

Pasture-based automatic milking systems in Australia

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EAAP 2015 – Warsaw, Poland



Agenda for today

- Australian dairy industry
- Australian automatic milking systems (AMS)
- Research on milking intervals, incentives, impact and management
- Current & future industry issues around AMS



Australian dairy industry

- 3rd largest rural industry
- 1.69 million dairy cows (76% HF)
- ~6,200 dairy farms
- ~9.500 million litres of milk
- Average farm: 270 cows (5,500 lts/cow)



AMS status in Australia



36 farms up & running
5 farms being installed

AMS status in Australia

Robots



144 robots

Cows



~10,250 cows

Milk



~56 mill litres milk

AMS status in Australia

Indoor systems



11%

Corral based systems



6%

Pasture-based systems



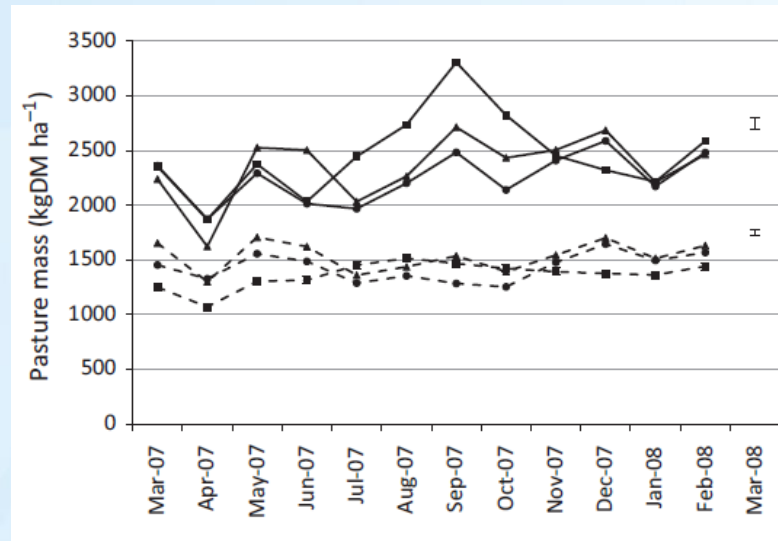
83%

AMS in pasture-based systems



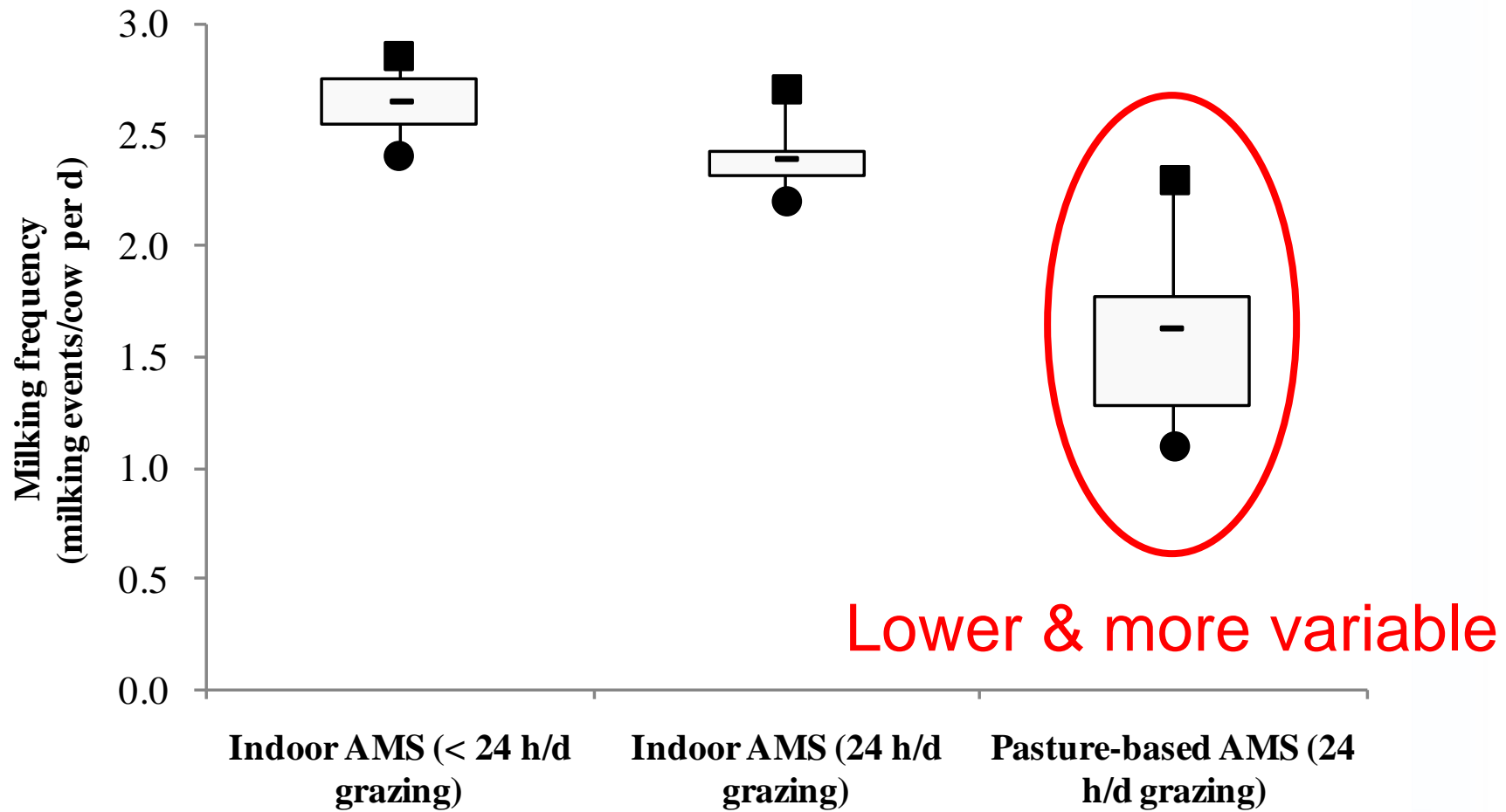
What had already been proven?

