

## Animal Behaviour Meets Technology on the New Zealand Biotechnology Learning Hub ([www.biotechlearn.org.nz](http://www.biotechlearn.org.nz))

By Cathy Bunting and Bill Barwood

*Dexcel's Greenfield Project is a research farm set up in Hamilton to explore the efficacy of a fully automated milking system in the New Zealand context. The continued progress of the project, begun in 2001, depends on integrating expert knowledge of animal behaviour with an understanding of New Zealand's pasture-based farming system, farmer needs, and the capabilities of technological tools.*

Dexcel is New Zealand's industry owned, national research organisation for dairy production. The Greenfield Project farm is of commercial size and serves as an industry research model for totally automated dairy farming. The project is funded by Dairy InSight and The Foundation for Research Science and Technology. It is a collaborative project with Sensortec Ltd and supported by The Waikato Automatic Farming Group.

Two robotic milking systems currently milk about 180 cows and the farm is set up so that cows are guided to the dairy for milking approximately once every 18 hours. The hub of cow traffic is the selection unit with its series of electronically controlled gates. The

cow is enticed here because of access to drinking water. As she enters the selection unit, the electronic bracelet on her ankle is read and a computer-based decision determines whether she exits to the dairy, a paddock with a fresh break of grass, or the paddock from which she has just come. Both the drinking water and the possibility of new grass are key incentives for her to enter the selection unit. Barley in the milking unit is an additional treat.

In contrast to batch milking, each robotic milker can only milk one cow at a time, and experience on the Greenfield Project farm has shown that there is a lull in cow activity during the early hours of the morning. One challenge for Dexcel staff is to develop a system where the milking machines are operational for the maximum amount of time in each 24 hour period. Another challenge is to determine the most efficient way to train new cows to use the automatic milking machine, the selection units, and the one- and two-way gates.

### Engaging younger students

Recently, two Year 4 classes of 8 year olds at a Hamilton Primary School, put their heads together to design farms

based on an automatic milking system like the one running at Dexcel. They had been to visit a conventional farm, jumped around in cow poo, seen a Herringbone milking shed, and quizzed the farmer about his daily routine. They then considered the key features of an automatic milking system by accessing the video clips and interactive activity in the 'Robotic milking' focus story available on The New Zealand Biotechnology Learning Hub ([www.biotechlearn.org.nz](http://www.biotechlearn.org.nz)).

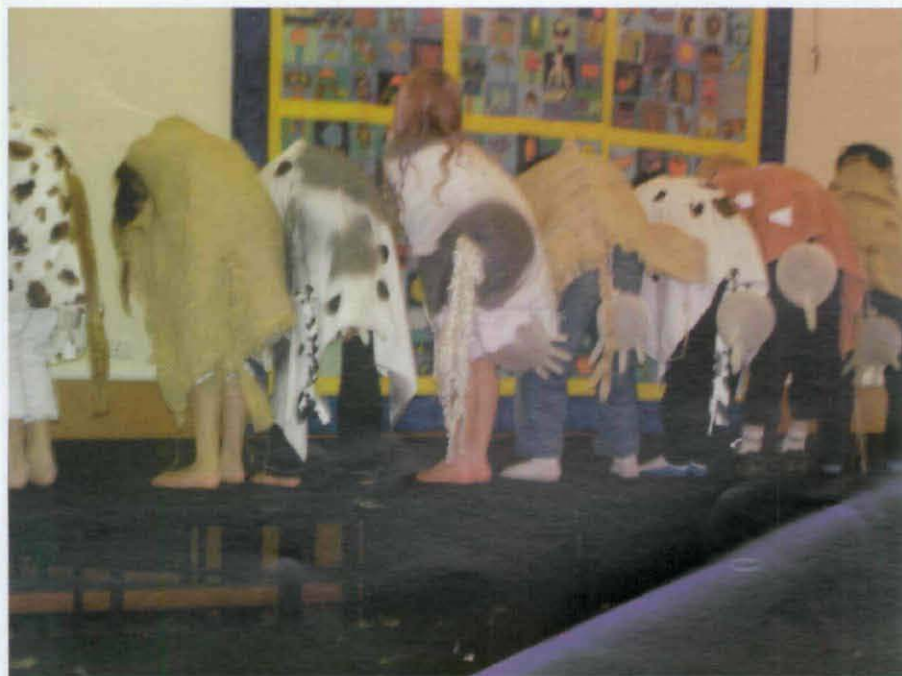
The children were highly engaged when designing their own farm layout and many incorporated ideas that had been alluded to during their teaching programme: the use of solar panels to power some of the electronic equipment, the temporary separation of sick cows from the rest of the herd, and the use of lasers in the automatic milking stalls.

