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Applying traceability across an industry

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ABSTRACT

Livestock Improvement Corporation (LIC) has a world leading capability in individual animal recording of which MINDA is the product that is most often associated with traceability. MINDA annually handles many millions of transactions that relate to individual animals, herds, farms, and the people who are associated with them. Currently, it is primarily a dairy application but other species are represented. MINDA already captures data that are required for traceability (lifetime ID, birth, death, movements, health records) on a central database, and does so using a variety of tools that suit all customer profiles. LIC systems include a trace forward/back functionality, integrated with existing internal GIS systems.

Keywords: MINDA; livestock; dairy; animal recording.

INTRODUCTION

Livestock Improvement Corporation (LIC) had its origins in the early 1900s, in regional farmer co-operatives that carried out herd recording and herd testing. In the 1980s LIC amalgamated into a national co-operative under the New Zealand (NZ) Dairy Board ownership. Ownership was subsequently moved back to dairy farmers in 2003 when Fonterra was established. LIC also listed on the NZ Stock Exchange in 2004 to allow trading between co-operative members. Therefore, LIC is a co-operative owned by farmers, for farmers. There are currently 12,004 farmer shareholders, each with equal control. Collectively, the 20 largest farmer shareholders own 1.1% of the company.

LIC has 12 directors; 9 elected farmers and 3 who are independent. The company has 470 permanent staff members and 1,500 seasonal employees. In the 2003/04 financial year LIC had a turnover of \$98 million and a surplus of \$4.8 million. This was due to a large annual research and development investment in key herd improvement activities such as genetic gain and biotechnology.

The high level aim of LIC is '*Leadership in pastoral livestock solutions*' which is achieved by providing information that will aid farmers in decision-making on-farm and when purchasing stock. These services include animal recording and management reports (MINDA), radio frequency identification (RFID) and farm automation systems, and national herd genetic evaluation of both cows and bulls. NZ can lay claim to many of the best dairy practices in the world and not the least of these is the information systems that were initially put in place over 100 years ago.

Livestock Improvement Corporation's current animal recording activity

LIC individually records large numbers of animals. This is done through a centralised animal database that was set up in 1985. There are 3.9 million adult dairy cows and 1.4 million young stock recorded

on the database, which are currently in the NZ dairy herd. Additionally, there are historical records of all animals previously recorded, dating back to 1985. That amounts to more than 30 million animals in total. Unique animal identification ensures that all the herd test production records can be genetically traced through recorded genealogy for the purposes of animal evaluation.

LIC's individual animal database ranks amongst the largest animal databases in the world. This individual animal database is not restricted to dairy animals. Currently, there are 75,000 non-dairy animals (primarily beef and goats) in 750 herds also recorded on the database. Other potential non-dairy animals for recording on the database are deer and sheep.

Though the database itself is the property of LIC, access to the information is defined in the Herd Test Regulations which come out of the Dairy Industry Restructuring Act (2001). In practical terms, this is controlled by the Core Data Access Panel, an independent committee appointed by Dairy Insight with no LIC representation. As well as LIC, there are a number of additional parties accessing data from the database. These include: dairy breed societies, veterinarians, stock agents, farm advisors, other artificial breeding companies, universities and Fonterra.

LIC operates within the Animal Health Board-approved identification scheme. This means that MINDA is approved under the Biosecurity Act and all individual animals have a unique lifetime identification tag that is with them for life.

LIC also operates the enzootic bovine leucosis (EBL) disease control scheme. This includes: a disease status allocated at a herd level, herd disease status that is updated as a result of regular tests (milk and blood), and animal movements. World Organisation for Animal Health (OIE) freedom from EBL status is anticipated to be achieved in the 2005 calendar year.

MINDA overview

Funding for MINDA comes directly from users/customers who pay to record the animal

information on the database through annual fees. This is in excess of \$10M per annum and is shared across the 12,000 clients using the MINDA service. More recently, Ambreed has entered the herd recording market. This has meant that LIC has been required to provide a system to capture that organisation's information – protecting the national database philosophy which is credited with much of the genetic gain seen in the national dairy herd.

Ninety seven percent of all NZ dairy farmers record their herd information at an animal level. This is all voluntary and is undertaken because farmers receive value from this service that outweighs the expense and effort it takes. This has not always been the case. Herd recording has always been closely aligned to herd testing and Figure 1 shows the uptake of herd testing services over many years, it paints a picture that 'Rome was not built in a day', in fact it has taken nearly a century for almost all dairy farmers to see the benefit of having a well recorded herd.

The scale of data management for an operation of this size is not insignificant. In excess of 30 million events are recorded against individual animals every year. These include 10 million herd test records (some of which come from non-LIC licensed herd testers), 4.5 million mating records (both artificial inseminations and natural matings), movement events from one location to another, births, deaths, health treatments, DNA tests, progeny test records, research trial data and many other ad hoc comments. Additionally, there are calculated fields that are updated every 3 weeks for all current animals through the Animal Evaluation Unit. This is managed through a combination of technical and human solutions. There are a suite of products and services that allow the farmer to select what level of intervention they require along with a call centre staffed by 35

customer representatives who are trained in both farming systems and LIC database systems.

Specifically related to traceability we note that in excess of 1.5 million animals have had recorded movements for the past 3 seasons, while health recording is the growth area with more and more farmers electing to use the MindaPro option for recording this. Table 1 shows the growth of health testing over the past 3 seasons. The value here is that, once recorded, the treatment moves with the animal throughout its life.

