Computer Use and Attitudes for A Sample of Canterbury, New Zealand Dairy Farmers

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Farm and Horticultural Management Group

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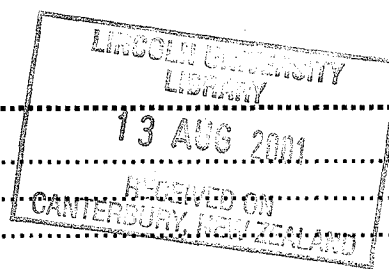>
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Abstract

With the objective of collecting data for assessing research hypotheses about information management, a mail survey was carried out on Canterbury dairy farmers between July and August of 2000. From a total of 537 questionnaires sent, 300 were received, resulting in 290 usable responses. This report describes the average farm, farm sizes, the manager's dairy farming experience and age, tenancy, education, management teams, non-family people giving a reasonable input into farm decision making, farm office equipment used, computer use, software utilisation, information sources, internet use, farmer goals, and farmer opinions about information management. While almost three quarters of the farmers own a computer, 61% are using computerised systems to manage farm information. Financial management was the most common use of computers with 54.48% of the farmers using them in this way, followed by the livestock area with 35.17%, while only 16.9% of the farmers were using software to support their feed management. Farmers using computerised systems were younger, more educated, and more profit oriented than non-users. This group managed bigger farms, they have been farming less time both in Canterbury and in total, and they also used farm advisers more extensively in their decision making, and they spent more time doing office work.

Contents

Tables

1. Introduction

As part of a PhD thesis[1] a mail survey of Canterbury dairy farmers was carried out. The purpose of the survey was to collect part of the data needed to assess some research hypotheses related to farmer adoption, and the usefulness of computerised information systems. The aims of this paper are to present some of the data and provide a discussion relative to the research topic.

A survey questionnaire was sent to 537 dairy farmers whose farms are located in Canterbury, New Zealand[2]. From these, there were returned 290 usable responses. This represents a good response rate according to Lincoln University-Farm Management Group mail survey history[3].

The original farmer database included the number of cows on each farm. This variable was used to compare the population (537 dairy farmers) with the 290 answers. Table 1 shows the percentages of different herd size groups for both the population and the sample.

Table 1.1 Herd size distribution

Herd class (cows)	Population (537 Canterbury dairy farms) %	Responses (290) %	Difference
Less than 150	13.44%	10.18%	3.26%
150-299	22.13%	20.70%	1.43%
300-449	20.16%	20.35%	-0.19%
450-599	15.61%	17.19%	-1.58%
600-899	19.76%	21.40%	-1.64%
More than 899	8.89%	10.18%	-1.28%

Chi-square=3.9 p>50%

The Chi-square test indicates that the differences are not significant. However, it seems that farmers with large herds had a greater response rate than small herd farmers.

The questionnaire covered six sections -General, Farm information management, Farm office, Computer usage, Information sources and Manager. A copy of the questionnaire is given as appendix 1.

The data is presented following the original order.

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[1] Research project: A study of factors affecting the adoption and usefulness of information system innovations: the case of Canterbury and Uruguayan dairy farmers

2 Livestock Improvement Corporation provided this original list on June of 2000.
[3] Nuthall, P. (2000), pers com.

2. Survey results

2.1 The average farm

Table 2.1 presents a group of statistics that describe the average Canterbury dairy farm.

Table 2.1 Average Canterbury dairy farm

	Effective area (hectares)	Cows (head)	Heifers (head)	Calves (head)
Average	167	478	111	132
Std Dev.	123	374	92	109
Median	140	400	95	104
Mode	150	500	100	100
Maximum	1050	2850	700	900
Minimum	30	46	0	10

The average farm is a little larger than the model used by the Ministry of Agriculture and Forestry for the Farm Monitoring report. Their Canterbury dairy farm has an effective area of 155 hectares, 440 cows and 100 heifers[4].

The farm effective area provides pasture resources for grazing as the largest component of animal intake. Feedcrops and pasture resources from other areas (a runoff) usually complement the first feed source. Additionally, some farmers purchase reserves and other animal meal to complete their cow diet.

Table 2.2 presents the percentages of farms that use additional feed resources and the average amounts.

Table 2.2 Feed sources used

Farms that use:	Percentage	Average amount/farm*
Feedcrop	27%	36 hectares
Runoff	56%	96 hectares
Purchased feed	67%	33,695 dollars

* The averages were calculated among farms that used the extra-feed resource.

Eighty eight percent of the farms complement their effective area grazing resources with at least one other feed source.

2.2 Farm size

The number of cows, as shown below in Table 2.3, was selected to reflect farm size. Six farm size classes were developed.

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[4] Ministry of Agriculture and Forestry (1999) Farm Monitoring Report: South Central Region.

Table 2.3 Farm size groups

Herd classes (cows)	Number of farms	Effective area/farm hectares (average)	Cows/farm (average)	Heifers/farm (average)	Calves/farm (average)
Less than 150	30	59	101	26	34
150-299	65	84	213	56	64
300-449	63	127	358	80	104
450-599	54	175	512	113	138
600-899	52	229	693	176	199
More than 899	26	453	1364	315	357

As Table 2.4 shows the stocking rate increases with the farm and herd size. It appears Large herd farms are more intensively production oriented. However, the t-test shows that the means are statistically different between the first herd class (less than 150 cows) and the second (150-299 cows) – t= -1.908 p=6%, and again between the first one and the largest class (more than 899) –t=-1.902 p=6%.
On the other hand, small herd farms show larger replacement rates. The only significant differences were between herd class 150-299 cows and herd class 300-449 cows –t=-2.312 p= 2.3%. Note, however, that this data does not allow for purchased feed and run-offs.

Table 2.4 Stocking and replacement rate and farm size

Herd classes (cows)	Stocking rate (Cows/hectare)	Replacement rate (Heifers/cow)	Replacement rate (Calves/cow)
Less than 150	1.71	0.26	0.34
150-299	2.54	0.26	0.30
300-449	2.82	0.22	0.29
450-599	2.93	0.22	0.27
600-899	3.03	0.25	0.29
More than 899	3.01	0.23	0.26

2.3 Dairy farming experience and age

Farmers were asked how long they have been dairy farming in the region and in total. Table 2.5 shows the details.

Table 2.5 Farmers' dairy farming experience

	Dairy farming years in Canterbury	Dairy farming years in total	Farmer age (years)
Mean	13.3	18.9	43.3
Std Dev.	12.4	11.9	9.6
Median	10.0	18.0	43.0
Mode	3.0	20.0	46.0
Maximum	60.0	60.0	23.0
Minimum	0.0	0.0	80.0

On average, farmers have been (dairy) farming almost 19 years, 6 out of the region, and 13 in Canterbury. The dairy farming experience variable has been grouped into four classes. The first includes what might be called the developing stage of a dairy farm, that is less than 5 years of experience. The second involves the consolidation stage, involving farmers dairy farming from 5 to 10 years and the third involves farmers from 10 to 30 years, which might be called a consolidated stage, and finally, a fourth class includes farmers with more than 30 years of dairy farming, which could be called exit stage of dairy farming. This grouping might be incorrect in that the pre-dairying history for the existing owners is not known.

Table 2.6 shows the number of farmers that result from combining both Canterbury and total experience variables.

Table 2.6 Percentage of farmers according their dairy farming experience in Canterbury, and in total (290 responses)

Percentage of farmers	Dairy farming in Canterbury				
Dairy farming in total	Less than 5 years	Between 5 and 10 years	Between 10 and 30 years	More than 30 years	Total
Less than 5 years	8.28%	0.00%	0.00%	0.00%	8.28%
Between 5 and 10 years	6.90%	9.31%	0.00%	0.00%	16.21%
Between 10 and 30 years	15.86%	6.55%	33.79%	0.00%	56.21%
More than 30 years	2.41%	0.34%	2.07%	14.48%	19.31%
Total	33.45%	16.21%	35.86%	14.48%	100.00%

Chi-square=684 p<0.1%

Farmers who have more years of dairy farming in total than in Canterbury have clearly started their activities in other regions. At the developing stage, from a total of 97 farmers, only 24 farmers seem to have started their operations in Canterbury. On the other hand, some farmers with more than 30 years of dairy farming in total started their business in the region.