AMS could work in pasture-based systems and achieve high levels of pasture utilisation



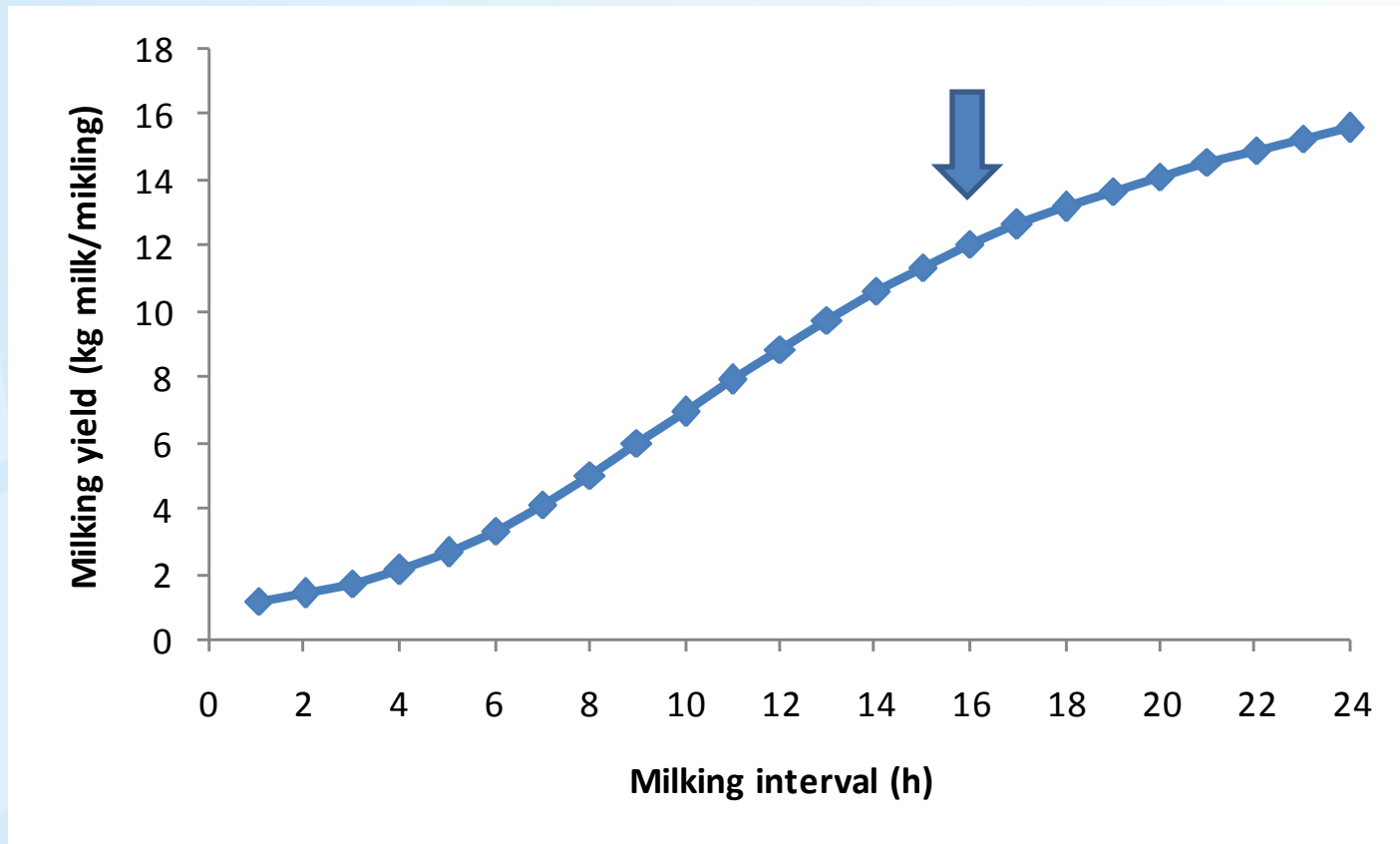
Clark et al. (2015) GFS, doi: 10.1111/gfs.12171.

