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OF COMPETITION AND REGULATION INC.**

Information and Communications Technologies in New Zealand: Nine Case Studies

Case Study 6: Wards Farm

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Ward's Farm

Overview

Sharemilkers Thomas and Fiona Ward have implemented various software applications to help them manage the operations of their farm in Canterbury, New Zealand. The DairyWin™ Concept Cash Manager™ and All-About-Grass™ applications enable them to keep accurate and integrated records of their cattle, from fertility records to production worth of cattle. This has reduced the cost of operations through savings in accountant fees and the time required to make decisions.

The case demonstrates that the infrastructure obstacles that the Wards faced did not impede them from investing in applications that were valuable to them although better infrastructure would allow more productivity enhancing opportunities.

The Farm

Thomas Ward a rural banker and his wife Fiona a teacher have been farming for the past six years. Prior to Woodbury they lived on a farm in Heinz. They employ one full time staff member and four part-time seasonal workers.

The Wards are sharemilkers on 220-hectare farm in Woodbury Christchurch, one of only two dairy farms in the area. A landowner who lives privately on the property owns the farm. A contractual agreement between the landowner and the sharemilkers delegates daily running of the farm to the sharemilkers whilst property investments related to change in pasture and feed are shared by the two parties, as these investments have a long term impact on the sustainability and productivity of the land. Most dairy farms in New Zealand operate on a contractual agreement between sharemilkers who run the daily operations of a farm and the owner of the land. The agreement allows the owner to conduct audits of the farm on a regular basis to determine utilization rates.

The farm supplies milk to Fonterra, a co-operative owned by suppliers. Fonterra arranges the logistics of milk collection from the farm gate to processing, and marketing of the manufactured products. As Fonterra provides systems for managing



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data related to shareholding, supply information and milk collection logistics, sharemilkers and farmers use information technologies mostly in support of farm management activities. Although this case study focuses on dairy farms it is presumed that farms in most other industries would likewise amalgamate logistics and industry information functions through third party arrangements such as co-operatives, industry associations and large processors, in order to capture the benefits of scale and scope economies available from processing and exporting (see Fonterra case study in this suite of analyses).

Business Model

The key information management tasks associated with dairy farming relate to the management of stock and pasture.

Dairy farming necessitates farmers and sharemilkers acquiring cows with good breeding (production worth) and mating them to produce calves and hence optimal quantities of milk at the desired quality levels over the dairy season. It is vital for the both industry and the individual farmer to capture information on each cow's lineage and fertility status. This information enables farmers to select and purchase the optimal animals for specific circumstances, and mate them optimally. Furthermore, breeding information can be used to selectively improve the national livestock quality. Some of this information, such as breeding and production worth, is acquired upon purchase from the breeder. Other cow-related information, such as fertility status, is available from the Livestock Improvement Centre (LIC) databases, which provide a repository of information collected on each animal through regular herd testing activities. Farmers and sharemilkers also maintain individual health records on each animal to ensure that it remains healthy and productive.

After calving in July, cows are milked for approximately nine months to the end of April. Milk is stored on the farm in refrigerated silos and is collected by tankers every second day. Tanker drivers check the acidity of milk before collection to eliminate the possibility of collecting sour milk and take samples from the silo for testing. The milk is automatically weighed as it is pumped into the tanker, and the driver records the quantity on the delivery docket. The samples are tested at the processing plant and the



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fat and protein ratio (milk solids) information is available the next day for farmers to access on the *fencepost.com* web site, or delivered by the tanker driver at the next collection. As farmers are paid for milk solids per kilogram, it is vital for them to know the quality of the milk that the herd is producing. The higher the milk solids content of the milk, the better the payout for the farmer. Farmers rely on information from the dockets and the processing plant to adjust their farm practices on a daily basis to optimise their returns. They also have access to information about industry average, district average and historical data of the farm up to twenty-fours from last collection time against which to benchmark their individual farm performance.

In order to achieve a high milk solids ratio in milk, farmers must also invest in stock feed and pasture. Aside from investments in stock, these are the most significant costs facing the business. Farmers must generate feed plans for the animals. As the quality and amount of pasture directly impacts on the quality of milk produced¹, farmers conduct regular 'farm walks' to analyse the amount and quality of pasture available, in order to plan stock movements around the farm, to determine the amount of supplementary feed required, and to devise pasture management plans (eg fertilizer application, planting).

In addition to the standard accounting tasks required of any business, the information management tasks specific to dairy farmers are a combination of on-farm observation tasks (both visual and scientific testing), and off-farm generic and specific information searches, to which the farmers apply their knowledge and experience to determine the courses of action that they will take on the farm.

