



NSW DPI DAIRY| ROBOTIC MILKING SYSTEMS

AW Howard Memorial Trust Travel Report

December 2015

Executive Summary

The AW Howard Memorial Trust Travel Grant was awarded to Dr. Nicolas Lyons (Development Officer Robotic Milking Systems, NSW Department of Primary Industries) with the core purpose of delivering a presentation at the European Federation of Animal Science annual meeting and participating in an AUTOGRASSMILK International Workshop.

Adoption of AMS is much more advanced in Europe than in Australia and the trend towards automation, precision dairy and robotics is increasing steadily. In countries such as The Netherlands approximately 20% of farms are operating with AMS, but approximately 50% of new installations are AMS. It is important that the Australian dairy industry is kept up to date and informed of these advances in order to obtain the right advice and knowledge to support the profitable and sustainable integration of technology.

Pasture-based farming systems, such as those in Ireland and Australia, have proven that it is possible to incorporate AMS into grazing environments. The key challenges are to maximize pasture utilisation while achieving production targets. With the incorporation of this technology, factors such as seasonality of milk production, herd testing and recording and amount of supplements fed are currently being discussed.

It was also widely acknowledged that these technologies generate a huge amount of data, but there is a need to transform these data into useful information to make better informed management decisions that increase productivity or efficiency of milk production.

This report contains a detailed description and analysis of the trip to Europe. Photographs and specific comments on different stages of the whole trip have been shared with the wider community using the [NSW DPI Dairy Facebook page](#).

Ireland

According to the Irish Farmers Association, Ireland has almost 17,000 dairy farmers that have an average of 60 cows each. The main production system is pasture-based with spring calving and they produce 5.4 billion litres of milk per year, mainly for the export market.

As from 2015 the milk quota system that used to impose limits to growth and milk production has been abolished in Ireland. As a consequence of this, many farmers are considering increasing herd size and milk production. However, this year has also seen a drop in milk price (from around 40 cents/litre to around 28 cents/litre), which has probably slowed down or delayed potential investment and growth.

In the last 5 years, there has been impressive growth in the adoption of robotic milking, with an estimate of 150 units operating in Ireland at the moment. On the one hand dairying is currently a more attractive option in comparison to beef or tillage. On the other hand, the constraints on labour (according to the Irish Farm Relief Services the cost to employ a person to milk up to 100 cows is of 42 Euros/milking or 70 Euros/day) and the search for improved lifestyle are also strong drivers behind this trend towards robotic milking. Furthermore, in the last 12 months an on-farm investment grant (TAMS II) was announced by the Minister for Agriculture as part of a suite of rural development measures. This provides a grant of up to 60% of capital investments such as robotic milking systems, available for young farmers within a partnership. This has also proven to be a great incentive to the commissioning of this technology.

Activities undertaken while in Ireland

- Visited four robotic milking farms with two commercial companies to gain a better insight into their experience of incorporating this technology into grazing systems and to understand their expectations into the future.
- Visited two robotic milking farms that are pilot farms within the AUTOGRASSMILK project where we discussed grazing management, energy use and possibilities for growth or expansion.
- Participated in a workshop with researchers involved in the AUTROGRASSMILK project to discuss their work on cow traffic, grazing management, economics and modelling.
- Discussed and provided input into a collaborative project that was submitted to the Teagasc – Moorepark research board for 2016 – 2019 around “Characterization and optimization of automatic milking systems options”.

Learnings and benefits

A key benefit was obtaining a better insight into the incorporation of AMS into grazing systems in Ireland and better understanding of the challenges they face. Most systems are characterised by excellent pasture management, including measuring and back fencing to avoid overgrazing regrowth.

Most farmers have a maximum of two single box robots milking 120-140 cows. They manage their systems with animals having access to two allocations of fresh grass per day (two way grazing), which is different to what happens in Australia where most farmers are managing their systems under three way grazing and some have even started managing four way grazing. The reason behind this might be simplicity on one hand, but also smaller herds and shorter walking distances.

Low levels of concentrate are usually being fed, and mainly through the AMS units, rather than using out-of-parlour feeders.

