



THE UNIVERSITY OF
SYDNEY

Dairy Research Foundation

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Directors Report



Welcome to the last edition of the DRF Newsletter for 2016!

It is hard to believe that another year has gone

already! A very tough year for many dairy farmers particularly in the southern regions but the resilience of the Australian dairy farmers is truly unparalleled..! Things start to look

brighter in the horizon and we hope for a really good 2017 for dairying..!

A lot has happened in our Dairy Science group this year. After running a very successful DRF symposium for farmers at CSU, Wagga Wagga, we also hosted the 2016 Australasian Dairy Science Symposium in Sydney last November with great success..!

Read more about this, our students and research and what is coming up and as always, make sure to send us any feedback, the only way we can get better..!

Merry Christmas and Happy 2017 for All ..!

Regards, Yani

2016 has been an uncertain and difficult year for the dairy industry.

Pricing and market signals have left a lot to be desired and put further pressure on dairy farmers.

This has meant a decline in Australia's milk production due to farmers making the decision to leave the industry or cut herds etc. A consequence of this will be the extra pressure put on the RD & E budget.

I am hoping the temptation to cut research at the expense of more short term measures will be resisted.

From the President



Looking forward to a brighter 2017 for dairy! Merry Christmas...

Bill



Australasian Dairy Science Symposium - ADSS 2016

16th - 18th November 2016

University of Sydney, Camperdown

The Australasian Dairy Science Symposium took place on 14 – 16 November 2016 at the Veterinary Science Conference Centre within the remarkable University of Sydney grounds and was a resounding success. We would like to extend a huge thank you to those who attended for their commitment and support in attending what is one of the biggest event of the year in our calendar.

With over 120 people attending this predominantly science based event, we had seven renowned invited speakers and six key sponsors

including Dairy Australia, Dairy NZ, AB VISTA, Tasmanian Institute of Agriculture, University of Melbourne and the University of Sydney Dairy Research Foundation, the Symposium drew an impressive calibre of attendees both nationally and internationally who were able to take away some key messages from the presentations that took place.

It was 2.5 days of lectures and presentations that covered a myriad of topics that are very important and relevant to the current Dairy Industry.





Such topics included, Welfare, Intensification/value adding, cows, plants and interactions, Labour management and farm economics, Feed production and feeding systems, Soils, nutrients and environment, Physiology, genetics, nutrition, reproduction and health and technology and data.

This Symposium had a unique feature this year of showcasing presentations within the lunch break on two days. This gave the opportunity for further learnings and interaction amongst the delegates

and definitely stimulated further talking points.

A huge thank you goes to the University of Sydney's Dairy Science team for the time and commitment required to ensure this Symposium achieved the success that it did.

It is also exciting to announce that Professor Danny Donaghy will be the proceeding Chair when the Symposium takes place in 2018 in Palmerston North, New Zealand.



ADSS Keynote Presentations

Public concerns about dairy welfare - how should the industry respond?

Prof. Daniel Weary
University of British
Columbia, Canada

Grazing management: setting the table, designing the menus and influencing the diner

Dr Pablo Gregorini
DairyNZ, New Zealand

Past, present and future of pasture-based dairy systems

Mr Pieter Raedts
TIA/UTA, Tasmania,
Australia

Feed production and feeding systems

Dr Bill Wales
DEJTR, Ellinbank Vic,
Australia

Balancing water quality threats from nutrients and production in Australia and New Zealand dairy farms under low profit margins

Dr Richard McDowell
AgRes, New Zealand

Lactational challenges in transition dairy cows

Prof. Rupert Bruckmaier
University of Bern,
Switzerland

Recent advances in starch digestion and metabolism in grazing cattle

Dr Chris Reynolds
Centre for Dairy Research
(CEDAR), University of
Reading, UK

Keynote speaker papers will be published in a special ADSS 2016 edition of Animal Production Science. Copies of their presentations are available on the ADSS website - [Click Here](#)



We are delighted to announce:

The Dairy Research Foundation's 2017 Symposium

July 25th -27th

Port Macquarie NSW

MILC -

More Income Led by Cows

Last year we took advantage of looking into other industries to hunt efficiency, this year it's all about **MILC** that is, **M**ore **I**ncome **L**ed by **C**ows.

