

# AUTOMATIC MILKING ONE YEAR AFTER ITS COMMERCIAL DEBUT IN NEW ZEALAND

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## Introduction

In August 2008 Carr Agricultural Group converted an 80ha dry stock and cropping block to an automated dairy farm, installing four, state-of-the-art, automatic milking systems (AMS) along with an advanced effluent management system and a fencing system. A month later, Southland farmers Bill and Janet Overgaauw converted 95ha to an automated dairy farm installing four AMS. So how did they go? What lessons have been learnt? What's next for these pioneering dairy farms?

## Overgaauw Robotic Dairy Farm, Winton, Southland

### *Farm profile*

Land area	<ul style="list-style-type: none"> <li>• 95ha effective milking platform</li> </ul>
Cows	<ul style="list-style-type: none"> <li>• 256 Friesian (41% 2 year olds)</li> </ul>
Calving Pattern	<ul style="list-style-type: none"> <li>• Seasonal moving to split calving (60% spring, 40% autumn)</li> </ul>
Staff	<ul style="list-style-type: none"> <li>• Owners</li> </ul>
Farm Layout Features	<ul style="list-style-type: none"> <li>• Flat contour</li> <li>• Farm divided into three sections (A, B, C) each with 10, approximately three hectare, paddocks</li> <li>• Four main races radiating from the centrally located farm dairy</li> <li>• Water located at the dairy</li> </ul>
Dairy Features	<ul style="list-style-type: none"> <li>• Four Lely A3 AMS</li> <li>• Three Grazeway® drafting units, two positioned at the entrance to the dairy that draft cows to the pre- or post-milking area depending on readiness for milking, a third positioned at the dairy exit which drafts cows to the holding yard (for treatment or inspection) or to grazing (section A, B or C).</li> </ul>

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Notes:

	<ul style="list-style-type: none"> <li>• Automatic milk diversion (colostrum, antibiotic or supply)</li> <li>• Extensive milking and cow information recorded at each milking (includes milk yield, milking duration, milk flow rate, SCC, conductivity, live weight, concentrate dispensed, activity that is used for heat detection)</li> <li>• Two vats (main supply silo and buffer vat)</li> <li>• Generator power back-up</li> </ul>
Technical Support	<ul style="list-style-type: none"> <li>• 24 hour technical on-call support provided by JJ's Ltd based in Invercargill, supported by Lely NZ Ltd and Lely Industries NV</li> </ul>

### *Herd*

The herd is Holstein Friesian with genetics sourced through Ambreed, WW Sires and KISamen. Initially 220 cows (100 heifers, 120 cows) were selected for the automatic milking farm from a herd milked at an adjacent farm owned by the Overgaaus. Seventeen cows were added to the herd in November 2008 and a further 19 autumn calved cows introduced in March 2009. Five cows were not suited to the system and sent back to the home dairy. Due to the large numbers of cows being trained at one time, cows were given only a few milkings before being judged as unsuitable for AMS. Given time these “unsuitable” cows may well have adjusted to the system. The average live weight of the cows is 535 kg (cows = 560kg, heifers = 499kg at 17<sup>th</sup> April 2009).

### *Cow training*

The cows calved during August and September at the adjacent dairy farm and were taken to the robotic farm when it was commissioned on 29<sup>th</sup> September 2008. During the first three days, a team of people worked in 8 hour shifts training cows to the system. The first group of 100 cows was walked to the farm in the afternoon and milked for the first time, followed by a further 120 cows that evening. The first group of cows was milked for the second time the next morning. Two people worked at each robot for the first milking for each cow in the herd. This was reduced to two people working in the yard and two people assisting with the robots when the cows were milked for the second time. On day three, two people were required to work at the dairy. After three days about half of the cows walked into the robots by themselves. In the first month about 50 cows needed to be fetched from the paddock each day, in October this had reduced to 10-12 and now for most days all cows voluntarily leave the paddock for milking.