One student got particularly excited about the possibility of using security cameras to monitor cow behaviour out in the paddocks. Other highlights of the classroom programme included dressing up as cows to act out a day on the farm for the school assembly, and using role play to explore some of the ethical considerations of a fully automated farming system.

The teachers who taught the unit drew on some of their own general knowledge about farming, but neither had much understanding of the automatic milking system before they started. The majority of their knowledge was gleaned from material provided on the Biotechnology Learning Hub, and the unit plan published on this site formed the basis of their classroom programmes.

### Supporting older students

The dairy industry is encouraging school leavers to get involved in research that will assist the industry lift productivity, improve the environment, and take the tedium out of routine tasks. Ryan Higgs, recipient of a New Zealand Dairy Industry Undergraduate Scholarship (NZDIUGS) is currently completing a research project in order to complete his



*A day in the life of a dairy cow: A school assembly performance.*

Honours degree in Applied Science (Agriculture) at Massey University. This degree has a focus on dairy production, ruminant nutrition and business. As part of his research, Ryan is investigating how different types of clover affect the efficiency of protein use in the rumen.

When cows eat clover (an important food source for New Zealand dairy cows), they consume much more protein than they can use. This excess protein is excreted in urine, giving the urine a high nitrogen content. The nitrogen then gets into surface and ground water, damaging New Zealand's waterways.

Ryan is investigating whether the different properties of different types of clover can affect the amount of protein that is metabolised by the cows rather than excreted.

The research is important because farmers are under pressure to decrease the impact of farming on the environment, as well as increase the proportion of protein that cows relative to what they consume.

### Career pathways

Ryan did not grow up on a dairy farm, but does have relatives who are farmers. He has also had increasing involvement in the industry through both vacation employment and his studies.

He graduated from Hamilton Boys' High School in 2002 and had a strong interest in farming because he saw it as providing lots of opportunities to "get ahead". However, his family and friends encouraged him to first gain a tertiary qualification in order to increase his career opportunities later in life, and to provide a new challenge before entering the workforce. Ryan decided to do a Bachelor of Applied Science majoring in Agriculture at Massey University. He finished the undergraduate degree in 2005 and decided to move onto postgraduate studies in order to further develop his skills and increase his employment opportunities.

Ryan has been a recipient of the New Zealand Dairy Industry Undergraduate Scholarship since 2003 when he began university. All his tuition fees have



Ryan Higgs

been paid by the scholarship, which means that he has not had to incur much student loan debt.

To find out more about the New Zealand Dairy Industry Undergraduate Scholarship go to [www.dexcel.co.nz](http://www.dexcel.co.nz) or contact Bill Barwood, Dexcel Ltd, phone 027 230 3715 or email [billbarwood@xtra.co.nz](mailto:billbarwood@xtra.co.nz).

To find out more about robotic milking and other exciting AgBio and Biotech stories and teaching resources go to [www.biotechlearn.org.nz](http://www.biotechlearn.org.nz) or contact Dr Cathy Bunting, University of Waikato, phone 07 856 2029, email [bunting@waikato.ac.nz](mailto:bunting@waikato.ac.nz)



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