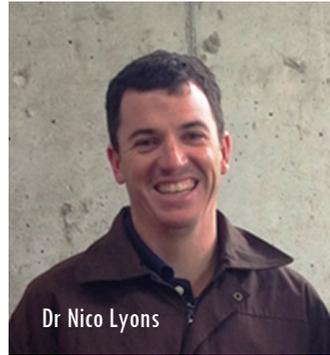
Our delegates the have the opportunity to take a step back and really look at the profitability of our farming operations and how we can improve financial stability through focusing on the cows.

We all know that our farming systems are more than just a herd and that to allow our cows to perform at their best we need to consider everything from feed to family.

Look forward to further information in the coming months.

AMS KPI Project

At the recent ADSS 2016 conference held at the University of Sydney, Associate Professor Kendra Kerrisk delivered an oral presentation on the initial findings from the [2015-16 Australian AMS KPI Project](#).



This project was coordinated by Dr Nicolas Lyons (above right) of NSW DPI and data captured will provide the industry with adequate and contextual information enabling farmers and service providers to make informed decisions. A second paper is soon to be published that will analyse other KPIs at cow level (such as milking frequency, yield, duration, flow, etc.) to better understand how variables interact with each other.

This project design would not be possible without participating farmers who were willing to share their time and assistance during the data collection period.

The [International AMS KPI Project](#) is now up and running as well. This program of work is monitoring 19 AMS farms in different countries (such as Australia, New Zealand, Ireland and Chile).

Financial and physical information is now also being collected from several Australian AMS farms in order to measure and compare farm business performance as well as help build up a better understanding of the profitability of this new way of farming.

The following page contains the abstract of the first paper to come from the Australian project. The full paper will be published soon in Animal Production Science's special edition for ADSS 2016.

On a different note, Nicolas has recently been given honorary affiliation with the School of Life and Environmental Sciences, the Faculty of Veterinary Science, at the University of Sydney. He will now be known by the title of Adjunct Senior Lecturer for the purpose of teaching.

Congratulations' Nico!

Current and potential system performance on commercial automatic milking farms

By Dr Nicolas Lyons

Dairy farmers considering installing automatic milking systems (AMS) would benefit from adequate contextual information on commercial AMS farm performance.

The aim of this study was to capture key performance indicators (KPIs) related to AMS utilisation on commercial Australian AMS farms on a monthly basis with the aim of understanding current and potential system performance.

Eight Australian AMS farms were monitored on a monthly basis for a 12 month period.

The average number of milking events (milking/robot.hour) was calculated for every hour of the day, on a monthly basis for each of the participating farms. Data exported electronically also allowed the calculation of the number of current and potential extra, both average and maximum; milking (milking/robot.day), cows (cows/robot), yield (kg milk/robot.day)



and milking time (hours/robot.day) for every month on each farm.

Despite a wide range in farm performance, the actual milkings (120 milkings/robot.day), cows (51 cows/robot), yield (1,263 kg milk/robot.day) and milking time (13.63 hours/robot.day) indicated that there is an opportunity to improve these parameters by a maximum of around 60%.

To achieve this would require the adoption of a variety of strategies that might be quite farm specific and would be reliant on optimisation of data relating to cow traffic and system utilisation that is relevant to pasture-based farming systems.

The full paper will be published soon in Animal Production Science's special edition for ADSS 2016.

The Dairy Science Team welcomes new Research Fellow to Camden

Dr Sabrina Lomax

I've recently joined the Dairy Research Group, moving from the Farm Animal and Veterinary Public Health Group with the Faculty of Veterinary Science at USYD – where my research focused on improving the welfare of extensively farmed livestock.

My new role as a research fellow with Dairy Research will be focusing on a Rural R&D for Profit project “Enhancing the profitability and productivity of livestock farming through virtual herding technology”.

The project is a collaboration between Dairy Australia, CSIRO, The University of Sydney, Tasmanian Institute of Agriculture, The University of New England and The University of Melbourne, and aims to evaluate the on-farm application of virtual fencing (VF) technology, demonstrate its implementation, and quantify and extend its benefits across the major livestock industries in Australia. The VF project will be bringing in a PhD student to the group in early 2017.



