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 operate 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. Report 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. A 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 rumination, to be used as an aid for oestrus detection and early detection of diseases.

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.

Information collected automatically by the system or entered by the farmer is stored in the herd management program and can generate reports and graphs that can be used to make management decisions and monitor performance of the individual cows and the system. These tools can help farmers to manage by exception, allowing for early detection of disease and create opportunities to make proactive decisions to increase whole-farm productivity.

Potential issues

- Farmers must have realistic expectations of what the automatic milking system can deliver to their farming systems, and each farmer might capture different benefits depending on their objectives.
- To maximise the benefits of automatic milking, farmers must be flexible and adapt to the new farming system.
- Adequate training of new cows is needed to ensure rapid and complete adaptation to the automatic system.
- Cleanliness of cows, their udders and the AMS will ensure not only improved milk quality, but also quick attachment, efficient milking times and fewer system callouts.
- Farmers should be prepared to spend some time in front of a computer to check reports and deal with individual cows that may require attention. It is essential to keep good records and update these in herd management program.
- Availability of technical support. An automatic milking system operates 24/7 and therefore may generate alerts or alarms at any time of the day or night. Farmers or staff may be able to remedy the situation remotely (depending on the brand) but some issues will require attendance at the dairy and may even require assistance from trained technical support personnel (either over the phone or by physical attendance).

Suppliers and types of automatic milking systems

The most common type of automatic milking system is known as the 'single box', in which one cow is milked at a time in a milking stall by a dedicated robotic arm that performs all milk harvesting tasks. Each single box can perform around 150 milking events per day, allowing for some idle time for cleaning, service and maintenance. It is therefore most suited to milk about 60 to 70 cows per day. Single box systems are supplied and supported in Australia by DeLaval and Lely.

- DeLaval: www.delaval.com.au
- Lely: www.lely.com

An alternative to single box are the 'multi box' systems, in which a single robotic arm operates across more than one milking stall. These multi box systems can generally milk more cows per robotic arm, but fewer cows per milking stall. The robotic arm is usually idle for less time because once it has attached milking cups to a cow in a particular stall it can move on to attend another cow in another stall. This generally has an advantage from the capital cost point of view. Flexibility in these systems means that they can start with one robotic system per milking stall but also be expanded according to farm system requirements, in some cases up to five milking stalls per robotic arm. Multi box systems are supplied and supported in Australia by Daviesway and GEA Farm Technologies.

- Daviesway: www.daviesway.com.au
- GEA Farm Technologies: www.gea-farmtechnologies.com

The latest commercial developments have focused on trying to incorporate automatic robots into rotary parlours. An example of this is the commercially available internal automatic rotary (DeLaval, AMR) that has the potential to conduct up to 1500 milkings per day. It has two teat preparation robotic arms and two attachment robotic arms, as well as a post-milking teat sanitation robot. Other types of automatic systems are currently under development and it is not clear at this stage what level of automation they will have and how they will operate and integrate within the farm system. The possible configurations have either one robotic arm per milking position (which means they rotate with the platform) or fixed robots (quantity depending on platform size) that handle multiple milking positions.

When deciding on a milking unit and brand take into consideration which company can offer you the best local service and support (pre sale and planning, installation, technical, maintenance and farm management support). This is an important factor as it will help you have a smooth commissioning and avoid extended downtimes in the event of a breakdown.

Further information

More detailed information about the use of automatic milking systems is available from the following resources and websites:

- Automatic milking systems frequently asked questions (FAQs)
- Dairy Australia: www.dairyaustralia.com.au
- FutureDairy Project: www.futuredairy.com.au
- DairyNZ Automatic Milking: www.dairynz.co.nz