Table 2.7 Average difference between total and Canterbury dairy farming experience (years)

	Dairy farming in Canterbury				
Dairy farming in total	Less than 5 years	Between 5 and 10 years	Between 10 and 30 years	More than 30 years	Overall average difference
Less than 5 years	0.1				0.1
Between 5 and 10 years	4.7	0.4			2.2
Between 10 and 30 years	14.1	8.7	2.9		6.7
More than 30 years	32.2	24.0	21.5	1.3	7.7
Overall average difference	10.0	4.3	4.0	1.3	5.6

Table 2.7 shows that farmers with less than 5 years of dairy farming in Canterbury have started, on average, dairy farming 10 years before, those between 5 and 30 years of dairy farming in the region have started 4 years before, and those with more than 30 years in Canterbury have largely started in the region.

In the eighties, dairy farmers from the North Island came to Canterbury to start new dairy farms to take advantage of lower land prices.

The next table shows the average age of each subgroup of farmers that have been counted in the former table.

Table 2.8 Average age of farmers according their dairy farming experience in Canterbury, and in total

Dairy farming in total	Dairy farming in Canterbury				
	Less than 5 years	Between 5 and 10 years	Between 10 and 30 years	More than 30 years	Overall average age (yrs)
Less than 5 years	48ab				48
Between 5 and 10 years	34ab	35			35
Between 10 and 30 years	40a	38	43a		42
More than 30 years	54		51	56	55
Overall average age (yrs)	41	36	44	56	43

Notes: "a" means statistical difference between one average and the following, "b" means statistical difference between one figure and the next. t-test=6.48 p<0.1%; t-test=4.32 p<0.1%; t-test=-3.22 p=0.2%; t-test=7.39 p<0.1%; t-test=-5.516 p<0.1%, and t-test=-2.87 p=0.5% (top-botton,left-right).

It is interesting to note that farmers who started developing their dairy farms in Canterbury without coming from other regions are relatively older than those who came from outside. Within this group of 24 farmers (with less than 5 years of dairy farming in Canterbury), more than a half are 45 or more years old. It is likely that these were sheep and crop farmers who decided to complement, or change, their former farming to dairying.

2.4 Tenancy

Farmers were asked to define themselves as either owner, sharemilker (50/50 type) or contract milker (other than 50/50 type). The next table shows that 59% of farmers identified themselves as owners while 22% as sharemilkers.

On average, sharemilkers (50/50) are 10 years younger than owners, and they manage larger herds. The t-test shows highly significant differences in both cases.

Table 2.9 Tenancy, age and herd size

Tenancy	Percentage of farmers	Average age (years)	Average herd (head)
Owner	58.97%	46*	410**
Sharemilker 50/50	21.72%	36*	574**
Sharemilker <50/50	0.34%	49	350
Other	2.41%	35	893
Unknown	16.55%	44	538
Total	100.00%		

*t-test=10.895 p<0.1%; **t-test=-3.178 p=0.2%

2.5 Education

Farmers were asked their formal education background in five categories: primary or less, equal or less than 4 years of secondary, more than 4 years of secondary, equal or less than 2 years of tertiary, and more than 2 years of tertiary. Table 2.10 gives the details.

Table 2.10 Education

Education level	Number of farmers	Percentage	Average age	Average herd size (head)
Primary or less	4	1.43%	68a	145*
Secondary. Equal or less than 4 years	136	48.75%	53b	447**
Secondary. More than 4 years	31	11.11%	53c	424
Tertiary. Equal or less than 2 years	37	13.26%	43	520
Tertiary. More than 2 years	71	25.45%	41	571
Total	279	100.00%		

a primary or less average age is statistically different from other education levels (t-test=5.195 p<0.1%; t-test=4.614 p<0.1%; t-test=7.189 p<0.1%; t-test=6.799 p<0.1%)
b secondary (=<4 yrs) average age is statistically different from both tertiary education levels (t-test=4.073 p<0.1%; t-test=3.495 p=0.1%)
c secondary (>4 yrs) average age is statistically different from tertiary (=<2 yrs) (t-test=1.828 p=7.2%)
* primary or less average herd size is statistically different from other education levels (t-test=-1.776 p=7.8%; t-test=-5.770 p<0.1%; t-test=-2.246 p=3%;t-test=-1.715 p=9.1%)
** secondary (=<4 yrs) average herd size is statistically different from tertiary (>2 yrs) (t-test=-2.129 p=3.4%)

More than 60% of the dairy farmers have a secondary level of education, while almost 40% have tertiary education. The higher the education background, the younger (on average) the farmers are. Education is correlated with age and has a Spearman's correlation coefficient of -0.279 (highly significant). Likewise, the higher the education background, the larger the herd. The Spearman's correlation coefficient is 0.174 between education and number of cows (highly significant).

2.6 Management team

Farmers were asked to describe whether management responsibilities were assumed personally, or whether they were shared within the family group. The next table shows that 19% of respondents state that they carried out the management job personally. Those who share their management work with their partner or spouse are in the majority (more than 60%). Almost 3% of farmers stated that they share decision making with brother(s) and, finally, the other 19% of farmers said that the whole family carries out the management work. This last group had the older average age. Couple management teams have the youngest average age, but the differences are not significant.

The following graph shows that "couple" management teams are common among sharemilkers. Conversely, owners show higher percentages of "whole family" and "brothers" management teams than sharemilkers. The chi-square test shows a high level of significance.

Female participation is more likely to occur in farms that are managed by "couple" management teams. This issue is discussed later with respect to computer ownership and computerised information systems use.

Table 2.11 Management team and age

Management team	Number of farmers	Average farmer age
1-Myself	18.97%	43*
2-Couple	60.34%	41**
3-Father/Mother and Sons/Daughters (F/M and S/D)	17.93%	50
4-Brothers/Sisters (B/S)	2.76%	45
Total	100.00%	

*farmer "Myself" average age is statistically different from Father/Mother and Sons/Daughters (t-test=-3.379 p=0.1%)
**farmer "Couple" average age is statistically different from Father/Mother and Sons/Daughters (t-test=-5.074 p<0.1%)

Structure of the management team and tenancy

Management team structure

Legend: 1-Myself 2-Couple 3-F/M and S/D 4-B/S
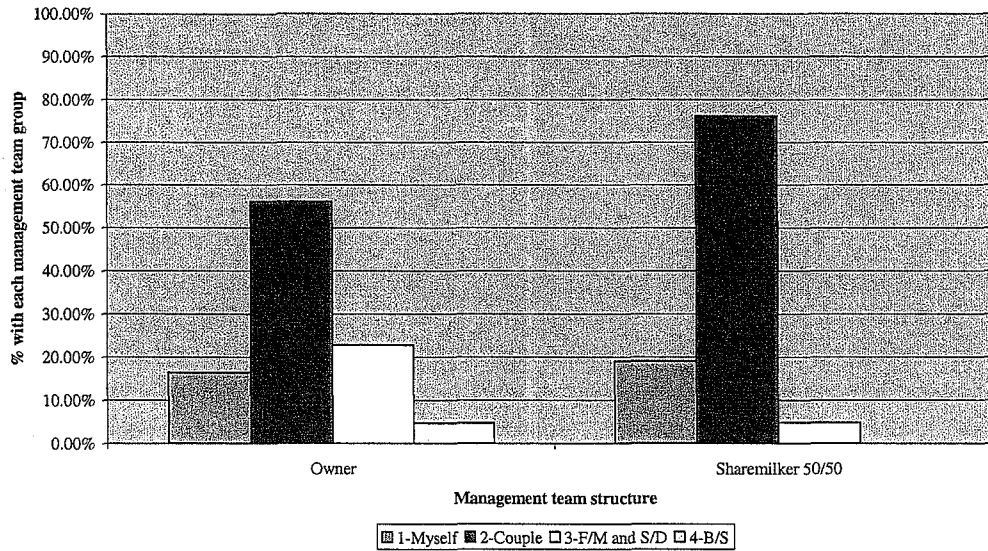
See Table 2.11 for definitions

2.7 Non-family people who give a reasonable input into farm decision making

Farmers were asked whether they involved non-family people through asking for ideas or suggestions as input into their farm decision making. Four types were suggested: advisers, accountants, lawyers, and friends/neighbours. Four levels of involvement were suggested: none, a little, quite a lot and heavy involvement.

Table 2.12 Management involvement by Non-family members

	Percentage who are involved			
	None	A little	Quite a lot	Heavy
Adviser	34.83%	28.28%	28.62%	8.28%
Accountant	33.45%	46.21%	16.90%	3.45%
Lawyer	71.38%	27.24%	1.03%	0.34%
Friend/neighbour	74.48%	20.00%	4.83%	0.69%

Advisers and accountants are the main contributors. Both show a similar level of involvement, but advisers seem to be more intensively involved than accountants. Lawyers and friends/neighbours are very much less involved.

