FUTUREDAIRY information sheet

# Automatic Milking Systems
## Experiences from early adopters

By Kendra Kerrisk and Bevan Ravenhill

Automatic Milking Systems (AMS) are being adopted around the world with more than 10,000 commercial dairy farms now in operation in more than 32 different countries.

FutureDairy research carried out at Camden in New South Wales has proven that AMS operates efficiently in a pasture-based environment.

This is not only a new way of milking cows but a new way of farming. It relies on a voluntary and distributed milk harvesting system. That is, cows milk themselves voluntarily throughout the 24-hour period with no distinct milking session times.

On-farm adoption in Australia is in its infancy but growing. During 2009, nine Australian commercial dairy farms installed AMS units.

### Farmer interviews

This Info Sheet captures experiences from seven of the nine commercial farms who installed AMS during 2009. Bevan Ravenhill interviewed the farmers, focussing on the planning, installation and commissioning phases.

Two of the nine were not interviewed because:

1. One farm commissioned the machines and started milking cows within the four week period prior to the study being carried out.
2. The other farm opted out of the study for undisclosed reasons.

It usually takes about 12 months of operation for farmers to develop a thorough understanding of the AMS system and the impacts on their labour, lifestyle and productivity. It takes a year to experience all seasons and a full annual cycle of operating with the new milk harvesting equipment. Over a year the whole herd calves back into the system as experienced animals (regardless of their stage of lactation) at start-up.

The results presented here are from a group of farms that were in the early days of AMS adoption. The study tour was timed to maximise the learnings while memories were still fresh, so most farmers had not been through the full 12-month cycle.

### In a nutshell…

The farmers interviewed were extremely positive about the steps they had taken to secure their future in the dairy industry.

Farmers valued the flexibility of the daily routine and were starting to capture the benefits of labour and lifestyle. They reported reduced stress on both cows and people; more frequent sleep-ins, increased confidence leaving the farm, reduced physical labour requirements and needing less total labour for the operation.

Interviewed farmers spoke highly of the technical ability of the milk harvesting equipment and the speed at which the cows adapted to the system.

They acknowledged that the first 12 months was a learning period for such a ‘new way of farming.’

### Herds

Herd size ranged from 93 to 310 cows with between two and four AMS units. The number of cows milked per AMS ranged from 50 to 78 and was determined by a range of factors including farm capacity, target milking frequency of the cows (and machine capacity) and plans for herd expansion.

An individual AMS unit can carry out around 150 milkings per day, depending on milk yield per milking session, milking speed of individual cows, operation practices (eg washing or not washing teats), speed of cows’ voluntary movement, number of times automatic machine washes are conducted and other practices. For example 75 cows milked twice a day would result in a similar utilisation as 50 cows milked three times per day.

Most farms maintained a similar herd size before and after installing AMS. About half were planning to increase the herd size within the first 12 months of AMS operation.

Most of the farms had mixed breeds with the predominant breed being Holstein Friesian. All breeds seemed to adapt to the system well. Some farmers reported that the smaller

breeds and/or younger cows could pose some minor attachment problems during settling if they move around in the crate too much.

## Reasons for choosing AMS

The key drivers for investing in AMS were around labour and lifestyle issues and were not necessarily driven by financial reasons. Most farmers had a number of reasons for investing in AMS. Two farmers felt the cost was very comparable to a conventional milk harvesting system with a high level of automation. Other key factors contributing to the decision to adopt AMS were:

1. Sustainability of operation in terms of environment, labour and lifestyle.
2. Farm succession.
3. Appeal of technology.
4. Not having to milk cows.
5. Opportunity to increase milking frequency without increasing labour.
6. Capture efficiencies of inputs and scale of operation.
7. Perceived advantages in individual cow feeding (based on production level).
8. Age, need to slow down, reduce physical labour.

## Robot performance

Most farmers were very positive about the technical reliability and performance of the entire AMS installation (including surrounding infrastructure). Two mentioned some technical reliability issues during the early start-up period. All farmers felt well placed to make system management decisions to achieve target performance levels.