Since my commencement in December I have hit the ground running and am looking forward to building my research profile with some new and exciting projects over the next year.

Virtual Herding

Read more about the reality of virtual herding, what it means and what research is planned over the next 2 pages.

Evaluation of Enhancing the profitability and productivity of livestock farming through virtual herding technology

Why is this project being undertaken?

About 10 years ago, CSIRO started to examine the potential of virtual herding (VH) for the beef cattle industry. Using a GPS system to define fence boundaries and a specially designed collar that alerts the animal to the fact that it has reached the “fence”, a prototype of the system was successfully demonstrated with beef cattle.

This work has provided useful information on the response of animals to protocols of various cues and controls, and prompted an Australian company Agersens Pty Ltd (<http://agersens.com/>) to obtain the rights to the VH technology that CSIRO developed to the pilot stage. The studies in this project will evaluate the application of the

technology in various key applications across different production systems, and will examine the responses of different livestock (dairy cattle, beef cattle, sheep) to various cues and stimuli to improve productivity and profitability in the livestock industries.

Who are the main partners?

The project has been funded by the Department of Agriculture and Water Resources, through their Rural R&D for Profit program. The project is a partnership between CSIRO, University of Sydney, University of New England, Tasmanian Institute of Agriculture and The University of Melbourne and involves the dairy, beef, wool and pork industries and their respective RDC's; Dairy Australia, Meat and Livestock Australia, Australian Wool Innovation and Australian Pork Limited.

What will the project achieve?

By 2020 the proposed project will deliver significant (10 to 20%) productivity and profitability improvements for livestock enterprises through evaluation, demonstration and participatory adoption of VH technology.



Overall, this project will ensure more efficient use of pasture, protect environmentally sensitive areas, improve the performance of livestock by better matching their nutritional requirements to feed availability, and reduce labour to enable significant productivity and profitability gains for Australian farmers.

How is the research being done?

The VH technology will be assessed across livestock sectors, regions and livestock farming systems. The project will:

- i) Develop and optimise VH and animal response;
- ii) Evaluate VH to better match grazing livestock nutritional demand with pasture availability,
- iii) Apply VH with the aim of significantly reducing or eliminating farm labour requirements for tasks associated with livestock movement.
- iv) Quantify the animal productivity gains possible by adopting VH allowing for either individual or sub-herd animal level management control as opposed to whole-herd management.

v) Achieve improved environmental outcomes by restricting livestock from environmentally sensitive areas;

vi) Quantify the benefits and costs, skills development and management changes required to integrate VH into livestock production systems across Australia.

vii) Establish an effective extension pathway between research and on-farm application of VH technology.

In all these studies it will be critical to monitor the welfare of animals through behavioural observations and physiological measurements to, not only ensure that the technology does not adversely affect the welfare of animals, but may actually deliver welfare benefits.

This project will also develop an understanding of the learning, management and ethical challenges faced by farmers that may implement VH on their farms.



Post Graduate Updates

Momena Khatun

I am now a 2nd year PhD student.

Last year there was lots of LEARNING and FUN! As a 2nd year PhD I have presented my research findings in front of a scientific community in an informal way.

It is a great challenge to present research and research findings in such a short time! I also had other unique experiences of presenting research, research findings and further research plans within 3 min (mini-oral presentation) in scientific way in front of national and international scientists. I had this experience by attending the international Australian Dairy Science Symposium. It also provided me the opportunity to meet renowned scientists from USA (Columbia, Uruguay), Europe (Switzerland, UK), New Zealand's and different parts of Australia and get to know their research activities.

I am also going to present my research findings in the upcoming



Momena Khatun with fellow students Ali Green and Ashleigh Wildridge (L-R)

[Australian Dairy Conference](#), the largest dairy event of Australia, in February 2017. As a part of my scientific research progress I have submitted my first paper entitled “Early detection of clinical mastitis from electrical conductivity data in an automatic milking system” to Animal Production Science journal (under review). In this article I have explored the potential of electrical conductivity to diagnose mastitis in automatic milking systems.