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2.8 Farm information management

2.8.1 Financial recording system (FRS)

Farmers were asked to describe which type of FRS they were using. Five alternatives were suggested: an informal system (such as memory to record, informal writing might be used such as notes on calendars, and off-farm printed reports as backup information), a manual FRS (such as a cash book), a computerised FRS (software), a combination of manual and computerised FRS, and a system based on a service that might be provided by an accountant. The farmer was allowed to tick one or more alternatives. To process this variable the responses were coded in the following order:

a) If a computerised FRS was involved, the farmer was classified into this group.

b) For the remaining farmers, it they use a "service system", they were classified into the "service system" group.

c) For those not classified above, if a manual system was used, they were put into this group.

d) The remaining farmers were put into the "informal FRS" group.

Table 2.13 presents the results. A large majority of Canterbury dairy farmers used a computerised information system, and 20% of these farmers used a service system.

Table 2.13 Financial recording system

Financial recording system (FRS)	Number of farmers	Percentage of Total
Computerised FRS	158	54.48%
Service FRS	56	19.31%
Manual FRS	44	15.17%
Informal FRS	32	11.03%
Total	290	100.00%

Farmers who were using computerised FRS were asked to identify which software package they were using. Table 2.14 presents the results involving seventeen commercial brands. However, almost 80% of farmers who identified their software were using one product, with just 5% using the second most important.

Table 2.14 Range of computerised financial recording system

Computerised FRS	Software name	Number of users
	Brand 1	99
	Brand 2	6
	Brand 3	2
	Brand 4	2
	Brand 5	1
	Brand 6	1
	Brand 7	1
	Brand 8	1
	Brand 9	1
	Brand 10	1
	Brand 11	1
	Brand 12	1
	Brand 13	1
	Brand 14	1
	Brand 15	1
	Brand 16	1
	Brand 17	1
	Spreadsheet	4
	Non identified	32
Total		158

2.8.2 Feed (pasture) recording and management system (Feed RS)

Farmers were asked to describe their Feed RS. Five alternatives were provided. Systems based on: (i) farmer memory, (ii) on notes in calendars, (iii) a manual system based on pocket notebooks, farm diary, field record books, or similar, (iv) a computerised recording scheme, and finally, (v) on an off-farm service. Farmers could tick one or more alternatives. The answers were coded following a similar procedure that was described above for the FRS.

Table 2.15 Feed recording and management system used by farmers

	Number of farmers	Percentage of Total
Computerised Feed RS	49	16.90%
Service	40	13.79%
Book	126	43.45%
Calendar	16	5.52%
Memory	59	20.34%
Grand Total	290	100.00%

* See text for an explanation of the categories

Table 2.15 shows the results. The majority use a manual device, such as a book or similar, or a calendar, with only 17% using a computer system. This is in contrast to the FRS situation. The second largest group are those who solely relied on their human capacities. A few used an off-farm service. Farmers using computers were asked to name the software that supported the information management. See table 2.16

Table 2.16 Range of computerised feed recording and management system

	Software name	Number of users
	Brand 1	7
	Brand 2	3
	Brand 3	2
	Brand 4	1
	Brand 5	1
	Brand 6	1
	Brand 7	1
	Brand 8	1
	Brand 9	1
	Brand 10	1
	Brand 11	1
	Brand 12	1
	Own programme	5
	Spreadsheet	17
	Non identified	6
Total		49

Twelve brands of commercial information systems were identified, with 33% using one product and 14% the second most important brand. An important number of farmers used spreadsheets to manage feed information. Adding these to those who said that they used their own programme (which may be developed on a spreadsheet), this group represents 55% of the farmers who have identified the kind of software they were using.

2.8.3 Livestock recording and management system (LSRS)

Farmers were also asked to describe their LSRS. The same five alternatives as offered for Feed RS were given. The next two tables show the results.

Table 2.17 Livestock recording and management systems

	Number of farmers	Percentage of Total
Computerised LSRS	102	35.17%
Service	66	22.76%
Book	118	40.69%
Calendar	1	0.34%
Memory	3	1.03%
Grand Total	290	100.00%

Table 2.18 Range of computerised livestock recording and management systems

	Software name	Number of users
	Brand 1	66
	Brand 2	16
	Brand 3	2
	Brand 4	1
	Own programme	1
	Spreadsheet	1
	Non identified	15
Total		102

The majority of farmers (41%) used a manual system. The next group (35%) are those that used computerised LSRS. Finally, a third group (23%) managed their livestock information through an off-farm service.

Farmers who used computerised LSRS were asked to identify the software used. Table 2.18 shows the results. The majority of these farmers (76%) that identified their software used one commercial product. The second most important product was used by 18% of these farmers.

2.8.4 GST returns

Farmers were asked to identify the person responsible for doing the GST returns. Table 2.19 shows the results.

Table 2.19 Percentage of farmers, age and herd size related to the person doing the GST returns

	Number of farmers	Percentage of farmers	Average farmer age (years)*	Average herd (head)**
Accountant	82	28.28%	44	510
Farmer	94	32.41%	44	430
Spouse/Partner	94	32.41%	42	458
Son/Daughter	3	1.03%	50	281
Other	13	4.48%	41	844
None mentioned	4	1.38%	42	368

*Chi-square=165 p<001%; **Chi-square=156 p<001%.

Approximately one third of GST returns are completed by accountants, similarly for spouses and farmers. Those who pay an accountant or ask an employee have larger herds.

2.9 The farm office

2.9.1 Office work

Farmers were asked the proportion of their total work devoted to management tasks and how many hours they spent doing office work per week. Table 2.20 shows the results.

Table 2.20 Office work

	Management work (% of total work time)	Farm office work (hours per week)
Mean	25.5%	10.5
Std	20.2%	10.2
Median	20%	7
Mode	10%	10
Maximum	95%	60
Minimum	0%	0

On average farmers spent a quarter of their time on management work. This appears to represent 10.5 hours per week. At the same time, notice that some farmers did not perform any formal management work and others stated that their jobs were largely all a farm management operation.

2.9.2 Office equipment

Farmers were asked to identify which equipment they used for helping their management and office work. Table 2.21 presents the results.

Table 2.21 Office equipment

Equipment type	% Owning
Fax machine	89.3%
Telephone answering machine	81.4%
Cellular phone	76.6%
Photocopier	70%
Computer	73.8%

In addition to this equipment, 10 farmers stated that they used a hand help computer (palm pilot) and 3 others stated that they used a scanner. Clearly the respondents farmers are well versed with electronic equipment

The percentage of computer uptake has been increasing since it started to be measured. Measures in New Zealand started in 1986, when a 5.6% of computer ownership among New Zealand farmers was reported (Pryde and McCartin, 1987). In 1993 the percentage rose to 24.4%(Nuthall and Bishop-Hurley, 1994), and in 1998 a new measurement showed 42.72% of farmers having computers (Nuthall and Benbow, 1999).

2.10 Computer use

Farmers were asked to identify the person who was the main user of the farm computer. The results are presented in the next table. Clearly, farmer and his/her partner or spouse are the main operators.

Table 2.22 Main computer user

Computer user	Number of famers	Percentage of computer users
Spouse	95	49.48%
Farmer	86	44.79%
Other family member	8	4.17%
Hired personnel	2	1.04%
Other	1	0.52%
Does not have a computer	98	
Total	290	

Table 2.23 shows how long the farm computer user has had a computer, what are the main uses of the machine and the average time per day that the computer is in use.

Farmers were also asked to identify their computer use routine. Seven alternatives were given to answer this question (see annex 1 question 17). Table 2.24 presents the results.

Table 2.23 Computer user experience, uses and use time

	Computer user experience (years)	Farm business (average % of total use)	Learning and education	Leisure/ personal	Commu nication	Off farm business	Average computer use time (hours/day)
Mean	7.4	63.67%	14.76%	14.56%	12.62%	17.28%	1.5
Std	5.2	2.01%	1.34%	1.11%	0.91%	2.16%	1.3
Median	6.0	70%	10%	10%	10%	10%	1.0
Mode	10.0	80%	10%	10%	10%	10%	1.0
Maximum	25.0	100%	100%	60%	80%	90%	12.0
Minimum	0.4	0%	0%	0%	0%	0%	0.15

Table 2.24 Computer use routine

	Total
On rainy days	0.56%
A regular period each month	16.67%
A regular period each week during daytime	17.22%
A regular period each week during evenings	14.44%
In irregularly available spare time	20.00%
Exactly when need arises	30.00%
Other	1.11%
Total	100.00%

2.11 Software utilisation

Farmers were asked to identify the types of software used and the time per month spent on each type. Table 2.25 shows the results.