### *Mastitis detection*

All but one farmer felt that monitoring tools built into the system gave them the ability to reliably detect and treat mastitis and all appeared to have managed to maintain a reasonably high to excellent level of bulk milk quality at the time of the survey.

With particular reference to mastitis detection, one farmer indicated that they found conductivity to be an unreliable indicator of clinical mastitis and one reported that on-line somatic cell counting devices were less reliable than they would like. One farmer reported some issues on farm with the development of feasible working routines regarding the timing of treatment for mastitis and other ailments. In an AMS cows can be automatically drafted for attention after milking and a good draft yard location and design will allow for those cows to be attended to just twice a day. However, if these cows do not have ready access to quality feed or a non-concreted area they may require more prompt attention.

### *Artificial insemination*

Two of the AMS farmers interviewed were not incorporating AI into their reproduction management plan and were instead using bulls for natural mating. The remaining farmers who were using AI found the activity devices useful as an aid to more conventional heat detection tools and visual observations. Only one farmer reported concerns with reproductive management pertaining particularly to the AMS farm system and the workload with heat detection. The results with regard to AI/mating management were purely based on farmer perception and did not involve analysis of any reproductive performance data.

## Farm system management

Six farms were pasture-based operations with cows allowed to graze for at least 300 days a year and grazed pasture representing more than 60% of the diet. Supplementary feed was available to cows either in the paddock or in a designated feeding area/feed pad as required.

Five farms used predominantly three-way grazing – cows were provided three pasture allocations per day, rather than the standard two allocations that would normally be provided in a conventional milk harvesting system. In an AMS, three-way grazing achieves more regular and predictable cow traffic.

### *Concentrate feeding*

The level of concentrate feeding varied between farms and across the lactation.

Only two of the installations included some form of out-of-parlour feeders to allow for higher daily intakes of concentrates. Feeding in the milking bail is likely to restrict the level of concentrate feeding that can be implemented due to the reduced “bail-time” of most cows. In an AMS the time available for consumption of concentrates is dictated by the milking frequency and speed of milking of each individual cow rather than the row speed or platform rotation speed in conventional milking systems.

Despite this, a number of farmers were reporting daily concentrate feeding levels of 8-10 kg concentrate/cow/day for cows in early lactation.

All farmers were comfortable using the individual cow feeding tools that are incorporated into the AMS software.

### *Voluntary cow movement*

All of the pasture-based installations were using a controlled cow traffic system whereby cows must pass through pre-milking drafting gates that restrict access to the milking stations using a variety of selection criteria that can be changed by farm staff.

Not all cows will always move themselves around the farm system and some will require encouragement from farm staff. The farmers spent only 10-60 minutes per day fetching cows for milking (average around 20 minutes) and reported that this task was generally carried out 2-3 times a day prior to setting up new pasture breaks.

## Planning and installation

All farmers felt they had access to the knowledge and support to make decisions regarding the layout of the dairy and other aspects of the farm system.

One farmer said that while the layout worked well he would likely change some aspects if he were to repeat the exercise. Most farmers contributed to the technical aspects of the installation. Some felt the original dairy layout designs were clearly intended for barn/indoor systems and required modifications to ensure they were more suited to the pasture-based cow trafficking system.

### *Regulations*

Industry level regulations posed very few challenges. Most farmers interviewed felt that the industry is not yet well prepared for the incorporation of AMS and are yet to modify the wording of regulations to accommodate AMS installations/operations.

Local councils created some issues for two farmers however these did not appear to be particular to AMS but to dairying in general.

## Commissioning

Many of the farmers expressed at least some disappointment in the commissioning process. Some of the challenges or issues they faced during installation and commissioning included:

- installation and commissioning delays
- power supply to the site
- shipment arrival timing
- undesirably low level of technical capability
- communication from the technical installation crew
- expectations surrounding commissioning dates.

Two farmers felt they had imposed too heavy a workload on themselves by co-ordinating the service providers and carrying out construction.