Decision to Implement Technology

When the Wards started dairy farming they used a manual system for capturing information about the six hundred cattle on the farm. This involved maintaining paper based records about health, breed and production worth for individual stock. The Fonterra processing plant also sent daily dockets with historical data on quantity of milk, district average and industry average data of other dairy farms. Compiling all these bits of information into a logical order to enable decision-making on a daily basis

¹ As long as the cow has good breeding



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required a lot of duplication. In order to increase efficiency, the Wards searched for packages that would allow integration of all the separate bits of information. They had a good idea of what functionality the packages needed to have from Thomas's prior experience in the industry and by talking to friends and family.

With an investment of approximately \$2,000 they acquired software packages that enabled management of the cashbook, stock health and pasture. Traditionally accountants use software packages such as the Concept Cash Manager™ package, DairyWin™ and All-About-Grass™ to prepare annual reports for farmers and sharemilkers. Acquiring these same packages allowed the Wards to prepare their own accounts and use their accountant only to audit the records for tax purposes hence saving approximately \$1,500 per annum.

The Wards purchased DairyWin™ software from LIC, which captures information about each individual animal. All-About-Grass™ is a mapping program that provides historical data and enables planning of stock movement. It captures other details like the impact of fertilisers and weather patterns on pasture. Concept Cash Manager™ is a financial package that is used to maintain accounts. All packages are off-the-shelf applications that are designed specifically for farming operations in New Zealand.

Implementation of ICT

The programs were installed on a PC at the farmhouse. The computer system that they had initially was not state of the art. As the DairyWin™ application requires an Internet connection to access LIC databases, the new system required both a modem and Internet access. Currently, the Wards have dial-up access using the standard telephone connection. Whilst dial-up Internet access is slow, the connection at Woodbury is better than the one at Heinz. The Wards see the investment by Fonterra into broadband infrastructure as a welcome intervention. The faster connection speed will enable faster and more reliable access to sites such as LIC that they regularly visit, in addition to the applications on Fencepost.com.

The initial task upon purchasing the software was to input all the data from the manual system to electronic records. This was time consuming and involved learning about the



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system as they used it. Fiona admits that it did not feel like they were saving much time by using a computer system initially. This was further complicated by the fact that they were new to the industry. Over time, however, the system has made the process of decision making much more efficient.

As both Thomas and Fiona were professionals, they were computer-literate when the initial farm computer investments were made. However, they both had to learn about operating the specific software packages, as both are involved in updating the system with information generated on the farm on a daily basis. Implementing the systems has also enabled them to learn more about the information generated on the farm..

Benefits of the ICT

In addition to the cost savings from computerising the farm accounts, the ability to access data through the *Fencepost.com* website about the quality of milk has had a major impact on the farm management. Timeliness of information has been critical for decision making of the farm: the information is readily available and allows immediate changes to be made on farm practices such as feed and pasture rotation, rather than having to wait until the next tanker collection up to two days away. However, whilst *Fencepost.com* provides a variety of additional information, such as latest research, weather, stock prices and Fonterra shareholder information, the Wards mainly use it to access specific information generated at their farm (eg milk quality tests). They acknowledge that other information is available, and may have some value (for example, comparing their farm performance with industry averages) if they had the time to utilise it, but when placed against all other daily on-farm activities, the priority goes to collecting and analysing the most important information that influences daily activities – the milk quality tests and herd information.

The ability to consolidate the various diverse sources of information about the operations of the farm onto an integrated software package has provided timely and efficient data for decision-making. Tracking individual cow details through the DairyWin™ package allows the Wards to more easily identify cattle that are performing well and those that are not, resulting in more efficient stock purchase and sale decisions. Historical reports can be easily generated when cattle is for sale. The Wards



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also benefit when buying stock from others using DairyWin™, as animal information can be easily transferred. Without access to this information, it would have taken three years of observing and monitoring stock before a new owner would know all the details about the cattle. However, with the new system, this timeframe is reduced substantially, and the risk of buying ‘unknown’ animals is substantially reduced.

Problems with ICT

Fiona and Thomas relied heavily on friends and family for recommendation about the best software. They also used their prior experience to shortlist packages that they were interested in. They did not trial any products but bought what was considered the best package at the time. The geographical isolation of being on a farm limits the options that they have of receiving on-going support and training on the software packages from the vendors. Thus, reliability of both hardware and software are important. Use of the Internet for software upgrades reduces the time taken in supporting the system, however the rural location does mean that hardware problems can be costly in terms of time lost organising a repair as well as the inconvenience of having the system ‘down’.