Grazing and AMS

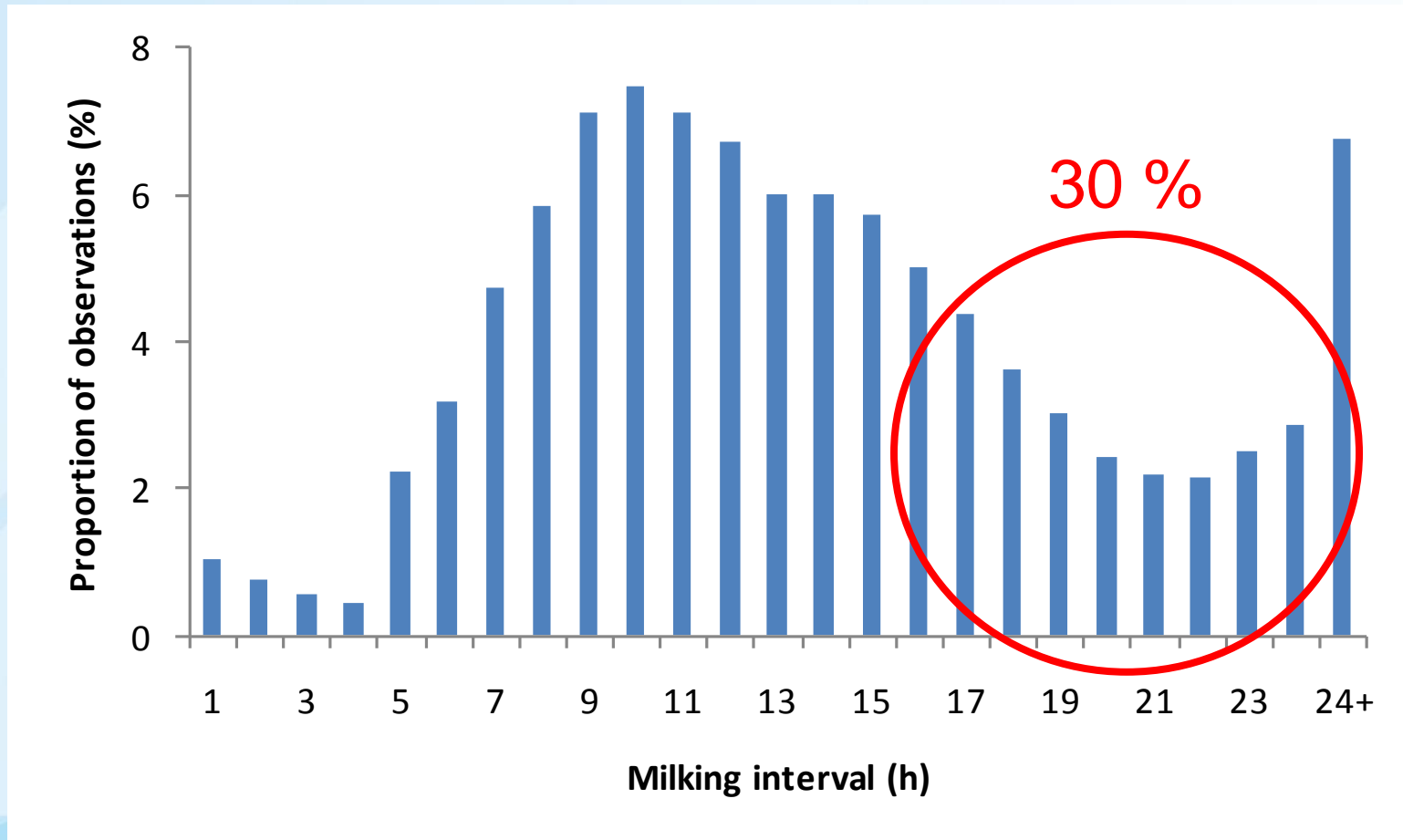


Lower & more variable

Concept of extended milking intervals



Milking intervals in pasture-based AMS



So what next?

How can we..?

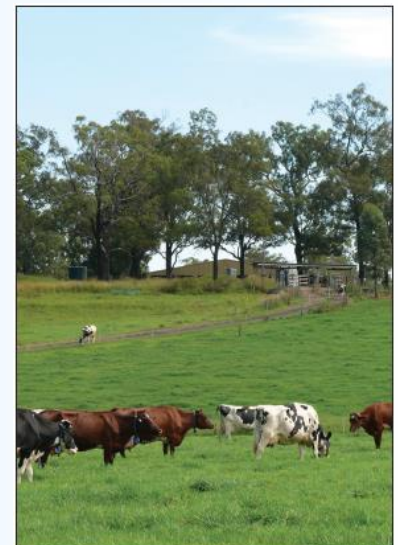
↓milking interval - ↑milking frequency - ↑milk yield



2 vs 3 way grazing trial

Hypothesis

- Frequency – size of allocations
- Smaller allocations
- Depleted quicker
- Cows would traffic out sooner
- Lower milking intervals
- Higher milk yield