Discussions were held with Teagasc – Moorepark regarding a project around education & training for robotic milking farmers and service providers. This will form part of conversations that are currently being held with Dairy Australia around this topic.

The importance of having had input into a research project is to increase the possibility for findings to be applicable to grazing systems in Australia.

Poland

Activities undertaken while in Poland

Dr Lyons attended the 66th annual meeting of the European Federation of Animal Science in Warsaw, Poland. Every year, the EAAP organises an international meeting that attracts around 1,000 people from all over the world. The aim is to ‘promote the improvement of animal agriculture through the application of science’.

Dr Lyons was an invited keynote speaker within the session ‘All aspects of automatic milking including combination with grazing (in cooperation with EU project Autograssmilk)’. The title of the presentation was ‘Pasture-based automatic milking systems in Australia’ and the abstract has been attached in the Appendix located at the end of this report.

The presentation was attended by around 50 people interested in the learnings and experience of AMS in Australia. The questions asked were around expanding the type of work we currently did with AMS farmers and how the findings were shared with the rest of the dairy industry.

As part of the conference Dr Lyons attended different presentations related to precision dairy, smart farming, animal monitoring, genetics and breeding cows for AMS, environment and feeding in dairy systems.

Learnings and Benefits

The conference provided valuable networking opportunities, with people working with AMS in countries such as Ireland, France, The Netherlands and Denmark that are further advanced than Australia in the adoption of AMS.

Discussions were held with Dr Peter Lovendahl from Aarhus University in Denmark about herd testing protocols for AMS. These discussions identified some labs and research centres that will be contacted early in 2016 to help identify the best protocol for herd testing and recording for Australia.

Opportunities were identified to engage research or student exchange programs with a university in France working on the incorporation of a mobile AMS in a grazing system.

Dr Lyons attended a meeting coordinated by the Animal Task Force (ATF) to discuss 'How to implement precision livestock farming?' This meeting was attended by around 100 people mainly from European countries and discussed opportunities and challenges in the precision farming area. Participants were offered the possibility to act as contributors to the ATF scoping paper on Precision Livestock Farming. This is currently taking place and results of this online discussion will be presented during the next ATF General Meeting and Seminar to be held in mid-November 2015.

Germany

Germany has around 4.2 million dairy cows in 52,000 dairy farms, ranging from small family farms to large corporations or private farms.

Germany has seen an increase in the number of robotic farm installations in the last year. The main reasons behind this trend are similar to what is observed in other countries: family farms struggle with the lifestyle associated with dairy farming and with attracting younger generations into dairy; larger farms see in AMS a possibility to reduce labour costs ('reduce the human factor') and increase milking frequency and daily milk yield.

Activities undertaken while in Germany

Dr Lyons was invited by GEA Farm Technologies' to inspect their new robotic rotary, the Dairy Pro Q. By developing this rotary, GEA Farm Technologies now has a full range of concepts suitable to different farm sizes and operations: Monobox, MiOne and Dairy Pro Q.

The Dairy Pro Q is a new robotic rotary concept that has one robotic arm per stall. It has the ability to feed animals during milking and divert milk from individual cows. Although it might be available for voluntary cow traffic, at this stage it is envisaged as a technology more suited to batch milking, requiring one operator to supervise the process. All of the current installations include a new concrete platform. One of the great advantages of this new system is that they contain an exchangeable service module and each stall is bolted in a 'plug and play' mode to the platform.

The rotary will be offered in sizes of 28 to 80 stalls, which will be able to milk between 150 and 450 cows per hour. Currently, four of these rotaries have been installed in Germany ranging from 28 to 50 stalls. The first farm we visited was an indoor system milking 350 cows on a 40-stall robotic rotary. The farm operated in a batch mode, with three milking sessions per day and each milking taking under two hours. We also had the opportunity to visit another farm with a 28-stall platform being installed.

This new type of rotary has only been installed in a small number of farms in Germany and, now that the concept has been proved, commercial release will probably take place in countries such as Canada, US, UK, Australia and The Netherlands during 2016.