Table 2.25 Types of software used

Software category	Percentage of users/computer owners	Average time per month (hours)*
Word-processor	42.52%	7.5
Financial and accounting recording system	59.81%	9.2
Pasture and crop record system	14.49%	4.8
Livestock record system	39.72%	7.3
Feed budgeting,	14.49%	4.4
Herd testing,	21.03%	4
Integrated farm management package	3.27%	2.3
Other spreadsheet use	14.95%	5.3
Other database use,	2.34%	4.2
Internet	51.87%	7.3
E-mail	54.67%	4.5

* The average was calculated among those who declared some use.

2.12 Information sources

Farmers were asked to identify which information sources are used on their farms. Ten sources were suggested (see annex 1 question 18). Respondents were asked to use a 1 to 3 scale where 1 means that this source is not used at all, 2 means a little and 3 means an important use. Table 2.26 contains the results.

Table 2.26 Information sources

Information source	An important use	A little use	Not used	Non-response
Daily newspaper	27.24%	56.21%	10.34%	6.21%
Farm publications	47.24%	43.10%	3.10%	6.55%
Commodity newsletter or magazines	15.17%	46.90%	25.52%	12.41%
Breed journals	9.66%	27.24%	46.90%	16.21%
Electronic news	3.10%	22.76%	53.45%	20.69%
Daily farm reports on radio or television	6.55%	40.34%	38.28%	14.83%
MAF reports	6.21%	39.31%	35.86%	18.62%
LIC advisory service publications	37.24%	43.10%	10.69%	8.97%
Field days/seminar	38.28%	40.00%	9.66%	12.07%
Neighbours/local contacts	20.69%	53.10%	11.03%	15.17%

The main sources of information seems to be farm publications, LIC advisory service publications and field days or similar events. Secondly, farmers get information from daily newspapers, neighbours or local contacts and commodity newsletter or

magazines. In last place appears the use of electronic media as a source of information.

2.13 Internet

Farmers were asked to identify which types of information or service they obtained from the internet. From 290 responses, 111 (38%) and 117 (40%) farmers identified themselves as internet and e-mail users respectively. Ten types of information were suggested for helping answering this question (see annex 1 question 19). Respondents were asked to use a 1 to 3 scale where 1 means that this type of information or service is used very occasionally, 2 means occasionally and 3 means frequently. The next table presents the results.

Internet is mainly used for electronic mail, although significant use is made of the media to obtain dairy company news. Ordering equipment and supplies and latest research results appears next. Finally, the other kinds of information or services show little use.

Table 2.27 Internet use

Type of information or service get from internet	Frequently	Occasionally	Very occasionally	Non-response
E-mail	27.93%	16.21%	7.24%	48.62%
News and weather information	2.41%	10.69%	27.24%	59.66%
Market information	2.76%	7.93%	25.86%	63.45%
Technical information	3.45%	9.31%	23.45%	63.79%
Economic information	1.72%	5.86%	27.24%	65.17%
Updates on changes to agricultural legislation	2.41%	12.41%	27.93%	57.24%
Latest research results	3.10%	15.17%	21.72%	60.00%
Entertainment and fun	1.72%	4.48%	28.97%	64.83%
Ordering equipment and supplies	7.24%	15.52%	20.00%	57.24%
Dairy company news	16.90%	13.79%	11.72%	57.59%

2.14 Farmer goals

Farmers were asked to rank their goals using seven suggested statements on a 1 to 5 scale where 1 means not important and 5 means very important (see annex 1 question 20). The next table presents the results.

All the goals proposed were ranked highly. The ranking has "enjoying farming" as the most important goal, with "achieving high profits" second, "to provide an income to raise farmer's family" third, "farming in a sustainable way" fourth, "achieving high farm production" and "having a reasonable income and plenty of time to enjoy other interests" follow with the lowest ranked goal "to be a top farmer".

Table 2.28 Importance of farmer goals: percentage of farmers in each category

Goal\Goal ranking	Not important	A little important	Moderately important	Quite important	Very important	Non response
To be a top dairy farmer	4.83%	4.14%	17.24%	25.86%	41.72%	6.21%
To achieve high farm production	3.79%	1.72%	12.76%	22.41%	54.14%	5.17%
To achieve high profits	1.38%	0.69%	6.55%	14.83%	72.41%	4.14%
To enjoy farming	0.69%	1.03%	4.14%	15.17%	75.52%	3.45%
To provide an income to raise my family	4.14%	1.38%	6.21%	14.48%	66.90%	6.90%
To farm in a sustainable way	1.72%	1.72%	11.03%	28.28%	52.07%	5.17%
To have a reasonable income and plenty of time to enjoy other interests	1.72%	4.83%	12.41%	17.93%	57.24%	5.86%

2.15 Farmer opinions about their information management

The final three questions gave to farmers were open type ones asking them about their ideas or suggestion about what is wrong, if anything, with their current information system; what new/better information/decision system they would like; and what new things they have done in the last 3 years for improving their information management (see questions 23, 24 and 25 in annex 6.1).

Tables 2.29, 2.30 and 2.31 present the results.

Only 33% of responders (from 290 usable responses) answered question 23. Some farmers stated more than one idea or suggestion. Each answer of these multiple responses was considered separately.

Farmers who thought that there was nothing wrong with their current information systems represent 13.5%. It can be guessed that this percentage is higher because some farmers who did not answer this question may feel satisfied with their current information systems. The other responses were grouped into four main explanations, (i) those related to the farmer him/herself, (ii) those that can be associated with technical/operational problems, (iii) those that involve information system off-farm components, and (iv) those that are components of the on-farm information system.

Each group contained 34.38%, 5.21%, 9.38% and 37.5%, respectively, of the farmers.

Within the first group (difficulties that involve the farmer him/herself), the main thing that farmers identified is their lack of time for improving information management. Farmers might know what was wrong, or what could be improved, but they have other priorities to improving a better information system. However, 57% of these farmers (who stated lack of time as a main constraint) have made changes during the last 3 years.

The farmers commenting on the information systems themselves were divided into three categories. One related to specific functions such as recording, storing and retrieving; a second involved information tools, and finally a category that refers to the whole information system. Each subgroup counts for 5.21%, 21.88% and 10.42% respectively.

Within the first category (5.21% of farmers), recording was identified as a major problem. In the second subgroup some farmers focused on the lack of computers, and the need for a computer upgrade, as information management constraints. Some farmers identified problems with available software. Finally, 10.42% of farmers identified the information problem as a broader one that might be solved by changing the whole information system.

Table 2.30 presents the results from question 24. This question was answered by only 20% of the respondents. Again, like question 23, some responses involve more than one idea/suggestion. Each of these was analysed separately. Answers were grouped into three categories, (i) those that relate changes to the farmer, (ii) those that have solutions from on-farm tools, and (iii) those that asked for off-farm tools/services. Possibly because the way that question 24 was asked (it is not immediately evident that the farmer is part of the farm information system), very few farmers focused change on themselves. The other two categories received approximately 50% each.

Within the second category (solution using on-farm tools), more than 30% of the responses focused on using a computer to improve information management. The use of a palm pilot was also suggested. Other farmers focused on the need for better software, especially for feed budgeting.

Those who proposed changes to off-farm tools/services, requested better local information, and suggested a web site with relevant information and links to dairy farmers. Others asked for better consultant services.

Table 2.29 Answers to the question "Any ideas or suggestions about what is wrong with your current information/decision system?"

	Percentage of respondents	
It is O.K.	13.54%	13.54%
Farmer related difficulties		
Enjoy being outside too much	3.13%	
Lack of time	23.96%	
Isolation	1.04%	
Computer illiterate	3.13%	
Internet illiterate	1.04%	
Lack of computer skills	2.08%	34.38%
Technical problems		
Problem to access Internet	3.13%	
Problem receiving LIC data	1.04%	
Unable to record on line information	1.04%	5.21%
Off farm components		
Conflicting information	2.08%	
Information overload	6.25%	
Lack of local information	1.04%	9.38%
FMIS		
Functions		
Lack of recording	3.13%	
Lack of storing	1.04%	
Slow to retrieve information	1.04%	5.21%
Tools		
Lack of computerisation	6.25%	
Need computer update	5.21%	
Unfriendly software	2.08%	
Unreliable software	1.04%	
Unsuitable software	3.13%	
Irrelevant information from software.	1.04%	
Lack of integration	2.08%	
Too many different systems/packages	1.04%	21.88%
General		
Problem to use information	2.08%	
Information is not always available	1.04%	
Not quick at forecasting trends	1.04%	
Lack of formalisation and /or organisation	6.25%	10.42%
Total	96	100.00 %

Table 2.31 presents the results from question 25. This question was answered by more than half the respondents. Like the former question, some farmers gave multiple examples of things done during the last 3 years to improve their information systems. Each action was treated separately.