2 vs 3 way grazing trial: Design

2WG



9 kg DM/cow
12h grazing

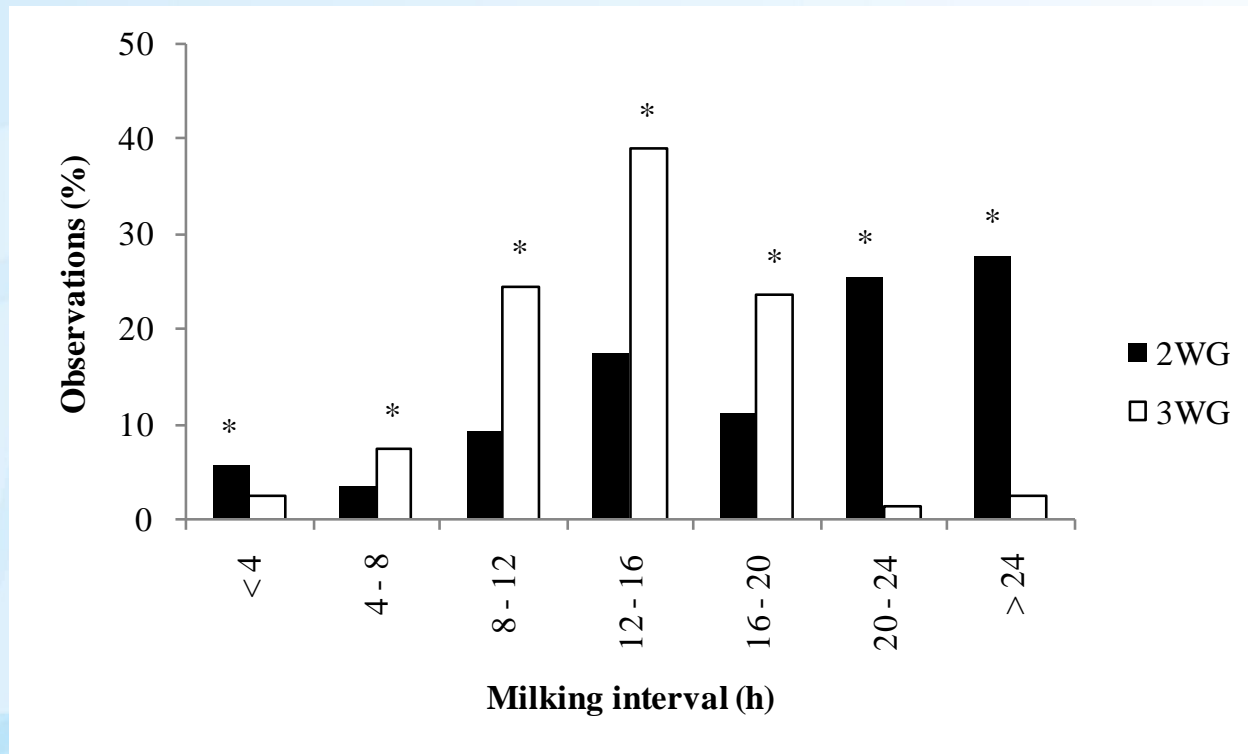
3WG



6 kg DM/cow
8h grazing

2 vs 3 way grazing trial: Results

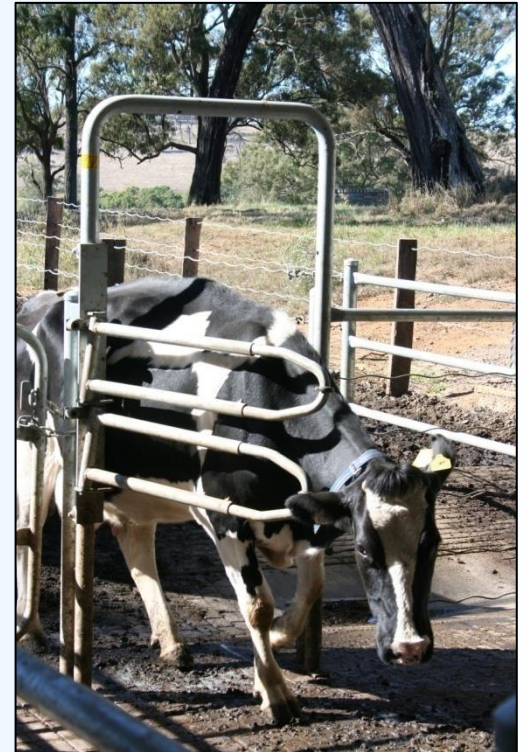
↓ Milking interval - ↑ Milking frequency - ↑ Daily yield
(-31%) (+40%) (+20%)



PRE vs POST feeding trial

Hypothesis

- Immediate reward
- Quicker return to the dairy
- Lower milking interval
- Higher milking frequency
- Higher daily milk yield



PRE vs POST feeding trial: Design

Whole herd (175 cows)