The approach taken to adapting cows and heifers to the AMS was quite farm-specific and depended on the timing of commissioning in relation to the calving dates and patterns of the herd. All of the farms reported that the herd adapted well to the AMS system.

However, where additional cows had been bought into the system after commissioning there was a tendency for these cows to behave with a herd mentality which took some time to break.

Very few cows were removed from the farm due to unsuitability with the AMS. The reasons for unsuitable cows included udder conformation, slow milkers and some undesirable behaviour.

### *Putting the timing into context*

This information was captured during early 2010, at a time when AMS was relatively new to Australia, the companies and the farmers.

The timing was important to ensure that memories of installation and commissioning were fresh in the farmers' minds but meant they weren't necessarily in a position to see the full impact of AMS potential. The companies would be expected to improve their knowledge, systems, service and management as time and experience progressed.

## Post commissioning

Flexibility of daily routine was cited as having the most immediate and greatest impact on labour/lifestyle.

Most farmers were also starting to capture additional labour or lifestyle benefits including reduced stress/pressure on both cows and people, more frequent sleep-ins, increased confidence in leaving the farm, reduced physical labour requirements and reduced total labour needed for operation.

Most farmers were happy with the amount of training about the technology and development of daily routines. However, they continued to learn about the capabilities of the system and software well after the cows had adapted.

Five of the seven farmers felt that they had developed a good understanding of how to motivate cows around the

system within one to two months of commissioning. One farmer suggested that he had not yet stopped learning and another believed that had taken three months to really understand the motivating factors. As farmers entered different seasons and climatic conditions, their knowledge and learning continued to be challenged and developed.

Farmers reported being confident in achieving voluntary and distributed milking within three months. Again some farmers continued to learn and understand as they gained experience.

The key hurdles experienced on farm post-commissioning were related to seasonal and climatic impacts on feed quality, availability and cow traffic.

## *For more information*

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## About FutureDairy

FutureDairy aims to help Australia's dairy farmers manage the challenges they are likely to face during the next 20 years. The challenges are expected to be related to the availability and cost of land, water and labour; and the associated lifestyle issues.

Our activities are structured around two priority areas – Precision farming (including automatic milking and innovations) and Feedbase (forages and feeding). These are the areas where there are opportunities to address the challenges related to water, land and labour resources.

For Precision Farming we are investigating technologies with potential to improve farm productivity, efficiency, labour management or lifestyle. FutureDairy is pioneering the development of pasture-based farming systems that use robotic milking for larger herds. Our research is conducted at Australia's first automatic milking system (AMS) research farm, at the Elizabeth Macarthur Agricultural Institute at Camden. Since mid-2009 we have been testing a new concept automatic milking system designed specifically for Australian conditions, while continuing to further develop the farming system around the milk harvesting equipment.

Our Feedbase goal is to develop sustainable dairying systems for the future, with the intensification of home-grown feed to enable more efficient use of land, water and grain. Our trials are being conducted at the University of Sydney's Corstorphine dairy farm and Mayfarm. The investigation is complemented with modelling and component field research in areas of forage production and utilisation.

We are investigating a complementary forage system (CFS) that involves triple cropping on 35% of the farm area and growing pasture on the remaining 65%. Our target is to produce more than 25t DM/ha/yr over the whole farm area, in a sustainable way. The three crops include:

- a bulk crop (eg maize);
- a legume for nitrogen fixation (eg clover); and
- a forage to provide a pest/disease break and to improve soil aeration (eg a brassica).

FutureDairy is now in its second phase. During the first phase, we used existing technology for automatic milking to test the feasibility of robotic milking in a pasture based system. The promising results paved the way for testing a new prototype AAMS with a larger herd during phase 2.

In the first phase, our Feedbase studies tested the feasibility of a complementary forage rotation grown on a small area, both under research and commercial conditions. Phase 1 combined technical research with social research and extension research. During phase 2 we are drawing upon that learning experience to improve our linkages with major extension groups.

### Contact us

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