is part of Food for Health Ireland (FHI). This consortium comprises researchers from Teagasc, UCC, UCD and UL, and industry partners Carbery, Kerrygold, Glanbia and Dairygold. It is supported by Enterprise Ireland. FHI is focused on developing ingredients derived from milk that have positive health benefits. To date, FHI has produced over 1,000 milk protein hydrolysates and bacterial fermentates. These samples are screened by Dr. Linda Giblin's team at Moorepark, for their ability to increase gut satiety signals, using mammalian cell lines.

Once a potential hit has been found, an in-house scale-up team (led by Dr Phil Kelly) focuses on the economic potential of scale-up of that sample. This information can then be transferred to our industry partners. Test foods are fed to pigs and blood samples are taken in order to measure levels of satiety. This work is performed in conjunction with Dr. Peadar Lawlor in the Pig Development Unit.

To date, researchers at Moorepark have identified 15 samples that induce satiety hormones *in vitro*. Out of these 15 samples, two front runners have demonstrated a reduction in food intake in animal models.

Moorepark is striving to identify to our industrial partners, milk ingredients that increase satiety. Ingestion of such foods may reduce portion size and/or meal frequency, leading to a reduction over time in food intake and bodyweight.

Workshop series on basic microbiology



A group at the workshop on aspects of basic microbiology held at Moorepark on February 18th.

safe food, the Food Safety Promotions Board, are supporting a series of basic workshops to create awareness of issues relating to basic microbiology and hygiene among workers in ready-to-eat food businesses. The workshops are being held in areas where there is a concentration of food businesses that will benefit from such an approach.

The principle behind this initiative was that many of the staff at food processing facilities did not have a scientific background. Understanding the basics of microbiology will help them to appreciate why hygiene procedures are necessary, thus making it easier for them to adopt such hygiene procedures.

The workshop covers basic microbiology (Kieran Jordan), tracing contamination using pulsed field gel electrophoresis (Marion Dalmasso) and hygiene practices (Eddie O'Neill). Workshops have been held at Gorey, Co. Wexford, and Moorepark. Further workshops are planned for Skibereen and Ennis.

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China's senior dairy scientist at Moorepark



Professor Guicheng Huo and Dr. Mark Auty

Teagasc Moorepark is pleased to host Professor Guicheng Huo, China's most senior dairy scientist.

Professor Huo is the General Director of the National Key Laboratory of Dairy Science (KLDS) and Professor of the College

of Food Science and Technology, Northeast Agricultural University, Harbin. The KLDS is China's main research centre in dairy.

In 2008, Dr Mark Auty (Food Chemistry & Technology Department, Teagasc) visited China to present food structure research to many of China's top food scientists. Following this visit, Prof Huo chose to spend three months in Moorepark as a visiting scientist.

In January, Professor Huo gave a presentation to Teagasc scientists outlining the challenges and opportunities facing the dairy industry in China. He emphasised the need to design dairy products that appeal to Chinese palates.

During his stay, Professor Huo will be developing future collaborations with key Teagasc research leaders, visiting Irish dairy companies and small farms.

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Paddy O'Keeffe and John Walsh remembered



John Walsh



Paddy O'Keeffe

The passing of our friend Paddy O'Keeffe and former colleague John Walsh was a cause of great sadness to all of us. Both men's careers spanned a period of great change in Irish agriculture, and their contribution was vitally important to the development of the internationally competitive Irish industry that we have today. Having known both over a long period, we are struck by how strikingly similar their personal attributes were. Both were instrumental in setting up the Dairy Levy Trust, based on the view that new technology would deliver better standards of living for farm families. Likewise, both were great advocates of low-cost grass-based systems of milk production. Paddy strongly supported the research programme at Moorepark, constantly encouraging the development of new technology. John, as Head of Moorepark from 1970 to 1986, made a significant contribution to the modernisation of dairy farming. Both continued to visit Moorepark on a regular basis right up to the end, providing mentoring to younger staff. Both will be sadly missed, not only by family and friends but also by the staff at Moorepark. May they rest in peace.

Pat Dillon and Paul Ross



At the signing of the collaboration agreement between Teagasc and Science Foundation Ireland at the Teagasc Research Centre, Moorepark, are Professor Mark Ferguson, Director General, SFI, and Professor Gerry Boyle, Director, Teagasc, with Sean Sherlock, Minister for Research & Innovation, and Simon Coveney, Minister for Agriculture, Food & the Marine. Photo: O'Gorman Photography

Food innovation alliance

Science Foundation Ireland (SFI) and Teagasc have agreed to jointly fund research grants between scientists from the agriculture and food disciplines and scientists from other scientific and engineering disciplines.

Welcoming the move, Minister for Agriculture Simon Coveney said this would strengthen and accelerate research and innovation in Ireland's agri-food sector, which employs in the region of 150,000 people and delivered a record €9 billion in exports in 2012.



Pictured at a Food Innovation Gateways Event at the Teagasc Food Centre, Moorepark are Professor Gerry Boyle, Director, Teagasc, Sean Sherlock, Minister of State at the Department of Enterprise, Jobs & Innovation & Professor Paul Ross, Head of Food Research Teagasc. Photo: O'Gorman Photography

Food Innovation Gateway

Food industry representatives had an opportunity to see the latest developments in food research, at the Teagasc Food Innovation Gateways event, which took place on Wednesday, 12 December. It showcased the technology on offer, emerging technology opportunities, technical services and pilot plant facilities available it provided industry an opportunity to meet the key researchers.



Pictured at the Teagasc Quality Workshop in Moorepark are Ronan Moran, Arrabawn; Dr. Bernadette O'Brien, Teagasc; John Sherlock, Arrabawn & Frank O'Flynn, Dairygold. Photo: O'Gorman Photography

Quality Workshop

A workshop on Milk and Product Quality was held at Teagasc Moorepark on Tuesday, 4th December and was repeated on Thursday 6th in Cavan.

At the workshop, information on milk quality issues was provided to key industry stakeholders. Over 140 delegates attended the workshop over the two days. Ireland is recognised internationally as a producer of high quality milk and dairy products and it is important that this position is maintained.

Upcoming Events

Open Day at Moorepark

A national Open Day will be held at the Teagasc Animal & Grassland Research and Innovation Centre, Moorepark, on Wednesday July 3, 2013. Set against the backdrop of milk quota removal in 2015, volatility in milk price and a positive market outlook for dairy products due to significant growth in world demand, this event is a necessity for all dairy farmers and stakeholders in the Irish dairy industry to attend.

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