PRE Feeding

Pasture



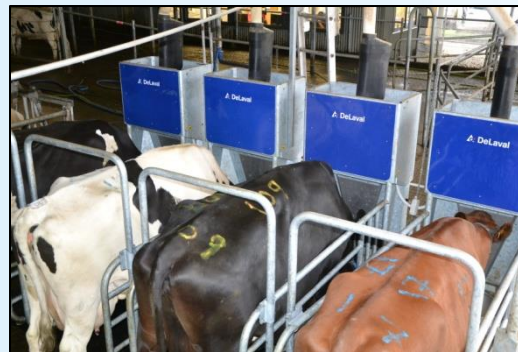
Supplements



Milking



Pasture



POST Feeding

Pasture



Milking



Supplements



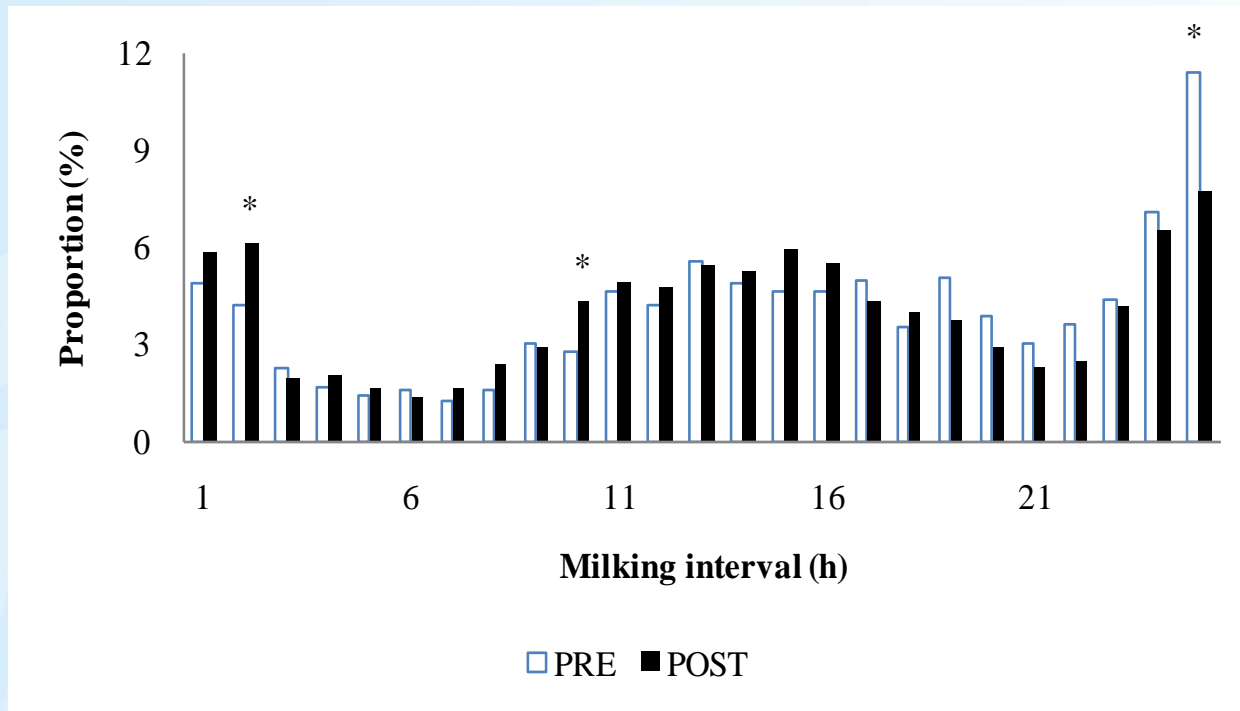
Pasture

PRE vs POST feeding trial: Results

	PRE	POST	Significance

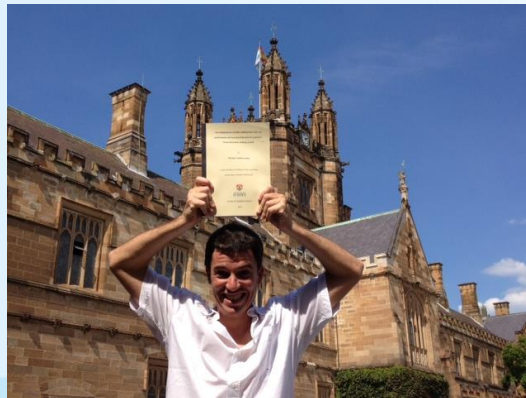
Difference in time spent on each area, but not on daily yield!

PRE vs POST feeding trial: Results



Main findings of my research

- Achievable targets for pasture-based AMS
- Identification of factors that affect milking intervals
- Incentive management (frequency, size & location)



What could the future look like?



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How will Australian cows be milked in the future?

How will Australian cows be milked?

- 48% of dairy sheds were commissioned more than 15 years ago
- 56% of dairy farms spend more than 4h/d milking
- 50% of farmers are considering installing a new dairy in the future
- 50% of farmers would consider installing AMS (+22% not sure)

How will Australian cows be milked?

Reasons to consider AMS	Reasons to not consider AMS
Lifestyle (66%)	Economic (75%)
Make dairy attractive (58%)	Farm layout (41%)
Data and information (57%)	Financial (38%)
Higher MF and milk yield (56%)	Support (25%)
Reduce labour units (50%)	Being on call (23%)

Interest for more information



Precision dairy Automatic milking system

Frequently asked questions:

Why consider adopting automatic milking?
Milk harvesting in conventional milking systems is a time-consuming and labour-intensive activity. Surprising that people from outside of the industry develop a negative perception of the lifestyle of dairy farming. Finding, training and retaining quality farm staff is one of the biggest challenges that dairy farmers and managers are facing today and is likely to be a challenge in the future.

Milk harvesting-related tasks usually account for 20% of daily farm activities. Based on hours spent milking systems (AMS) aim to reduce the time and cost of the milking-related tasks and are used to reduce the total labour requirements. This creates an improved (more flexible) and attractive milking environment.

Other reasons may encourage farmers to consider milking systems as a viable option for their operation include the possibility of achieving higher milk yields per cow per year, individual quarter possibility to feed cows individually, as well as that should allow for improved herd management.

What are the key things I must be aware of when making a decision to adopt automatic milking?
If you are considering a switch to automatic milking, you should have realistic expectations and do not expect to plan the farm layout, taking into account actual farm practices. Seek advice from, and have already adopted automatic milking to it as essential design elements and gain from it.