Answers were grouped into four categories, (i) those that focused on improving farmer information management skills (1.42%), (ii) those that upgraded farm office capabilities (51.88%), (iii) those that involved a change in the information system (17.45%), and finally (iv) those that addressed new, or greater access to information (29.25%).

Very few farmers stated that they had learned how to use a computer, however farm office upgrades mainly involved having a computer, or upgrading it. This improvement is usually associated with a software purchase or upgrade. Some farmers introduced the use of palm pilots and other office devices such as fax and answering machines.

Some farmers said that they reorganised their entire information system, others focused on the recording function, introducing the use of tools such as a pasture probe, diary and cashbook.

Farmers who addressed new information sources focused on employing farm consultants, taking part in discussion groups, more reading, especially farm publications and the use of internet, as well as participating in field days and seminars.

Table 2.30 Answers to the question "Any ideas or suggestions as to what new/better information/decision system you would like?"

Percentage of respondents

Farmer information management skills		
A shift from reactive to proactive decision making	1.61%	
Always have an open mind, read, listen and develop ideas	1.61%	3.23%
On farm tools		
More use of computer	29.03%	
Better use of computer	1.61%	
Tools like palm pilot that can be use in the paddocks	4.84%	35.48%
Better software		
Feed budgeting	8.06%	
Herd management	1.61%	
Irrigation management	1.61%	
Accounting	1.61%	12.90%
Off farm tools/services		
Better use of radio programmes	1.61%	
Channel information through Dairy Co.	1.61%	
Local information	11.29%	
Employ a consultant	3.23%	
Better adviser service	6.45%	
Improve farm publications	1.61%	
Web site with relevant information	8.06%	
More oversea information	1.61%	
Access to top farmers	3.23%	
Better climate information	3.23%	
Improve research information presentation	1.61%	
Information suitable for small dairy farm	1.61%	
Meeting with scientists	1.61%	
More use of research	1.61%	48.39%
Total	62	100.00%

Table 2.31 Answers to the question What new things, if any, have you done in the last 3 years to improve the information you have for making decisions? (for example, you have started using a new diary, or you have purchased a computer, subscribed to a new magazine...).

	Percentage of respondents	
Farmer information management skills		
Learn to use computer	1.42%	1.42%
Office		
Computerisation		
Computer purchase/update/upgrade/use	28.77%	
Software purchase/use/upgrade	16.04%	
Palm Pilot	3.77%	48.58%
Other machines		
Answering machine	0.94%	
Fax	2.36%	3.30%
Reorganise FMIS		
reorganise farm information system	2.83%	2.83%
Other changes		
Staff meetings	0.47%	
Employ staff	0.47%	
More use of budgets	0.47%	
Register with LIC	0.47%	
E-mail	3.30%	
E-banking	2.83%	8.02%
Improve recording		
Improve recording	1.89%	
Pasture probe	2.36%	
Diary	1.89%	
Cashbook	0.47%	6.60%
Information sources		
Read more	2.83%	
Employ farm consultant/specialist	7.08%	
Disscusion group/ listen to colleagues	3.30%	
Internet	8.49%	
Field days/seminar	2.36%	
Newspaper	0.47%	
Journal	0.47%	
Farm publication	3.30%	
Computer magazine	0.94%	29.25%
Total	212	100.00%

3 Factors associated with farmer's computer uptake and computerised information system (CIS) use

This research is concerned with farmer use of computers and computerised information systems (CIS) to manage farm information. According to the data collected, 73.8% of the farmers have a farm computer and 60.7% use at least one kind of computerised information system. Farmers' information systems were divided into three areas: finance (54.5%), feed and pasture (16.9%), and livestock (35.2%). Only 11.4% of respondents had a completely computerised information system, that is, using some software to support their information management in all three areas.

While it is necessary to own a computer to use any CIS, the reverse it is not true. Thirteen percent have computers but they use other non-computerised systems for their information management.

3.1 Herd size, computer uptake and CIS use

Table 3.1 presents the relationship between the size of the herd (as a farm size measure) and farmer computer adoption. There is a clear association between both variables, the larger the herd the higher the percentage of computer uptake. The t-test is significant.

Table 3.2 shows the relationship between the herd size and the use of at least one CIS. This variable shows a similar clear association with herd size, the larger the herd the higher the percentage of CIS use. The t-test is highly significant.

Table 3.1 Computer ownership and herd size

Herd size (cows)	% with computer
Less than 150	53.33%
150-299	64.62%
300-449	77.78%
450-599	79.63%
600-899	82.69%
More than 899	80.77%

t-test=-2.122 p=3.5%

Table 3.2 CIS use and herd size

Herd size (cows)	% that use at least one CIS
Less than 150	26.67%
150-299	49.23%
300-449	65.08%
450-599	66.67%
600-899	76.92%
More than 899	73.08%

t-test=-3.345 p=0.1%

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There are at least two possible explanations that support this positive association between herd size and CIS use. Firstly, the extra income from using computer technology increases with the scale of the dairy operation, particularly, where the technology is not easily divisible, as it is the case with computer and software. This fact may be related to the second explanation that there is a minimum critical time input needed to take advantage of a computer system. Large farms may have farmers more management oriented and therefore prepared to devote time to computer use.

3.2 Farmer age, computer uptake and CIS use

For analysis purposes the farmers' age was grouped into seven classes. The next table shows the age classes, the number of farmers that each includes and the percentage over the total.

Table 3.3 Farmer's age distribution

Farmer age (years)	Average age (years)	Number of farmers	Percentage
Less than 30	27	17	6.07%
Between 30 to 34	32	32	11.43%
Between 35 to 39	37	55	19.64%
Between 40 to 44	42	59	21.07%
Between 45 to 49	47	50	17.86%
Between 50 to 59	53	49	17.50%
More than 59	65	18	6.43%
Total		280	100.00%

Table 3.4 shows the relationship between the farmer's age, computer uptake and CIS use.

Table 3.4 Farmer's age, computer uptake and CIS use

Farmer's age (years)	% with computer*	% that use at least one CIS**
Less than 30	70.59%	70.59%
Between 30 to 34	75.00%	71.88%
Between 35 to 39	76.36%	65.45%
Between 40 to 44	76.27%	66.10%
Between 45 to 49	84.00%	62.00%
Between 50 to 59	65.31%	48.98%
More than 59	50.00%	27.78%

*t-test=1.621 p=10.8%;**t-test=3.567 p<0.1%

While the relationship between farmer age and computer ownership does not seem so strong, farmer age and CIS are strongly related. The t-tests were non significant and highly significant respectively. The younger the farmer the higher the percentage of CIS use.

Personal computers became available by the eighties, and they became relatively cheaper by the nineties. People, as they get older, may progressively lose learning

capability. Younger people are more likely to change and start new things, however, availability and cost must also be considered.

3.3 Education, computer uptake and CIS use

3.3.1 Farmer education

As was discussed earlier there is a relationship between farmer age and education (see pages 5 and 6). The younger the farmer the more educated. However, as each farmer age class is considered, there is some variability in education levels. The next table presents the relationship between farmer age classes and education levels.

Table 3.5 Age and education

Farmer age (years)	Education level (percentage within each age class)					
	Primary or less	Secondary <=4yrs	Secondary >4yrs	Tertiary <=2yrs	Tertiary >2yrs	Total
Less than 30	0.00%	18.75%	12.50%	31.25%	37.50%	100.00%
Between 30 to 34	0.00%	35.48%	6.45%	16.13%	41.94%	100.00%
Between 35 to 39	0.00%	50.00%	15.38%	17.31%	17.31%	100.00%
Between 40 to 44	0.00%	42.37%	11.86%	16.95%	28.81%	100.00%
Between 45 to 49	0.00%	46.94%	10.20%	10.20%	32.65%	100.00%
Between 50 to 59	2.13%	68.09%	4.26%	4.26%	21.28%	100.00%
More than 59	20.00%	60.00%	20.00%	0.00%	0.00%	100.00%
Total of each education level	1.49%	47.96%	10.78%	13.38%	26.39%	100.00%

Chi-square=37.991 p=9.9%

The next table shows the relationship between farmer education and computer uptake and CIS use.

Table 3.6 Farmer education, computer uptake and CIS use

Farmer education, computer uptake and CIS use		
Education level	% with computer*	% that use at least one CIS**
Primary or less	25.00%	0.00%
Secondary. Equal or less than 4 years	71.32%	53.68%
Secondary. More than 4 years	83.87%	67.74%
Tertiary. Equal or less than 2 years	70.27%	59.46%
Tertiary. More than 2 years	83.10%	78.87%

Mann-Whitney U-test=-2.149 p=3.2%;**Mann-Whitney U-test=-3.829 p<0.1%

Education shows a stronger relationship with CIS use compared with computer ownership. Mann-Whitney U-tests were significant and highly significant for education and computer uptake and for education and CIS use respectively. The more educated the farmer, the higher percentage of computer uptake and CIS use.