Learnings and benefits

It is probable that large farms in Australia will look at this technology as an attractive tool to batch milk their herd whilst managing the whole milking process and capturing a lot of data and information to better inform management decisions.

Insights gained in Germany into the installation and operation of this system will be valuable in assisting Australian dairy farmers who are considering this or similar technology.

The Netherlands

Activities while in The Netherlands

Dr Lyons attended the two-day 'Cows in the cloud, down to earth' symposium organised by Lely International. This event was attended by more than 100 farm advisors, feed advisors, veterinarians and farmers involved in AMS in different countries around the world.

Speakers from different disciplines discussed the latest research and advice in order to optimise productivity and profitability of robotic milking systems.

A short [video](#) was prepared by Lely International to highlight the main parts of the symposium.

Overall benefits of the travel

- Represented the Australian dairy industry within the European domain.
- Fine-tuned and modified NSW DPI's communication initiative around AMS and precision technology, based on ideas that were captured during this trip (webinars, online conversations, working with farmers).
- Identified the need for a training and education program around robotic milking. Engaged Teagasc-Moorepark (Ireland) in conversations that are currently being held with Dairy Australia around this topic. It is expected that an initial meeting and draft plan for a training and education program should be available before the end of the year.
- Identified protocols for herd testing and data recording that are currently being used in France and Denmark, to be passed on to the Australian Dairy Herd Improvement Scheme (ADHIS) given that the need to capture this information and use it to guide breeding selection decisions has been identified.
- New and different management practices relating to grazing systems, animal management and system performance were captured and will form part of the body of knowledge to be disseminated within the Australian industry.
- There is a need to explore different opportunities to maximize robot utilization (increase milk harvested per AMS unit above current results). Input was provided into a project submitted by Teagasc – Moorepark (Ireland) to the 'Teagasc Research Project and Walsh Fellowship Board'. Although the research will be conducted in Ireland, the value of having input into this project is avoiding duplication of work previously done, as well as allowing the possibility for findings to be applicable to grazing systems in Australia.
- The idea of bringing 'super users' together to discuss ways of pushing the boundaries was identified and will be explored in the Australian context.
- Achieved international recognition of expertise and the Australian experience of AMS.
- Publication of work in conference proceeding.
- Networking opportunities and learning about precision dairy farming and robotic milking systems from the wider dairy community are a key part of Dr Lyons' role.

Appendix

Abstract of presentation delivered at the EAAP Conference

Pasture-based automatic milking systems in Australia

Automatic milking systems (AMS) arrived in a pasture-based system in Australia in 2001. Currently there are 32 farms operating AMS, and at least another 6 being installed. They milk over 8,000 cows producing almost 45 million litres of milk per year. The average AMS farm has 250 cows milked with 4 robots. The dairy industry should expect these numbers to increase exponentially from now onwards.

Every dairy region in Australia has farmers that have decided to commission AMS. These installations are from every commercially available type (single box robots, multi box robots and robotic rotary) and operate in an array of farming system types (although over 80% of them operate under grazing with variable levels of supplementation).

The experience of the existing commercial operations, together with almost 10 continuous years of research conducted at FutureDairy, has proven that the technology and existing farm management knowledge of AMS can be implemented successfully in Australian dairy farming pasture-based systems.

Cows in pasture-based AMS have lower milking frequencies, compared to indoor AMS. Although AMS farmers can achieve similar pasture utilisation than those milking conventionally, pasture management does have an impact on cow traffic. Lower milking frequencies are associated with lower pre-grazing pasture biomass and increasing proportion of pasture in the diet, distance to pasture and pasture allowance. Management practices such as feeding during milking, offering 3 pasture allocations every 24 hours (instead of 2) and offering access to supplement after milking all increase milking frequency.

Currently research is focused on the adoption of AMS on herds with over 600 milking cows. Efforts are also concentrated on understanding the impact of AMS on animal behaviour and wellbeing, as well as improving efficiency of individual cows and whole system performance. Work is being conducted to categorise and quantify the costs involved in running and maintaining an AMS as well as a whole financial performance analysis.

More information

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