Precision dairy technology Automatic milking systems

Fact sheet:

What is the technology?
Automatic milking systems (AMS) have been developed for dairy farms to reduce the labour required for milk harvesting. The technology has become increasingly common on overseas farms that typically consist of small herds in indoor systems, with or without limited grazing during certain months of the year.

Automatic milking systems provide greater flexibility of milking times and milking frequency than conventional milking systems, eliminating the need to milk cows at regular set times. This allows the operator to shift their focus to other areas of on-farm management such as feeding animals, animal health treatments, insemination and calf rearing. Record and information management becomes vital to the successful operation of automatic milking systems.

In Australia, the challenge was to incorporate automatic milking into pasture-based production systems while maintaining production targets. Australian pasture-based systems often manage moderate to large herds (more than 300 milking cows) and have longer distances between paddocks and the dairy. Extensive research conducted through the FutureDairy project (www.futuredairy.com.au) has helped develop management practices around automatic milking systems that are useful for farmers considering or currently working with this technology.

How does the technology work?
Each cow is fitted with a unique electronic identification that allows the cow to be 'recognised' electronically at gates and in the milking unit. An robotic arm cleans the teats, attaches the milking cups and sprays the teats of each cow. Each quarter is milked individually and cups are removed based on the milk flow from each teat, thereby minimising overmilking of each quarter. Most automatic milking systems have the capacity to feed grain-based concentrate at each milking.

Farmers adopting this technology generally operate with voluntary cow traffic through the management of incentives that encourage cows to move unassisted throughout the farm system. The most common and reliable incentives are feed grain-based supplements at the dairy, distinct allocations of pasture or supplements that, if adequately managed, ensure target milking frequencies and system utilisation are achieved.

With no defined milking session times, milking events are distributed throughout the day and night based on cow traffic, milking permission settings and system capacity. Some farmers may choose to operate the system with batch milking by bringing groups of cows to the dairy at defined times to be milked by the robots. Each farmer will choose the type of system that best suits their preference and needs.

What data does this technology provide?
By milking each quarter individually, the system enables the operator to assess production and some milk characteristics at an individual quarter level (compared to the whole udder in conventional milking systems). Milk quality parameters such as conductivity and milk colour can also be measured regularly, as can supplement intake. Somatic cell count is not available on all AMS brands and is generally an optional 'add-on' to the system.

Cow traffic and visitation events are often used as indicators of herd and individual cow performance. With automatic systems, farmers will typically also use the support herd management program to store health and breeding records for individual cows within the herd.

It is not uncommon for AMS farmers to have additional technology such as the monitoring of cow activity and nutrition, to be used as an aid for oestrus detection and early detection of disease.

How can you use this information?
By freeing up time previously spent on milking activities, farm staff can dedicate more time to operational and business management.



NSW DPI Dairy Automatic Milking Systems Newsletter - Issue 1

AMS KPI Project

AMS KPI Project - General farm information

July 2015

The Automatic Milking Systems' KPI Project provides the Dairy Industry with key information of what is achievable under commercial conditions. Information about milk production, AMS utilisation and farm demographics will help understand how these farms 'behave' over a 12 month period.

Table 1: General farm information

	Farm 1	Farm 2	Farm 2	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9
Breed of cows	Holstein, Holstein x Jersey, HJx Brown Swiss, Holstein x Brown Swiss, Red Holstein	Holstein	Holstein	Holstein and Brown Swiss (5%)	Holstein	Holstein	Holstein	Friesian x Jersey	Holstein
Calving system	Year round	Seasonal	Split (3 batches)	Year round	-	Year round	Split (2 batches)	Seasonal	Seasonal
Milking area (ha)	55	60	100	40	100	75	43	90	50
Type of robots	Single box	Single box	Single box	Single box	Single box	Robotic rotary	Single box	Single box	Single box
Number of robots (#)	3	3	3	3	6	-	3	3	3
Feed stations (#)	0	6	4	0	6	14	3	2	2
Gate time changes	6:30, 13:00 & 20:00	1:30, 9:30 & 16:30 (feedpad 23:30)	2:00, 8:00 & 17:00	Barn with free cow traffic	0:00, 10:00 & 16:00	4:00, 11:00 & 19:00	5:00, 14:00 & 22:00	1:30, 9:00 & 16:30	2:30, 9:30 & 16:00

AMS KPI Project

Table 2: Herd information

	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9
Cows in milk (#)	198	41	149	186	310	368	122	66	105
Heifers (%)	34%	34%	34%	32%	15%	36%	26%	68%	36%
Animals that calved (#)	9	1	23	12	26	49	29	3	7
Farm stocking rate (milking cows/ha)	4	0.68	1.49	4.65	3.10	4.91	2.84	0.73	2.10
Robot stocking rate (milking cows/robot)	66	14	50	62	52	368	41	22	35
DIM (#)	160	260	182	144	193	185	162	151	214