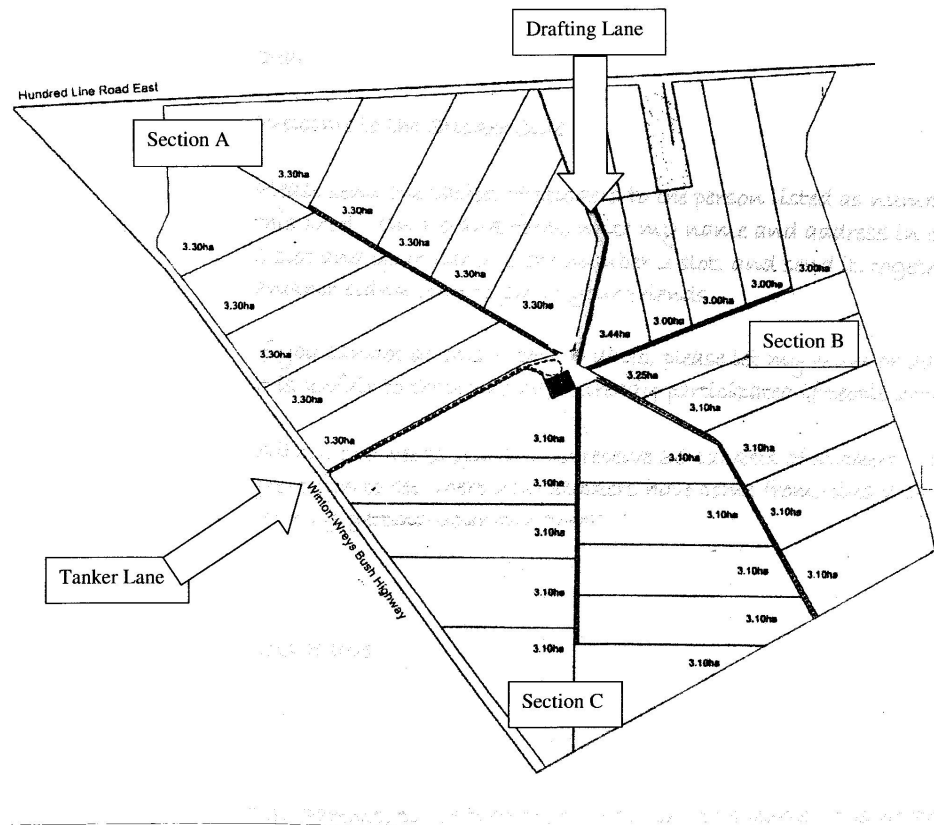
### *Farm and dairy layout*

The farm layout is shown in Figure 1. The farm has been fenced into 30 paddocks that are managed as three main blocks (Section A, B and C) with cows grazing in each of these sections every 24h. Cows are granted access to a new grazing area at 1am (Section A), 9am (Section B) and 5pm (Section C). Access to the grazing area is granted when cows pass through one of three

Grazeway® drafting units located at the entrance to the dairy and when exiting the post-milking area.

There are four laneways that radiate from the dairy and lead to the different sections. The dairy is centrally located and the maximum distance to the furthest paddock is about 450m. Water is located only in the pre and post-milking areas within the dairy.

The dairy houses the four Lely A3 AMS. There is a pre-milking waiting area.



**Figure 1.** The Overgaauw farm layout including location of the dairy housing four Lely A3 AMS, the three grazing Sections (A, B and C) within which grazing is available from 9am, 5pm and 1am

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### *Feeding and farm system*

The farm is a first year dairy conversion and previously grazed sheep. Pasture grown on the farm is supplemented with molasses (600g/cow/d), meal (Dairy Performance fed at a variable daily rate according to the following criteria: 0-20 litres = 1kg, 20-30 litres = 2 kg, 30+ litres = 3 kg, all heifers = 3 kg) and silage, either conserved from the milking platform or bought in (5 kgDM/cow/d fed since mid January); replacement heifers are grazed off. This season 180 bales of silage were conserved from the milking platform.