There are possible explanations for this positive relationship. Firstly, as was noted before, there is a positive association between education and farmer age. For the very young farmers (less than 30 years, and may be those between 30 and 34) computers were part of their educational environment. Additionally, youth and education may provide an ability for changing and trying new things. Finally, education, especially tertiary education, reduces the knowledge gap that may exist between farmers and information technology developers. Educated farmers may tend to see and think about their farm management problems and their solutions in a similar way to scientists and CIS developers.

3.3.2 Spouse and child education, computer ownership and CIS use

Farmers who stated that they manage their farms with family member assistance were asked to identify their education levels. As was noted earlier, there were 175 and 55 farmers that stated "couple" and "whole family" management team structures respectively. From their responses the education level of 201 spouses or partners, and 33 farmer children, were available for analysis.

The next table shows the analysis.

Table 3.7 Spouse education and computer uptake

Farmer spouse education level	% with computer	% that use at least one CIS
Primary or less	0.00%	0.00%
Secondary. Equal or less than 4 years	75.00%	55.95%
Secondary. More than 4 years	85.37%	78.05%
Tertiary. Equal or less than 2 years	78.26%	65.22%
Tertiary. More than 2 years	80.77%	69.23%

The next table shows the relationship between the children's education and computer uptake and CIS use.

Table 3.8 Children education and computer uptake

Children education level	% with computer	% that use at least one CIS
Primary or less	100.00%	0.00%
Secondary. Equal or less than 4 years	50.00%	31.25%
Secondary. More than 4 years	75.00%	50.00%
Tertiary. Equal or less than 2 years	80.00%	60.00%
Tertiary. More than 2 years	85.71%	57.14%

The results appear similar to those developed for farmer education. However, the Mann-Whitney U-tests were not significant, due, in part, to the lower number of observations.

3.4 Involvement of non-family people, computer ownership and CIS use

3.4.1 Adviser

The next table shows the relationship between adviser involvement, computer uptake and CIS use.

Table 3.9 Adviser involvement, computer ownership and CIS use

Adviser involvement	% with computer*	% that use at least one CIS**
0-No involvement	65.35%	48.51%
1-A little	73.17%	64.63%
2-Quite a lot	81.93%	66.27%
3-Heavy involvement	83.33%	79.17%

Mann-Whitney U-test=-2.751 p=0.6%;**Mann-Whitney U-test=-3.169 p=0.2%

Adviser involvement is strongly related with both computer ownership and CIS use. Both Mann-Whitney U-tests are highly significant. The stronger the adviser involvement, the higher percentage of both variables. While the relationships between adviser involvement level and farm herd size and education are not clear, younger farmers use advisers more intensively (see tables in appendix 6.3). Farms who heavily rely on advisers may tend to see and think through their farm management problems and solutions in a similar way to scientist and CIS developers do. In this way, well advised farmers may act as educated farmers.

3.4.2 Accountant

The next table shows the relationship between accountant involvement, computer uptake and CIS use.

Table 3.10 Accountant involvement, computer ownership and CIS use

Accountant involvement	% with computer	% that use at least one CIS
0-No involvement	69.07%	57.73%
1-A little	75.37%	61.19%
2-Quite a lot	79.59%	65.31%
3-Heavy involvement	70.00%	60.00%

Unlike adviser involvement, accountant use does not have a relationship with computer ownership and CIS use. Both Mann-Whitney U-tests are not significant. Accountant use was also not related to herd size, farmer age and education (see tables in appendix 6.4). This may be explained because most farmers use an accountant for tax purposes.

Neither a lawyer nor friend/neighbour involvement levels show any relationships with computer ownership and CIS use (see tables in appendix 6.5).

3.5 Information sources, computer ownership and CIS use

From the 10 sources of information, only 2 have statistically significant (Mann-Whitney U-tests) relationships with computer ownership. These are electronic news, as can be expected, and daily newspapers (MWU-test=-3.429 p=0.1% and −2.693 p=0.7% respectively). Field days and seminar, however, are related to computer ownership in that there is only a 9.7% probability of accepting the null hypothesis (no relationship).

CIS use shows a highly statistically significant (Mann-Whitney U-tests) relationship with Breed journals and electronic news (MWU-test=-2.656 p=0.8% and −3.393 p=0.1% respectively) and a statistically significant (Mann-Whitney U-tests) relationship with MAF reports and daily newspapers (MWU-test=-1.87 p=6.1% and −1.946 p=5.2% respectively).

3.6 Farmer goals

Achieving high profits is the only goal that shows a statistically significant (Mann-Whitney U-test=-1.933 p=5.3%) relationship, and highly statistically significant (Mann-Whitney U-test=-2.231 p=2.6%) relationship with computer uptake and CIS use respectively.

4 Summary

4.1 Main findings from the survey

The average dairy farm in Canterbury milks 478 cows using an effective area of 167 hectares. Besides adult stock, 111 heifers and 132 calves are kept as replacements. In addition to on-farm pasture, 27%, 56% and 67% of farmers use feedcrops, a runoff and other purchased feeds respectively. Only 12% of farmers rely on just home farm pasture.

The average dairy farmer is 43 years old and has been farming for almost 19 years, 6 of them outside Canterbury. Newer farmers have longer dairy farming off-region experience than older ones. More than 60% of dairy farmers have a secondary level of education, while almost 40% have tertiary education.

Owners (71%) and 50/50 sharemilkers (26%) are the two largest tenancy types. The average sharemilker is 10 years younger and manages a larger herd (164 more cows) than owners. More that 60% of dairy farms are managed by a partnership between the farmer and his/her spouse or partner. Only 19% of farms are managed by the "farmer alone". Other 18% are managed by family members of two generations (parents and sons/daughters).

Two thirds of the dairy farmers involve, in varying degrees, advisers and accountants in decisions.

Table 4.1 Type of information system use by dairy farmer –percentage use by column

Information systems	Financial recording system	Feed (pasture) recording and management system	Livestock recording and management system
Memory		20.34	1.03
Manual-informal	11.03	5.52	0.34
Manual-formal	15.17	43.45	40.69
Computerised	54.48	16.90	35.17
Service	19.31	13.79	22.76

Table 4.1 summarises the percentage of farmers using each type of information system practice in the three main management areas: finance, feeding and livestock. More than 60% of farmers use at least one computerised information system, while only 10% use a computer for all three areas.

Farmers use on average 25.5% of their working time to perform management work, meanwhile, they spend 10.5 hours per week in the farm "office". The average office is well equipped with electronic devices such as a fax machine (89.2%), telephone answering machine (81.4%), cellular phone (76.6%) and personal computer (70%).

The two significant types of computer users are the farmer's spouse or partner (49.5%) and the farmer him/herself (44.8%). The average farm computer user has

7.4 years of experience as a PC-operator and the machine is used on an average of 1.5 hours per day.

The main sources of information for dairy farmers seems to be farm publications, LIC advisory service publications and field days, or similar, events. Secondly, farmers get information from daily newspapers, neighbours or local contacts and commodity newsletters or magazines. Finally, other information sources such as breed journals, MAF reports and daily farm reports on radio or television appear to have less (relative) importance for dairy farmers. In the last place appears the use of the electronic media as a source of information.

The internet is mainly used for electronic mail. Next is the use of this media to obtain dairy company news. Then, ordering equipment and supplies and latest research results appears next. Finally, other kinds of internet information sources or services such as climate, market, technical and economic data show some use.

Farmers ranked all the proposed goals highly. Enjoying farming was the highest ranked goal, secondly, achieving high profits. The next most important was to provide an income to raise the farmer's family, and farming in a sustainable way. The fourth most important was to achieve high farm production and have a reasonable income and plenty of time to enjoy other interests. The lowest ranked goal was to be a "top farmer".

The analysis of the final set of open questions (question 23, 24 and 25) shows farmers are concerned with continuing to introduce computers and software to improve their information management. Increasing farm consultant employment as well as other information sources, such as the internet, are other strategies suggested by farmers.

4.2 Computer uptake and computerised information system use

Table 4.2 summarises the statistical results. Computer uptake and CIS use are more likely on large farms (large herd and large effective area). Young farmers, with less dairy farming experience, more education and profit oriented, are more likely to have a computer and to use it for managing farm information. Farmers that involve a farm adviser, spend more time doing office work, and obtain information from daily newspaper, electronic news, breed journals and MAF reports are more likely to own a computer and use farm management software.