I am currently preparing another paper for the Journal of Dairy Science. In this analysis I will be presenting the role of different AMS data including electrical conductivity and milk yield related information.

I am also in progress to start my field study regarding investigation of different immune profiles due to mastitis under the supervision of [Professor Sergio \(Yani\) Garcia](#) from University of Sydney, Australia in collaboration with [Professor Rupert Bruckmaier](#) from the University of

Bern, Switzerland.

My research planning also includes investigation of some behavioural activity change due to mastitis by using activity sensor (SCR HR-LDn activity sensor). To follow my findings please keep an eye on the upcoming newsletters.

Juan Molfino



It's hard to believe that we are already in December! The last couple of months were very intense, and very productive.

In October I ran a field trial in Corstorphine Dairy Farm, with the aim of characterize the behaviour and performance of 2 different groups (Efficient, Inefficient) of cows in pasture-based automatic milking systems.

We know that in each herd there are cows with different level of efficiency, if we can explain how?

and why? these cows are performing different, we can then propose guidelines to increase efficiency and productivity.

Cows were fitted Gps and activity and rumination monitors, and were monitored for 10 days. I'm now analysing all the data and I'm very excited about getting some results!

I also hosted a group of Consultants from Conaprole, the largest dairy cooperative in Uruguay. They visited Australia with the aim of getting information about pastures, automation, effluent management and energy efficiency in the dairy.

The group were interest in the research we are conducting here, we visited the Automatic milking rotary in Corstorphine, and we ended the day visiting Leppington Pastoral Company, special thanks to Michael Perich for receiving us.

On the 9th and 10th of November I attended the 2016 Faculty of Veterinary Science Post Graduate Conference that was held in Camperdown Campus. This was a great conference, where we were able to see what all veterinary students at our University are researching. An excellent couple of days, with great presentations.

I presented the study we conducted last year "Evaluation of an activity and rumination monitor in dairy cattle grazing two types of forages.", that was already submitted for publication. Special thanks to Marie Wildridge for organizing it! Last but not least, I also attended the 2016 Australasian Dairy Science

Symposium that was held on main campus from 16th to 18th November. I presented in one of the mini oral sessions and also had the privilege of chairing one of these sessions. Wide range of interesting topics and excellent international speakers.

This was a great opportunity for networking and also see some kiwi friends.

Congratulations Yani, Kendra and all the team on organizing such a great event!

I would like to wish everybody a Merry Christmas and a Happy New year!



Poster presentation at the Post Grad Conference held in November

Alexandra Green

In August I had the privilege of travelling to the beautiful and lush Bega to attend the Future Ready Dairy Farms Expo with two other emerging scientists. The trip provided a great opportunity to network with fellow scientists, dairy farmers and business owners and meant that we could showcase our work to a wider community.

We were even interviewed by the ABC and another local radio station!

I have been further improving my public speaking skills through participating in the university's three minute thesis challenge and presenting at the annual post-graduate conference, both of which were great ways to concisely share my research aims.

Most recently the dairy science group attended the Australasian Dairy Science Symposium held at the University of Sydney, Camperdown. This was one of the highlights of my PhD so far as I was able to meet some of the top cow behaviour experts in the dairy field. They were all very helpful and provided me with ideas on how to better my research.

Since the last newsletter I have also been busy planning three



Ali introduces a calf to some of her recording equipment

experiments which I am hoping to complete when the weather cools down. I will record the vocalisations of dairy heifers exposed to feed manipulation, social isolation and calf separation.

I will then cross compare the features of these vocalisations and determine whether meaningful information is encoded within them. I will confirm my findings by comparing the vocalisations to data on heart rate and activity.

So far I have received my sound equipment and have begun testing it out in the paddocks. It has been very entertaining chasing cows around with a microphone! I have also learnt how to use the computer program 'Praat' which will assist with the analysis of the vocalisations. I am hoping to take this further and learn how to write code in this program which will speed up my analysis.

Hopefully by the next newsletter some preliminary results will be available!

Alex John

I have been doing a number of trials at the University of Sydney Mayfarm property recently.

I have a number of pens constructed (pictured below) that allow me to individually house and feed cows.