### *Grazing management*

A 20-day grazing rotation is maintained throughout the year. Pasture is supplemented with silage fed in the paddock, or area is taken out for conservation depending on pasture covers and grazing residuals. Pastures are mowed before grazing through November, January and February. Cow movement and post-grazing residuals are used as indicators of feeding levels.



**Figure 2.** The Overgaauw farm dairy layout showing four Lely A3 with cows in the premilking waiting area (foreground) and the post milking exit area (furtherest from AMS)

### *Labour impact*

The commissioning period during which 220 cows were trained to use the system was very labour intensive. It followed immediately from a busy spring at the home farm so the assistance from Lely staff, family and friends was important. After the initial commissioning

week, the second stage was to become less reliant on the support from JJ's Ltd and to learn to trust the AMS and the information that it was giving on the cows. As the cows adjusted to the system, and Bill and Janet became more and more confident with the technology, their labour input reduced. Now they spend approximately three hours per day on farm-related work, which mainly involves cleaning, shifting fences and checking reports generated by the herd management system.

The main impact on the type of work has been an increase in the monitoring of the farm and cows, and a decrease in physical work. They feel that they are controlling more of the farm operation. In a conventional shed they used to be focussed mainly on the cow's udder but now use the computer for this information. Now it is more important to observe how the cows are flowing, whether they are relaxed, how long they are spending in the paddock, and to focus on grazing management.

The most valued information generated by the computer is the udder health data (conductivity and SCC alerts) as well as the failed milkings and alerts for cows that are late for milking. These data are checked twice a day, in the morning and in the afternoon.

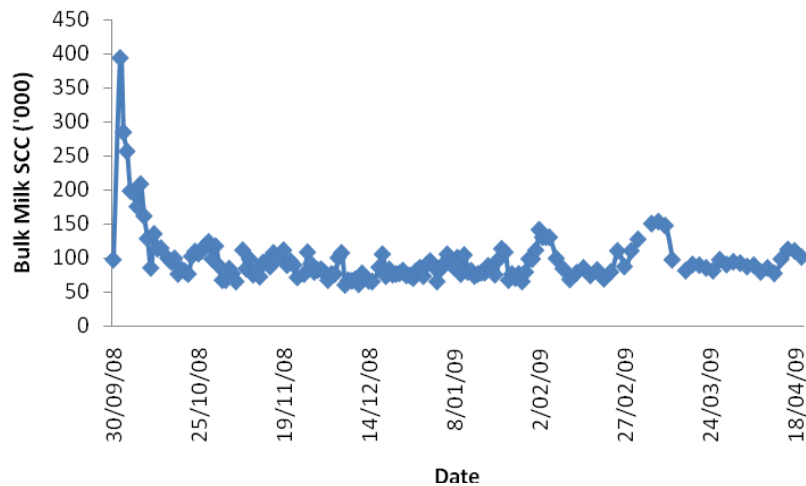
#### *Animal health*

Janet and Bill have noticed that the cows are very relaxed, "They have become very friendly and are not scared of people". Compared with their other herd they feel that the cows are 'doing their own thing' and are in control.

There have been 19 new cases of mastitis (excludes repeat treatments) since the farm was commissioned (9 of these occurred in the first four weeks of operation). Bulk milk SCC (BMSCC) was higher for approximately 10 days after commissioning the farm (Figure 3). Average BMSCC for the season to date is 92,000 cells/ml. There have been 16 cases of lameness, 14 of which were in the first four weeks after commissioning (likely due to some adjustment to a new race material and concrete).

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better utilise robots, a barn to house 150 cows over winter will be built and next season a winter milk contract will be sought.

### **Stradbroke Dairy, Winslow Ltd, Ashburton**

The Stradbroke Dairy farm is situated south-west of Ashburton near Mt Somers. The farm is a first year conversion to dairy, having previously been used for cropping and sheep. The farm already operated two centre pivot irrigators but a new dairy has been built. The farm is owned by Winslow Ltd, a subsidiary of Carr Agricultural Group, who are also the Lely distribution centre servicing the greater Canterbury region.

