FUTUREDAIRY information sheet

Automatic Milking

Detecting mastitis and heat

by Kendra Kerrisk

An automatic milking system (AMS) requires a completely different approach to heat (oestrus) and mastitis detection because milking occurs as a background operation, mostly without the presence of a human.

The FutureDairy team has tested the automatic mastitis detection tool in the DeLaval automatic milking system at Camden.

Results indicate that the available tools for automatic mastitis detection are both accurate and easy to manage.

The use of activity meters for automatic heat detection is currently under investigation at Camden

Automatic mastitis detection

The critical issue is to determine which milk measures reliably identify all clinical cases of mastitis while minimising the number of false positives (see box).

False positives may be cows with sub-clinical mastitis, some of which may self-cure while others will progress on to a clinical case. False positives can also be generated as a result of an incomplete milking.

It's important to minimise false positives so operators have confidence in the system, to avoid diverting milk unnecessarily and also to avoid unnecessary physical examinations of cows.

The FutureDairy team conducted a study to determine which measures provided the most accurate alerts for clinical mastitis.

No single measure accurately indicated all clinical cases without too many false positives. However accurate detection was achieved using a combination of alerts and a monitoring function in the DeLaval software.

Mastitis detection

At every milking, FutureDairy's automatic milking units measure a number of indicators of mastitis such as milk yield, milk conductivity and blood concentration in milk (all for individual quarters). More recent models also have somatic cell count sensors.

An automatic electronic alert is generated when the unit detects milk that is deemed 'abnormal' according to various settings which can be defined for individual cows or at a herd level.

'Abnormal' milk can be automatically diverted so it does not enter the vat. The AMS can also be set to draft cows to a holding yard for examination and/or treatment if abnormal milk is detected.

The most reliable alert was based on the following measures over three consecutive milkings:

- milk conductivity (relative and absolute)
- blood concentration in milk
- milk yield (expressed as a proportion of expected milk yield).

Combined, these measures picked up all but one clinical case of mastitis with an acceptable level of false positives (some which were sub-clinical cases). The undetected cow was treated immediately after calving, prior to her first milking.

Using these three measures would mean that for every clinical cow detected, no more than four cows would have to be looked at physically. In our experience this was not too intrusive on the daily work routine.

Automatic heat detection

A number of commercial 'activity meters' are available to automate heat (oestrus) detection. They work on the principle that cows on heat are more physically active.

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At Camden, the automatic milking system can be set to automatically identify cows on heat using DeLaval activity meters. The activity meter is attached to the cow's collar which holds the electronic ID system.

Overseas, activity meters are used successfully as a stand-alone heat detection tool in automatic milking systems with cows housed in indoors in barns or feedlots.

The FutureDairy team is investigating the accuracy of the activity meters when used in the pasture-based automatic milking system at Camden.

The results will be used to fine-tune the settings in the DeLaval activity meters to ensure they are accurate when used in automatic milking systems under Australian conditions.

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 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.

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