This allows us to collect some excellent data around the feeding behaviour of cows at an individual animal level.



The aim of my trials was to investigate ways to manipulate cow feeding patterns. If successful, we can then apply these ideas to pasture-based AMS to see if we can improve robot utilisation at night.

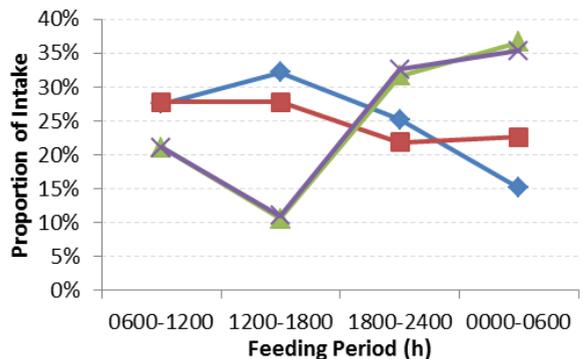
The aim of the first experiment was to determine the Protein : Carbohydrate intake target of cattle



applying the geometric framework for nutrition. The geometric framework has been applied to a variety of animals, from the common house fly, through to moose and humans.

In all cases a clear preference for a particular protein: carbohydrate ratio has been shown. Preliminary data from our experiment showed that cows preferred the high carbohydrate feed over the high protein feed in a 2:1 ratio.

In the second experiment we investigated ways to manipulate cow feeding behaviour throughout 24 hours. We split the day into four equal periods and manipulated the type and/or amount of feed offered in each of the four 6 h periods.



In one treatment we offered the previously mentioned high carbohydrate feed, as a “preferred” feed type, during the period from midnight to 0600 h. We found by offering a preferred feed (red line) under ad-lib conditions during this period of the night we were able to increase proportion of feed intake by an additional 50% compared to if cows received the lucerne feed in all four feeding periods (blue line).

In the second treatment we varied the quantity of feed offered to the cows, feeding them opposite to their natural feeding behaviour (i.e. less during the day and more during the night).

We called this treatment “variable allocation”, and found that we were able to increase feed intake in the early morning period (midnight to 0600 h) by nearly 2.5x (green line). However, when we incorporated both

“preferred” and “variable allocation” into a single treatment (purple line), there was no further increase in feed intake during the early morning period. I’d also like to say a big thankyou to Laurie Sampson (pictured below) who, as part of her student exchange here in Camden, did a huge amount of work with me on my trials.

I am now testing variable allocation as a method of pasture allocation in a pasture-based AMS farm.

This experiment is taking place at the University of Melbourne’s Dookie Research Farm.

Here we are comparing the effect of offering consistent proportions of pasture across the three daily pasture allocations against our variable allocation concept, where we are offering the largest proportion of pasture during the night and the smallest proportion of pasture during the day.



Meaghan Douglas

The last few months have been a couple of busy ones on the research front!

I recently attended the Australasian Dairy Science Symposium (ADSS) in Sydney, and presented a 3-min mini-oral of work from my first nylon bag experiment that I conducted earlier this year, titled 'Ruminal degradation of nutrients in perennial ryegrass'.

My focus was on discussing the amount of rumen-degradable and rumen-bypass protein from three early spring cultivars of perennial ryegrass, discussing the differences we found between cultivars within both northern and south-west Victoria. It was a great experience, but not as



easy as it sounds to tell your story in only three minutes!

I was also fortunate enough to be

given the opportunity to chair one of the mini-oral sessions on the next day, with the help of assistant-chair John Roche from DairyNZ – that was another great experience.

Back at Ellinbank, we have just finished a grazing experiment that utilises data from my perennial ryegrass samples harvested in late spring last year.



Cows grazing in their paddock following milking. Each treatment consisted of three reps of 8 cows, all of which grazed in separate strips within a paddock.

To formulate these grain mixes I used the nutrition model CPM-Dairy, and used the inputs of the feeds (both pasture and supplement) to determine what the best supplementary ration would be during early spring to complement the nutrients that the cows were getting from the pasture.

The grain mixes were weighed out for each individual cow each day (and each milking!) of the experiment, and hand-fed in the dairy. By the end of the month-long experiment, we had weighed out just over 5,500 bags of grain for 96 cows!