#### ***Farm profile***

Land area	<ul style="list-style-type: none"> <li>• 68ha effective</li> </ul>
Cows	<ul style="list-style-type: none"> <li>• 271 Friesian, mixed age (no heifers)</li> </ul>
Calving Pattern	<ul style="list-style-type: none"> <li>• August to December in 2008/09 then moving to year round</li> </ul>
Staff	<ul style="list-style-type: none"> <li>• Manager + assistant (1.5 FTE)</li> </ul>
Hours of work	<ul style="list-style-type: none"> <li>• 8am – 5pm, on-call out-of-work hours duties shared among staff</li> </ul>
Farm Layout Features	<ul style="list-style-type: none"> <li>• Flat contour, centrally located dairy</li> <li>• Farm divided into four sections (A1, A2, B1, B2), two either side of the dairy allows for two-way (A-B), or four-way (A-B-C-D) grazing. Cows move from one section to the next via the dairy. A central race bisects each grazing area.</li> <li>• Grazeway® drafting units located at entrance to, and exit from the dairy.</li> <li>• Feed pad adjoining the dairy with separation area for cows requiring attention</li> <li>• Water located in raceways near the dairy</li> </ul>
Irrigation	<ul style="list-style-type: none"> <li>• Two centre pivots</li> </ul>

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Dairy Features	<ul style="list-style-type: none"> <li>• Four Lely A3 automatic milking systems</li> <li>• Automatic milk diversion (colostrum, antibiotic, supply)</li> <li>• Extensive milking and cow information recorded at each milking (includes milk yield, milking duration, milk flow rate, SCC, conductivity, live weight, concentrate dispensed, activity that is used for heat detection)</li> <li>• Generator power back-up</li> <li>• Single milk vat with a rapid wash facility</li> </ul>
Technical Support	<ul style="list-style-type: none"> <li>• 24h support provided by Winslow Farm Technologies</li> </ul>

### *Herd*

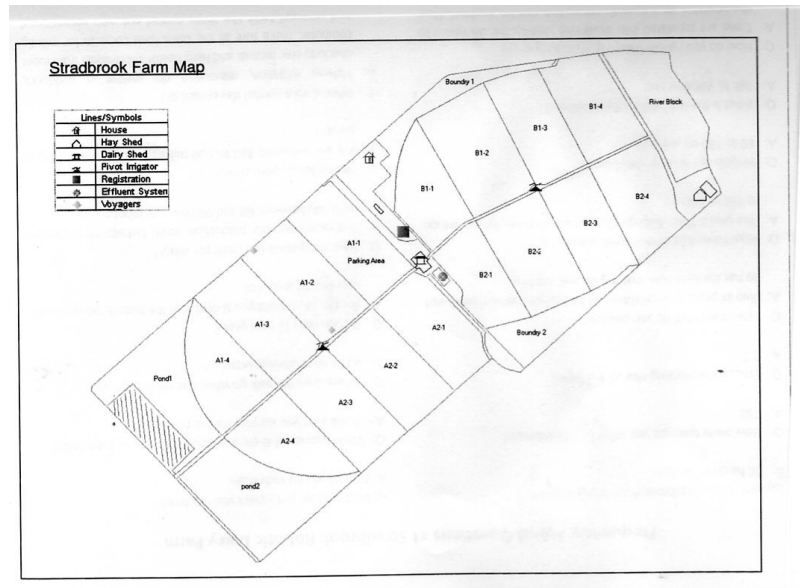
The herd is Holstein-Friesian (genetics sourced through Ambreed) mixed age cows (no heifers). Calving was spread from 1<sup>st</sup> August to 1<sup>st</sup> January. This was due to the pregnancy status of the herd (purchased from multiple farms), to reduce workload during the training phase and to assist with moving to year-round calving in the following season. Once the main herd of 253 cows had calved, a further 18 cows were added to the herd in February 2009, making a total of 271 cows. The average live weight of the cows is 535 kg, at 20<sup>th</sup> April 2009.