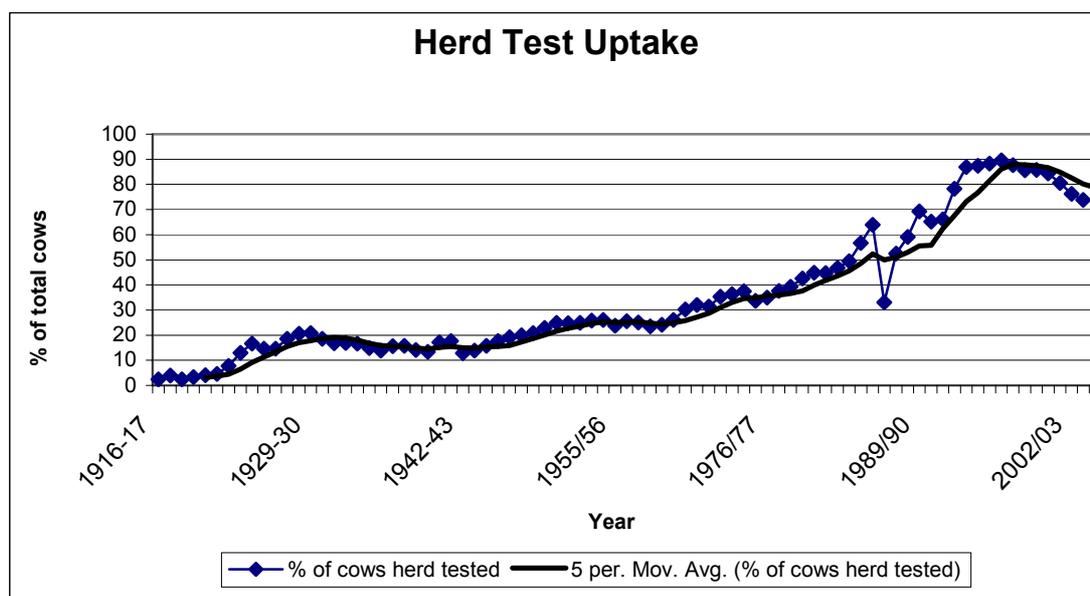
TABLE 1: Health events recorded on LIC National Database.

	2001/2002	2002/2003	2003/2004
Diagnosis	87,163	86,454	135,708
Treatment	365,781	598,621	871,777
Total	452,944	685,075	1,007,485

Over 60% of all transactions are now carried out electronically with farmers adopting the various technologies that have been offered in different forms since the early 1990s. Without doubt the advent of the Internet has lead to increased farmer uptake of these types of services with the LIC website (the portal for MINDA clients to access their herds' information) showing farmers making use of it in every hour of the day, and every day of the year.

Records taken from the database are of a similar volume and are drawn off the database in many ways, electronic readable files, PDF, flat files, Excel spreadsheets, and even paper.

FIGURE 1: The annual trend in percentage of dairy cows that are herd tested from the 1916-17 season to the present.



The basis of the system is a unique animal record that includes information such as, parents, offspring, matings, gender, breed, birth date, milk production, disease treatments, movements and genetic indices. This links to a dimension, which we refer to as the herd, where information such as disease status, herd owner/manager details and addresses are added. Finally, this information is linked to a unique location of a farm at a specific location which has other information such as GPS location associated with it.

This system works when industry drivers encourage action from a customer to correctly record and notify these to LIC. The events-based database has many business rules that provide encouragements to the farmer to let LIC know of the events. One simple example is that in order for a cow to have a herd test recorded it must first have a calving date recorded, i.e. without having calved there is no milk to be sampled. In turn, the farmer does not receive information back on this animal (other than raw data) until the calving is recorded. Though there are many examples of non compliance, this approach has lead to a high level of integrity of data on the database.

Internationally, uptake of MINDA compares well to countries where legislation requires recording. This has, as indicated earlier, taken many, many years, not something that the other industries are likely to have.

Data entry reporting

Now that electronic data management is with us, MINDA usage is dominated by Internet-based products (see Table 2). Since the launch of E Minda software in 2002, we have seen farmer usage of the electronic systems increase from 15% to 64%.

A clear and present issue with anything that is part of NZ's low cost milk production system is the cost of services and as a result of high penetration levels and a board of directors who are mostly farmers themselves LIC provides the services through low cost software from \$40 per month for an average size herd.

TABLE 2: Data entry options used for MINDA

Data input	Report outputs	
Paper	Paper/pdf	36%
Electronic	Paper/pdf	36%
Electronic	Electronic	28%

Traceability options for MINDA

Traceability is constrained by the ability to centralise all this individual information. The LIC database was built specifically with this in mind and as such is adequately equipped to provide any number of specific reports of which animals have been where at what time, with the only significant constraint being the time a farmer may take to inform LIC of the activity.

A recent presentation to a pan industry group considering traceability in NZ highlighted the current capabilities of MINDA with regard to the issues

surrounding traceability. LIC held that on an industry-wide basis it can provide;

- Lifetime animal identification
- Birth, movement, and death records
- Health records
- Location details, for example linked with LINZ database
- Animal ownership, management and responsibility details.

Comparing this with the listed requirements of an internationally acceptable traceability system;

- On-farm and centralised recording of trace data
- Centralised management of all records
- Provision of trace forward and backward
- Geographic information system (GIS) analysis of trace events
- Integration of information with other organisations.

LIC's capabilities were therefore demonstrated to be capable of delivering all that is expected from our trading partners.

Challenges in implementing a national system have ranged from human inertia, to lack of perceived benefits, to technical barriers, all of which take persistency and innovation to overcome. LIC has not achieved this overnight. A penetration level in excess of 90% in a voluntary market requires people on the ground, innovators in the backroom and politicians all working toward our goal of 100% involvement. This is what we have been told is needed to secure the long term access to overseas markets for our dairy products.

Further details on the MINDA system can be sourced from:

http://www.lic.co.nz/main.cfm?menuid=96&sub_menuid=98