One of the problems that the Wards identify in their use of ICTs is the requirement to double handle all information. Virtually all of their on-farm information is gathered ‘in the field’, necessitating documentation first on paper, and subsequently entering it onto the computer at the end of the day. This opens up the possibility of data inaccuracies arising from transcription errors or omissions. Errors could be reduced and duplication of tasks avoided if data could be captured electronically once, at the point of detection out on the farm, rather than transcribed in the farmhouse onto the computer.

Future

Although the broadband rollout by Fonterra and Telecom will increase the quality of transmission, the Wards would like to see investment in wireless technology to enable data capture at generation sources around the farm to reduce transcription errors and duplication.



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In the future, the Wards plan to invest in palm pilot type hardware that will enable them to input information directly into the system. This would be particularly useful during calving, which is very busy time and requires accurate capture of information. However there are risks associated with operating technology in wet areas and at present, appropriate hardware is not readily available. Alternatively they may investigate the possibility of training the farmhand or an extra resource to capture information during the calving process.

Furthermore, the Wards have noted that much of their work necessitates physical walks around the farm to identify and collect pasture and soil data. If remote monitoring could be cost-effectively and reliably implemented (for example, remote sensors identifying pasture data, with wireless transmission back to a base unit), then further timesavings would be possible.

Summary

The case illustrates that the supply and availability of suitable applications was not an issue for the Wards when they decided to implement technology at their farm. However had the applications not been available, the Wards say they would not have commissioned a customised package to enhance productivity within the farm. The case illustrates that where there are value-enhancing applications available (ie software packages) buyers will invest irrespective of infrastructure issues such as slow connection speed or an old PC. Although the infrastructure was not state of the art, it did not impede them from investing in applications that reduced operating costs where the benefits exceeded the additional cost.

The provision of aggregate information by Fonterra enables farmers to compare productivity across the region and the industry, but where there are only two farms in the district the information is of limited use and thus farmers are mostly interested in farm specific data. The options that farmers choose are the ones that have the most utility for them. As they are mostly concerned about the operations of their farm, industry information and aggregated data is of limited value. Nonetheless, this does not discount the possibility that if new technology has the potential to reduce the time taken for other tasks (eg remote sensors and wireless transmission), farmers may



have the time to invest in developing new ways to use this information to increase on-farm productivity. However, with present technologies and time constraints, there are higher priorities on which the scarce human resources can be productively engaged.

The Wards used family, friends and personal contacts to search for relevant software packages, as users of the application are the best advocates for the performance of the software. Although they had the ability to search on the World Wide Web which would have reduced search costs, the decision to use family and friends as advisors indicates that trust is a major factor in the decision to purchase applications. This is consistent with Locke (2002, 2003).

The case also demonstrates that, even with standard packages in a typical non-information-intensive industry, users must invest time in order learn how to use software and hardware. This learning is application-specific (Howell and Obren, 2002) rather than generic, and must be undertaken even by experienced ICT users for the benefits to accrue (Arrow, 1962; Greenwood and Yorukoglu, 1997; Atkeson and Kehoe, 2001). There is no substitute for 'learning by doing' in this respect. The ways in which the Wards are examining making changes to their operations (eg using a farm hand to record calf data during calving) are examples of the types of complementary investment that Brynjolfsson and Hitt (2002) and Greenwood and Yorukoglu (1997) identify are necessary developments that must be undertaken before measurable productivity gains will accrue.

Furthermore, the case illustrates that benefits from the use of the Internet are derived not from the infrastructure per se, but from the applications that utilise this connectivity. Merely because applications exist, or information is available via a particular medium, it does not necessarily follow that it will be utilised unless the benefits to the end user outweigh the costs. New Internet applications must have tangible benefits to the end user in order for them to be used. Hence, the Wards use online milk testing data, as there is a tangible benefit, but do not access a lot of the other data on Fencepost.com, as it is not underpinned by a positive benefit currently, given current costs, benefits and constraints (eg available time). This illustrates the derived demand for access to both the Internet and specific applications available on the Internet. It also underlines the difficulties faced by organisations such as Fonterra in gaining farmer support for



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the use of applications that collect information that is useful to the production aspects of the business, but of limited value 'on the farm', reinforcing the findings of that case study. Farmer compliance with the requirements of these systems will clearly require a significant education exercise, including reinforcing the extent of the co-operative benefit over the costs to the individual.

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