FUTUREDAIRY information sheet

Automatic Milking Systems

Improving labour productivity and lifestyle

By Kendra Kerrisk

With herds increasing in size and people placing more value on lifestyle, labour availability is becoming a significant challenge on Australian dairy farms.

Conventional milk harvesting methods are labour intensive. They rely on people to move cows to the dairy, carry out udder preparations, attach the teat cups, monitor udder health and milk quality and – in most cases – remove the cups at the end of milking.

Automatic milking systems (AMS)

Automatic milking systems (AMS) have the potential to address labour issues. Two key differences between conventional milking and an AMS are:

1. voluntary movement of cows (cows bring themselves to the dairy, present themselves for milking and take themselves back to the paddock); and
2. distributed milking (it occurs 24-hours per day).

In an AMS the entire milking procedure occurs without human assistance. The cow presents herself at the dairy and is recognised by an electronic transponder.

Pre-milking teat preparations can be used for individual cows or for the entire herd. Different AMS brands use different methods.

The cups are attached to the udder by a robotic arm which uses teat co-ordinates recorded at previous milkings to locate the approximate position of teats. A laser beam and camera on the arm then fine-tunes the teat location for placement of teat cups.

Cups are removed from quarters individually, preventing over- or under-milking of individual quarters. This also allows udder health to be monitored on a quarter basis.

Potential Benefits

The main potential benefits of an AMS system are improved labour productivity, improved working conditions, lifestyle and animal welfare.

Because cows voluntarily walk to and from the AMS dairy there is no herding of cows or batch milking. A small proportion of cows may need to be fetched once or twice a day to ensure that desirable milking intervals are achieved. The result should be better working conditions making it a more attractive industry for staff and less stress on cows.

By freeing up several hours a day previously spent milking cows, farmers can have a more flexible working day and can divert attention to farm and business management; for example monitoring the performance of individual cows and the whole farm system.

Although the cow movement is voluntary, physiological motivation levels and incentives encourage high producing cows to be milked more often (6-12 hourly) compared to lower producing cow (12-24 hourly). This is achieved by changing the parameters by which milking permission is granted, for example yield and interval since previous milking. The location of shade, water and access to supplementary feed can be used as incentives to encourage cows to move to the dairy.

Worldwide Use

Automatic milking systems are well-proven in intensive indoor dairy systems. More than 10,000 AMS units have been installed on about 7000 commercial dairy farms in about 30 countries. About half of new installations in Europe are AMS. These farms are predominantly indoor systems with cows housed for all or most of the year.

There is one commercial, pasture-based AMS farm in Australia, in Victoria. This farm is owned and operated by Max and Evelyn Warren who have done a lot of the pioneer work in using AMS in Australian conditions.

There is also a very extensive pasture-based AMS research farm in New Zealand, milking up to 190 cows.

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FutureDairy's AMS Research

FutureDairy has established an AMS facility at Camden, NSW to research and develop an AMS suited to Australian dairying systems.

There are two areas of study using different incentives (mostly feed):

1. developing a management system that will optimise AMS efficiency while maintaining high pasture utilisation (a key to profitability).

2. working with DeLaval to develop a new concept AMS with improved cow throughput compared to the present technology.

The management system incorporates automatic drafting which determines whether a cow is allowed to enter the dairy or is returned to pasture. We use the location, quantities and frequency of allowance of different incentives in to optimise cow traffic and maintain system efficiency.

Research Sites

Although most of the FutureDairy's AMS work is being undertaken at NSW DPI's Elizabeth Macarthur Agricultural Institute (EMAI), we are also working cooperatively with the Warrens' AMS dairy in Victoria and Dexcel in New Zealand (Greenfield project).

These collaborations are very valuable, particularly in light of the very limited international expertise with pasture-based AMS.

Timelines

The AMS dairy at EMAI was commissioned in April 2006. We have developed a whole farm system around the existing automatic milking units. Refinement and system optimisations are being addressed in 2008.

At the same time we are working with DeLaval to develop a prototype for the new concept AMS tailored to the needs of the Australian pasture-based dairy system. Key features will be voluntary and distributed milkings and competitive capital pricing.

For more information

Dr Kendra Kerrisk
Research Fellow, Automatic Milking
ph (02) 9351-1633
email kendrad@usyd.edu.au

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 NSW Department of Primary Industries' Elizabeth Macarthur Agricultural Institute at Camden. From mid-2009 we will be 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/y rover 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

Project leader:	Dr Sergio (Yani) Garcia ph (02) 9351-1621 email: sgarcia@usyd.edu.au
Precision Farming leader	Dr Kendra Kerrisk ph 0428 101 372 email kendrad@usyd.edu.au