### *Cow training*

It was not possible to train the cows to the farm layout and AMS before calving, due to ongoing site works, so cows were introduced to the AMS at calving. The first twenty cows proved difficult to train and more effective training methods were found as further cows calved into the system. Four groups were established on the farm: 1. Calved and experienced at using AMS, 2. Colostrum cows, 3. Springers, 4. Dry cows. As the herd size increased, experienced and colostrum cows were managed in the same herd and the robots used to differentiate cows and divert milk accordingly. Training became easier the more cows that were in the herd. It is believed that this was due to staff establishing an effective routine and cows learning from other cows.

### *Farm layout*

The dairy is positioned centrally on the farm with a central race running from the length of the farm (Figure 4). With the exception of the race and perimeter fencing there are no other permanent fences. Temporary fencing is used to define daily grazing areas. The positioning of the four AMS is shown in Figure 5. Cows enter the waiting area via a Grazeway<sup>®</sup> drafting unit and leave the dairy via a third drafting unit that directs cows to either side of the farm.



**Figure 4.** Stradbroke Farm layout showing two centre pivot irrigators and raceway and central dairy housing four Lely A3 AMS



**Figure 5.** Inside the dairy showing four AMS and cows in the waiting area

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### *Feeding and farm system*

Pasture grown on the farm has been supplemented with grain (4kg/cow/day) fed through the AMS, and pasture silage. The farm has periodically been used to test new feed for Winslow Ltd as part of their research programme. Pasture covers were very high at the start of the calving because of the broad calving spread, growth far exceeded demand and a large quantity of silage was made. During the conversion the farm was re-sown with three different pasture mixes from Agricom (Advance MaxP, tall fescue, Sterling AR1 tetraploid ryegrass and Ohau AR1 tetraploid long rotation ryegrass).

### *Grazing management*

Initially pasture was offered to the herd in a single 24h allocation (A grazing) but when sufficient cows had calved this was changed to two allocations per day (A-B grazing) then three (A-B-C grazing). Three-way grazing has been the preferred routine for most of the season; however, on two occasions the herd was switched to four breaks per day – both times when cow numbers were at the maximum, with a proportion still in training.

- Early January, when all cows had calved and with peak numbers milking for the first time, the shift to four breaks/day helped reduce congestion at the shed and spread milking better.
- Mid to late February when 17 cows were bought in and a proportion of the herd was in training, the shift to four breaks/day helped spread milkings and increased milking frequency. Once cows had settled into the system, break changes were cut back to three times a day.

Early grazing management focused on pasture allocation in square metres per cow, calculated from pasture available. There was less focus on residuals. Later pasture management has focused more on residuals and using standard grazing management principles from conventionally milked dairy farms. Cow flow and grazing residuals are now used to fine-tune the daily pasture allocation.

### *Labour impact*

During the first three months there were two full time staff working on the farm. Since this farm was also used as a demonstration farm additional staff were involved in cleaning and site preparation duties. Now there is a full time manager and a part-time assistant who also works on other Winslow farms (total 1.5FTE). The farm was fortunate to have had two staff experienced in working with automatic milking systems in USA and Europe. The initial staff who commissioned the farm are now working on new projects for the Carr Agricultural Group. The new farm manager has experience working on a range of farms in the South Island. He reports he has more free time, is not stressed, is more flexible in his work hours and is enjoying the later starts! But he points out that staff need to be computer literate.

Asked if he misses milking cows? “Yes and no. I thought I would not have much interaction with the cows but it’s turned out I actually have a lot more interaction with the cows. The cows are friendlier too.”

How is managing this farm different from conventional farms? “Completely different – you have a lot more tools e.g. live weight and rumen function, you can look at a whole herd basis and make decisions quickly, then go to an individual cow and make instant changes.”