The next step will be to compare the results from the experiment with those

expected by the model to determine the accuracy of CPM-Dairy to accurately predict animal and nutrient requirements in pasture-based dairying systems. This research has been funded by Dairy Australia.

Over the next few months I'll be busy writing papers, and getting ready for another nylon bag experiment in March 2017, which will test the degradation characteristics of perennial ryegrass sampled in summer from Victoria. After that is another grazing experiment in April, which will follow a similar format as the one that we have just finished.



Ashleigh Wildridge



Well where has time gone, I remember writing my first student update for the newsletter thinking that I have a long way to go, I will be a student forever! But would you know it, I finished all of my trial work and data collection in September and it would seem that I am on the home stretch.

November is a big month for us all, with the last postgraduate conference for the Faculty of Veterinary Science (USYD) followed by the big Australasian Dairy Science Symposium the week after.

For these events I presented the results of my project where I looked at the use of shade in the pre-milking area of a pasture based AMS.

I found some great results from this project showing that our cows at

Corstorphine liked having shade in their pre-milking yard so much that they produced more milk, ate more concentrates and spent a greater proportion of their time ruminating while waiting at the dairy to be milked (than if they had no shade).

The results of this project have now been written up and submitted for review to be published in a special edition of Animal Production Science for ADSS.

The results of this and my previous trial where I used shade along the laneway of a pasture based AMS to encourage voluntary traffic, show that there is promise for pasture based AMS farmers to improve the performance and comfort of their lactating cows during summer through the adjustment of farm infrastructure and management.

Work on my other projects is also steadily progressing with several papers now getting closer to submission for publication with only a few pieces of data are left to analyse.

Although I have a lot of writing ahead of me, it is rewarding to see what I have achieved and learnt through research and all the stories shared with me by the farmers I have visited.



Camden Farms Update

Conditions are heating up again as we move into the summer months.

This sudden surge in temperature has had an affect on milk production but it is expected that this will settle very soon.

It is constantly amazing all of us on the farm how quite the cows have become. This is a good indication that automatic milking is definitely a stress free environment for the girls.

Next year, after spending most of my life with the University of Sydney, I will retire my post of Farms Manager. Camden Farms and the staff and students have been a huge part of my existence and whilst it will be sad to say goodbye, it is time for someone

new to step in to take our AMR farm to the next level!

It is anticipated that a new Farms Manager will be appointed early in the new year to allow a smooth transition.

Regards

Kim McKean



*A happy and safe
Christmas and
New Year to
one and all....*

Recent Publications

Staff and students from the Dairy Science team recently presented at the Australasian Dairy Science Symposium held on the Uni's Camperdown Campus. [Click Here](#) to view the Abstracts document.

Wildridge, A, Garcia, S.C., Thomson, P, Jongman, E, Clark, C.E.F., Kerrisk, K. The impact of a shaded pre-milking yard on a pasture based automatic milking system. Animal Production Science (In Press).

Wildridge, A, Garcia, S.C., Thomson, P, Clark, C.E.F., Jongman, E, Kerrisk, K. (2016) The impact of a partially shaded laneway on voluntary traffic between pasture and an automatic milking system. Proceedings of the Precision Dairy Farming Conference, Leeuwarden, The Netherlands. 163-168

Khatun, M., Clark, C.E.F., Lyons, N.A., Thomson, P., Kerrisk, K.L., García, S.C (2016) Early detection of clinical mastitis from electrical conductivity data in an automatic milking system . Animal Production Science journal (In review).

Lyons, N.A., Kerrisk, K.L. (2016) Current and potential system performance on commercial automatic milking farms. Animal Production Science journal (In Press).

What's planned for 2017

- The Faculty of Veterinary Science will become Sydney School of Veterinary Science, under the Faculty of Science from January 1, 2017.
- Most Dairy Science Staff will become part of School of Life and Environmental Sciences (SOLES) as at January 1, 2017
- Continuing research trials for some of our post graduate students and writing up for others
- DRF Symposium - to be held on July 25th to 27th in Port Macquarie, NSW