Table 4.2 Statistical tests values for factors affecting computer uptake and CIS use

	Computer uptake	Computerised information system use
Farm		
Herd size	-2.122 (t-test) p=3.5%	-3.345 (t-test) p<0.1%
Effective area	+	-2.573 (t-test) p=1.1%
Tenancy		
Farmer		
Age		3.567 (t-test) p<0.1%
Education	-2.149 (M-W-test) p=3.2%	-3.829 (M-W-test) p<0.1%
Goals	To achieve high farm production -1.933 (M-W-test) p=5.3%	To achieve high farm production -2.231 (M-W-test) p=2.6%
Time dairy farming in Canterbury	2.585 (t-test) p=1.1%	3.846 (t-test) p<0.1%
Time dairy farming in total	2.451 (t-test) p=1.6%	4.085 (t-test) p<0.1%
Management		
Management team structure		
Adviser involvement	-2.751 (M-W-test) p=0.6%	-3.169 (M-W-test) p=0.2%
Accountant involvement		
Management work		
Office time		-1.925 (t-test) p=5.5%
Information sources	Daily newspaper: -2.693 (M-W-test) p=0.7% Electronic news -3.429 (M-W-test) p=0.1%	Daily newspaper: -1.946 (M-W-test) p=5.2% Breed journals -2.656 (M-W-test) p=0.8% Electronic news -3.393 (M-W-test) p=0.1% MAF reports -1.870 (M-W-test) p=6.1%

+ a blank cell represent a non significant relationship

5 References

Ministry of Agriculture and Forestry (1999) Farm Monitoring Report: South Central Region.

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6 Appendixes

6.1 Appendix 1: Mail questionnaire
Farm Management Group - Lincoln University

Dairy Farmers' Information Systems Questionnaire

All information given is strictly confidential. Any published results will contain only averages and non-identifiable information.

Section 1. General

If you are not the manager of the farm, please pass this on to the manager, who may be the owner, the sharemilker (50/50) or the contract milker (other than 50/50 arrangement). Please, write here which category you fall into: _____

1. Please give the following information about your dairy production system for the last season.

Effective (milking) area:_____hectares
Milkers:_____head
Non-calved heifers:_____head
Calves reared:_____head
Feed crops owned_____hectares and/or feed crops rented_____hectares
Runoff owned _____hectares and/or runoff rented_____hectares
Approximate value of other purchased feed (for example silage)_____dollars

2. a) How many years have you been dairy farming in Canterbury? _____years
   b) How many years have you been dairy farming in total? _____years

3. Which family members, if any, are regularly involved in farm decisions? (Tick the most appropriate box)
   a)   Myself..
   b)   I and my spouse/partner..
   c)   I, my spouse/partner and my son(s) and/or daughter(s).....................
   d)   I, and my son(s) and/or daughter(s)...
   e)   Other (please specify_____

4. For each family member actually involved in decision making, please give the level s/he completed their formal education? (Tick the appropriate box)

Yourself Spouse Child1 Child2 Child3
   a) Primary or less
   b) Secondary – four years or less
   c) Secondary – more than four years
   d) Tertiary – two or less years
   e) Tertiary – more than two years

(note here if more members are involved_____)

5. Which non-family people have a reasonable input into farm decision making? (Tick each relevant box)

	A little	Quite a lot	Heavy involvement
a) Farm consultant	☐	☐	☐
b) Accountant	☐	☐	☐
c) Lawyer	☐	☐	☐
d) Friend or neighbour	☐	☐	☐
e) Other (please specify_____)	☐	☐	☐
f) Other (please specify_____)	☐	☐	☐

Section 2 Farm information management

6. Which of the following best describes your **financial recording system**? (Tick one or more boxes; for computers please give name of software (SW))
   a) Informal system with reliance on bank and similar statements as backup ☐
   b) Manual (or hand-written) record system ☐
   c) Computer-based record system: SW_____ ☐
   d) Both manual and computer-based: SW_____ ☐
   e) Accounting or consulting service ☐
   f) Other (please specify _____) ☐

7. Who does the GST returns? (Tick one box)
   a) Myself.. ☐
   b) Spouse/Partner.. ☐
   c) Son/daughter... ☐
   d) Accountant.. ☐
   e) Other (please specify _____) ☐

8. Which of the following best describes your **pasture and other feed-crop recording/management system**? (Tick one or more boxes; for computers please give name of software (SW))
   a) My memory... ☐
   b) Notes on calendars... ☐
   c) Pocket notebook/Farm diary.. ☐
   d) Field record book (hand-kept)... ☐
   e) Computer-based system: SW_____ ☐
   f) Consultant or company service: name of service_____ ☐
   g) Other (please specify _____) ☐

9. Which of the following best describes your **livestock recording /management system**? (Tick one or more boxes; for computers please give name of software (SW))

   a) My memory... ☐
   b) Notes on calendars... ☐
   c) Pocket notebook/Farm diary.. ☐
   d) Livestock record book (hand-kept)... ☐
   e) Computer-based: SW_____ ☐
   f) Consultant or company service: name of service_____ ☐
   g) Other (please specify _____) ☐

Section 3 Farm office

As a farmer you perform different kind of tasks, e.g. milking, renewing pastures, fixing fences, supervising staff, purchasing inputs, planning the whole operation, etc.

10. On average, what percentage of your working time do you spend doing:
    a) Field work and other physical farm activities _____%
    b) Management work including farm office time or its equivalent _____%
    c) Other (please specify_____) _____%
    100%

11. On average, how many **hours per week** (including phone time) do you spend in your farm office (or its equivalent) organising your farm activities and staff?
    _____hours

12. What farm office machines do you have? (Tick one or more boxes)
    a) Fax machine...
    b) Telephone answering machine..
    c) Cellular phone..
    d) Photocopier..
    e) Computer...
    f) Other (please specify _____)

If you do not use a computer for business, please go on to question 18 Section 5
If you use a computer for business, please continue answering the following questions.

Section 4 Computer usage

13. Who is the primary computer operator on your farm? (**Tick one box**)
    a) Myself...
    b) My spouse..
    c) Other family member..
    d) Hired personnel...
    e) Other (please specify _____)

14. How long has this person been using computers?   _____years

15. (i) What percentage of computer time is spent on each of the following? (Give a percentage of total computing time)
    a) Farm business... %
    b) Learning and education.. %
    c) Leisure/personal.. %
    d) Communication.. %
    e) Off farm business... %

    100%

    (ii) What is the average **TIME PER DAY** that the computer is used? [____] hours

16. How many **HOURS PER MONTH** do you spend using each of the following packages or system? (leave blank if zero) (SW=software)

a) Wordprocessor (SW name_____)
b) Financial and accounting record system (SW name _____)
c) Pasture and crop record system(SW name _____)
d) Livestock record system(SW name _____)
e) Feed budgeting(SW name _____)
f) Herd testing(SW name _____)
g) Integrated farm management package (SW name _____)
h) Other spreadsheet use (SW name _____)
i) Other database use (SW name _____)
j) Internet
k) E-mail
l) Other (please specify _____)

17. Which statement best describes how often the computer is used for business (Please tick **one box**)

a) A regular period each week during evenings.................................
b) A regular period each week during daytime..................................
c) A regular period each month..
d) On rainy days...
e) In irregularly available spare time..
f) Several days at the end of the financial year.................................
g) Exactly when the need arises..
h) Other (please specify _____)

Section 5 Information sources

18. Which of the following sources of information are used on your farm? Please rate the importance of each on a 1 to 3 scale (1=not at all,2=a little,3=very important)

a) Daily newspaper..
b) Farm publications..
c) Commodity newsletter or magazines..
d) Breed journals..
e) Electronic news ....
f) Daily farm reports on radio or television.......................................
g) MAF reports (market, analysis and others)...................................
h) Livestock Improvement advisory service publications.......................
i) Field days/seminar..
j) Neighbours/local contacts...
k) Other (please specify _____)
l) Other (please specify _____)

If you do not use the Internet, please go on to question 20 in Section 6

19. Indicate how frequently you use the internet for each of the following information/functions by entering in each box either **1=very occasionally, 2=occasionally, 3=frequently**

    a) E-mail..

    b) News and weather information..

    c) Market information (prices, suppliers).......................................

    d) Technical information ....

    e) Economic information (interest rate, exchange rates, etc.)..................

    f) Updates on changes to agricultural legislation................................

    g) Latest research results...

    h) Entertainment and fun..

    i) Ordering equipment and supplies..

    j) Dairy company news...

    k) Other (please specify _____)

    l) Other (please specify _____)

Section 6 Manager

20. For each of the following objectives, please rate its importance on a 1 to 5 scale (1=not important through to 5=very important).

    a) To be a top dairy farmer..

    b) To achieve high farm production...

    c) To achieve high profits...

    d) To enjoy farming..

    e) To provide an income to raise my family.....................................

    f) To farm in a sustainable way..

    g) To have a reasonable income and plenty of time to enjoy other interests

    h) Other (please specify) _____

    i) Other (please specify) _____

21. What percentage of your total income is derived from dairy farming? _____%

22. What is your age? _____years

23. Any ideas or suggestions about what is wrong with your current information/decision system?

_____

_____

_____

_____

24. Any ideas or suggestions as to what new/better information/decision system you would like?

_____

_____

_____

_____

25. What new things, if any, have you done in the last 3 years to improve the information you have for making decisions? (for example, you have started using a new diary, or you have purchased a computer, subscribed to a new magazine...).