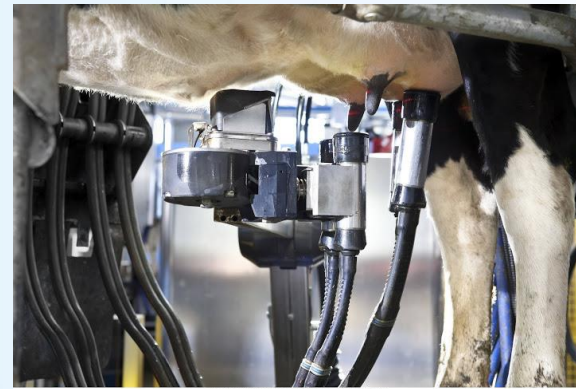
Table 3: Daily milk production and quality

	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9
Daily milk production (kg/day)	4,372	993	3,893	5,792	6,834	7,186	2,704	1,080	2,577
Fat (%)	3.87	3.79	3.82	3.96	-	3.15	4.08	4.6	-
Protein (%)	3.34	3.47	3.34	3.35	-	3.3	3.5	3.37	-
Somatic cell count (x 1000)	188	75	172	146	-	320	84	107	-

All this information is available online

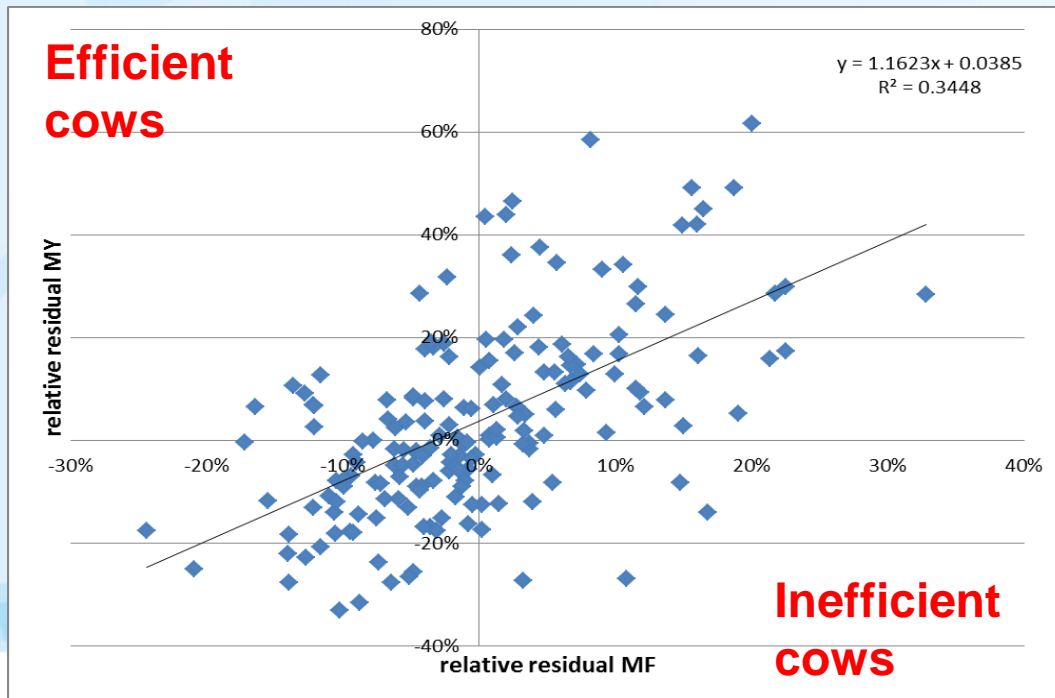
AMS farmers priorities

- Feed allocation / management
- Maximizing system capacity
- Data needs to provide information
- Different needs of different farmers



Industry priorities

- Economics and benchmarking
- Training needs
- Herd testing and breeding



40% more
milk with 10%
less milkings

Conclusion

- AMS is not a new way of farming
- Good understanding of what is achievable
- Still work to be done for pasture-based systems
- Management of huge amount of data
- Need to have an industry approach

Integrations of technologies on dairy farms enable innovation only if they can have a positive impact on farm (sustainability)

Thank you very much for your attention!



The AW Howard Memorial Trust Inc.



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