

RETROFITTING A ROBOT TO AN EXISTING DAIRY

Dairy farmers frequently ask the FutureDairy team if it's possible to fit a robot to an existing dairy, especially a rotary.

The concept appeals to those with a relatively new dairy which is still very functional. Automation already available in conventional dairies includes in-shed feeding, automatic cup removal (ACR), teat spraying and drafting.

So is automatic cup attachment (ACA) the next development for conventional dairies?

FutureDairy's Dr Kendra Davis says the answer is no, it is not feasible in the foreseeable future. And her view is shared across the Tasman, by the authors of the report *The development of automatic cup attachment technology for New Zealand dairy farms – a feasibility study*.*

"It is not a new concept but a very difficult task. The idea has been considered by many dairy equipment companies and researchers over the past 20 years, without any real progress," says Dr Davis.

There are four reasons why there is limited potential for retrofitting a robot to an existing rotary dairy:

- Technically, it's not feasible;
- Most labour and lifestyle benefits of an AMS would not be achieved with a robot on a rotary;
- Costs are prohibitive; and
- Limited market size.

Technical issues

Technical issues with putting a robot on an existing rotary include speed of cup attachment, access to the udder, variation in existing dairy dimensions and milk quality concerns.

The automatic cup attachment technology that is currently available is too slow to be retrofitted to an existing dairy. It takes about 30 seconds for a robot to attach a set of cups, which is much slower than a human working in a conventional dairy (3-10 seconds).

"The speed of robotic attachment is improving, but it may be many years before a robot is as fast as a human," says Dr Davis.

Either a number of robots would be needed, depending on the size of the platform, or cows would need to be fetched in smaller batches to minimise the amount of time cows spend waiting for milking.

"A system that involved fetching small batches of cows would simply replace one tedious task (putting cups on cows) with another (fetching many groups of cows)," she says.

Dr Davis pointed out that conventional dairies are not uniform in dimensions which also poses technical challenges for retrofitting.

Another technical challenge is providing the robot with access to the udder. Currently all robotic cup attachment technology approaches the udder from the side of a cow.

A robot on a conventional system would have to be developed to access the udder between the cows' back legs. The only other option would be to use every second bail on a rotary as a dummy bail allowing the robot to access the cow from the side.

Dr Davis says the conformation of the udder is less suited to automatic cup attachment from between the back legs than the side.

“Automatic attachment uses lasers and a camera to detect the position of teats. In most cows, the back quarters are bigger and lower than the front quarters. The lobes of the back quarters would obscure front teats from the lasers and camera, making automatic cup attachment very difficult,” she says.

Added to that, cows’ legs are relatively close together providing limited room for the robot to access the udder from between the back legs. In comparison, a robot has much more room to access the udder from the side of a cow.

A robot accessing the udder through the back legs would have increased risk of soiling and contamination of milking apparatus, resulting in milk quality risks.

“One manufacturer has attempted to attach cups by having automatic cup attachment coming up through the floor (potentially rotary platform) however, this attempt was unsuccessful and has been abandoned,” says Dr Davis.

Labour and lifestyle issues

Using a robot for automatic cup attachment in a conventional dairy does not carry the same labour and lifestyle benefits as an automatic milking system where cows voluntarily move to and from the dairy and milking occurs throughout the day and night.

A conventional rotary dairy fitted with automatic cup attachment technology would still involve twice daily milkings. Cows would need to be fetched and it is likely that someone would need to oversee the operation, detect mastitic cows, divert colostrum and antibiotic milk and reattach cups that are kicked off (or send individual cows around the platform for a second rotation).

“So this system may reduce the total amount of labour units required, but does not remove the need for someone to work the unappealing hours of a conventional system,” she says.

Costs

Dr Davis believes the cost of this type of automatic cup attachment on top of all of the other automation and the conventional dairy itself would limit the uptake on farm.

Australian potential market

“Even if retrofitting automatic cup attachment to a conventional dairy was technically possible, it would only be relevant to a very small number of Australian dairies in the coming 10 years,” says Dr Davis .

Rotaries account for 11% of all shed types in Australia*. The proportion of new installations being rotaries is likely to be quite high. Dr Davis estimates that 25-35% of the Australian herd is currently milked by rotaries although there is no hard data available.

The use of automation in Australian dairies is still fairly low. Of the Australian dairy farms surveyed*:

- 13% had electronic animal identification (EID);
- 8% had automatic drafting;
- 4% had activity monitors;
- 9% had computer assisted feeding; and
- 28% had adopted automatic cup removers (ACR).

New concept

FutureDairy is developing a farm management system to support the use of the current automatic milking system (AMS) on a pasture-based operation.

“We will also test a ‘new concept’ automatic milking system which is being developed by DeLaval, specially designed for Australian conditions,” says Dr Davis.

It will be a ‘higher throughput’ system with a single robot being capable of milking a herd of about 240 cows.

“This higher throughput would make an automatic milking system more suited and cost-effective for Australian dairy farms,” says Dr Davis.

* The development of automatic cup attachment technology for New Zealand dairy farms – a feasibility study, Ohnstad and Jago, 2006

** Australian Dairy Industry Technology and farm management practices survey, (Klindworth and Greenall 2007, based on data from 2004/05)

A tour of FutureDairy’s Automatic Milking System is included in the program for this year’s Dairy Research Foundation Symposium, 8-9 November. Registration details available from Sherry Catt 02 9351 1631 or sherryc@camden.usyd.edu.au.

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