Of the information provided by the computer – what is the most valuable? “Rumination data from the rumination monitors and the conductivity report, live weight less so. I use the system’s ability to group cows a lot and look for low producing cows.”

What impact has there been on the cows? “Once they have learned what to do I think they enjoy it; they move of their own free will. The cows are much friendlier. There are more issues with dominance though, particularly over water and access to the robots.”

#### *Animal health*

The staff have generally been impressed with the herd health. There have been 16 cases of mastitis and five lame cows treated since the farm was commissioned.

#### *Drivers of cow movement*

The main driver of cow movement is feeding. It appears that feeding at the dairy is particularly important, whereas the location of water is less important. At various times water has been located along the races and then in the paddock, and the cows have still moved well. A number of different regimes have been trialled to determine the best times for allocating the new areas of pasture. The times of 9am, 5pm and 1am have proved to be best thus far. It is also important to send cows onto new pasture as much as possible and back to the old paddocks if they are not due for milking. There are, at times, large groups of cows anticipating gate changes but the shed clears quickly.

Figure 6 shows the distribution of cow milkings over the day. The data show a familiar pattern of good utilisation of the robots through most hours of the day, with less use between 2am and 5am.

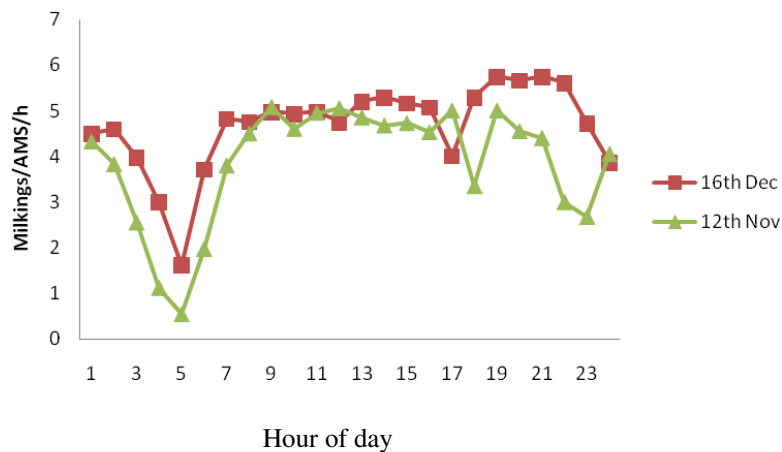
#### *Future goals*

The plan is to focus more on individual feeding/management of cows by tiering of cows, and targeting feeding and milking frequency. The calving spread will be moved to year

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round calving. There will be increased focus on pasture management; getting pasture covers right for the calving pattern at the beginning of spring and achieving better quality pasture and pasture utilisation.



**Figure 6.** Distribution of milkings throughout 24h. Data are averaged for two, 10 day periods (2/11/08 – 12/11/08 and 26/11/08 – 15/12/08)

### Acknowledgements

The cooperation of the Overgaaus and Winslow Ltd in sharing their experiences in pioneering automatic milking in New Zealand as well as the staff at the Lely Centres in Invercargill and Ashburton and Julian Gaffaney from Macfarlane Rural Business Ltd are gratefully acknowledged in the preparation of this paper.

### Further useful sources of information

If you are considering automatic milking for your farm it is important to research the different options thoroughly. Lely Industries NV, De Laval, Fullwood (UK), WestfaliaSurge, SAC and Zenith all supply equipment internationally and Lely New Zealand Ltd and De Laval are actively marketing the technology in New Zealand. Visit New Zealand and Australian research and commercial farms that have implemented automatic milking (Stradbroke Dairy, Winslow Ltd, Ashburton; Overgaauw Robotic Dairy Farm, Winton; University of Sydney FutureDairy research farm; there are also at least two commercial farms operating in Australia). Take advantage of the knowledge of experienced independent DairyNZ researchers based in Hamilton or visit the DairyNZ website for more information.

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