_____

_____

_____

_____

Thank you very much for taking the time to complete and return this questionnaire. The results will be of general interest to many people, including other farmers, businesses and policy makers while also assisting us to develop solutions for dairy production problems.

Once this mail-survey is completed another interview survey on a much smaller group of farmers will be carried out to obtain more detailed information. If you would be happy to spend approximately 2 hours with me, Jorge, discussing ideas on information systems and how these could be improved, please give your name and telephone number on the space below. The numbers interviewed will be restricted to a random selection.

Please use the self addressed freepost envelope enclosed to return the questionnaire.

Name_____

Phone_____

6.2 Appendix 2: Feed sources

The next six tables show (one per herd size class) details about the feedcrops, runoff and other purchased feed used by the surveyed farmers.

Table A.1 Feed resources of farms with less than 150 cows

Number of farms in the class		30	Average amount (hectares)
Percentage of farms that use:	Feedcrop	20%	9.5
	Runoff	63.33%	45.7
	Puchased feed	66.67%	Average expenditure
			$ 8,050.-
			Silage tonnes equivalent[5]
			80 t

Table A.2 Feed resources of farms from 150 to 299 cows

Number of farms in the class		65	Average amount (hectares)
Percentage of farms that use:	Feedcrop	21.54%	18.5
	Runoff	64.15%	55.4
	Puchased feed	80%	Average expenditure
			$ 26,433.-
			Silage tonnes equivalent
			26.5 t

Table A.3 Feed resources of farms from 300 to 449 cows

Number of farms in the class		63	Average amount (hectares)
Percentage of farms that use:	Feedcrop	22.22%	34.1
	Runoff	55.33%	75.9
	Puchased feed	63.49%	Average expenditure
			$ 21,085.-
			Silage tonnes equivalent
			21 t

---

[5] $ 0.1/kg of DM of silage

Table A.4 Feed resources of farms from 450 to 599 cows

Number of farms in the class		54	Average amount (hectares)
Percentage of farms that use:	Feedcrop	35.19%	35.6
	Runoff	44.44%	125
	Puchased feed	66.67%	Average expenditure
			$ 34,310.-
			Silage tonnes equivalent
			34 t

Table A.5 Feed resources of farms from 600 to 899 cows

Number of farms in the class		52	Average amount (hectares)
Percentage of farms that use:	Feedcrop	34.62%	39.4
	Runoff	50%	128.3
	Puchased feed	59.62%	Average expenditure
			$ 38,681.-
			Silage tonnes equivalent
			39 t

Table A.6 Feed resources of farms with more than 900 cows

Number of farms in the class		26	Average amount (hectares)
Percentage of farms that use:	Feedcrop	30.77%	85.1
	Runoff	57.69%	57.69
	Puchased feed	46.15%	Average expenditure
			$135,000.-
			Silage tonnes equivalent
			135 t

6.3 Appendix 3: Age and adviser involvement

Table A.7 Age and adviser involvement

Farmer age (years)	Adviser involvement levels (percentage of farmers within each age class)			
	0- No involvement	1-A little	2-Quite a lot	3-Heavy involvement
Less than 30	12.50%	31.25%	43.75%	12.50%
Between 30 to 34	29.03%	41.94%	19.35%	9.68%
Between 35 to 39	38.46%	26.92%	30.77%	3.85%
Between 40 to 44	28.81%	33.90%	32.20%	5.08%
Between 45 to 49	38.78%	28.57%	20.41%	12.24%
Between 50 to 59	38.30%	23.40%	29.79%	8.51%
More than 59	73.33%	13.33%	13.33%	0.00%

Chi-square test: 7.9% probability of accepting the null hypothesis.

Table A.8 Herd size and adviser involvement

Herd classes (cows)	Adviser involvement levels (percentage of farmers within each herd class)			
	0- No involvement	1-A little	2-Quite a lot	3-Heavy involvement
Less than 150	45.83%	29.17%	12.50%	12.50%
150-299	33.87%	27.42%	29.03%	9.68%
300-449	30.00%	40.00%	23.33%	6.67%
450-599	41.67%	25.00%	29.17%	4.17%
600-899	40.82%	18.37%	34.69%	6.12%
More than 899	23.08%	38.46%	30.77%	7.69%

Chi-square test: 26% probability of accenting the null hypothesis.

Table A.9 Education and adviser involvement

Education level	Adviser involvement levels (percentage of farmers within each education level)			
	0- No involvement	1-A little	2-Quite a lot	3-Heavy involvement
Primary or less	25.00%	25.00%	50.00%	0.00%
Secondary equal or less than 4 years	36.03%	33.09%	24.26%	6.62%
Secondary more than 4 years	54.84%	19.35%	25.81%	0.00%
Tertiary equal or less than 2 years	24.32%	32.43%	32.43%	10.81%
Tertiary more than 2 years	33.80%	21.13%	30.99%	14.08%

Chi-square test: 45.3% probability of refusing the null hypothesis.

6.4 Appendix 4: Age and Accountant involvement

Table A.10 Age and accountant involvement

Farmer age (years)	Accountant involvement levels (percentage of farmers within each age class)			
	0- No involvement	1-A little	2-Quite a lot	3-Heavy involvement
Less than 30	31.25%	50.00%	18.75%	0.00%
Between 30 to 34	32.26%	38.71%	22.58%	6.45%
Between 35 to 39	26.92%	50.00%	15.38%	7.69%
Between 40 to 44	30.51%	49.15%	18.64%	1.69%
Between 45 to 49	38.78%	36.73%	20.41%	4.08%
Between 50 to 59	34.04%	61.70%	2.13%	2.13%
More than 59	40.00%	46.67%	13.33%	0.00%

Chi-square test: 23.7% probability of accepting the null hypothesis.

Table A.11 Herd size and accountant involvement

Herd classes (cows)	Accountant involvement levels (percentage of farmers within each herd class)			
	0- No involvement	1-A little	2-Quite a lot	3-Heavy involvement
Less than 150	25.00%	54.17%	16.67%	4.17%
150-299	33.87%	46.77%	12.90%	6.45%
300-449	25.00%	53.33%	21.67%	0.00%
450-599	47.92%	31.25%	16.67%	4.17%
600-899	32.65%	53.06%	10.20%	4.08%
More than 899	26.92%	53.85%	15.38%	3.85%

Chi-square test: 19.8% probability of accenting the null hypothesis.

Table A.12 Education and accountant involvement

Education level	Accountant involvement levels (percentage of farmers within each education level)			
	0- No involvement	1-A little	2-Quite a lot	3-Heavy involvement
Primary or less	25.00%	50.00%	25.00%	0.00%
Secondary equal or less than 4 years	29.41%	55.15%	11.76%	3.68%
Secondary more than 4 years	41.94%	41.94%	16.13%	0.00%
Tertiary equal or less than 2 years	35.14%	35.14%	24.32%	5.41%
Tertiary more than 2 years	35.21%	39.44%	21.13%	4.23%

Chi-square test: 41% probability of refusing the null hypothesis.

6.5 Appendix 5: Lawyer and Friend/neighbour involvement

Table A.13 Lawyer involvement, computer uptake and CIS use

Lawyer involvement	% with computer	% that use at least one CIS
0-No involvement	71.98%	59.42%
1-A little	78.48%	65.82%
2-Quite a lot	66.67%	33.33%
3-Heavy involvement	100.00%	0.00%

Mann-Whitney U-test: 100% of accepting the null hypothesis

Table A.14 Friend/neighbour involvement, computer uptake and CIS use

Friend/neighbour involvement	% with computer	% that use at least one CIS
0-No involvement	71.16%	57.21%
1-A little	82.76%	72.41%
2-Quite a lot	80.00%	66.67%
3-Heavy involvement	50.00%	50.00%

Mann-Whitney U-test: 100% of accepting the null hypothesis