Farm Computer Uptake and Practices in New Zealand

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There is wide interest in both management circles and service industries in forecasts of the future uptake of computers on farm and horticultural businesses. Similarly, knowledge of how computer owning managers are utilizing them is of interest. From a 1992/93 postal survey of a stratified random sample of New Zealand producers it was determined that of the 24 per cent with computers, 19 per cent used them for business purposes and 5 per cent solely for entertainment and other non-business functions. An analysis of the length of past and anticipated ownership suggests New Zealand farmers are near the maximum uptake rate on the traditional sigmoid adoption curve. Existing ownership was positively correlated with farmer education level and farm size. On average, the computer was used 6.87 hours/week and three-quarters of respondents believed the benefits compensated for the costs. Farm budgeting and financial recording were the major business uses.

1. Introduction

Computers are becoming an increasingly important component of farmers' decision making. When personal computers were first introduced the majority of farmers did not believe they would be of value. This situation has changed, though there is still a major software development and education task ahead of those involved in the industry. To ensure these proceed as smoothly as possible it is important to study farmers' use of computers. This paper contains a review of a New Zealand wide farm computer survey.

Personal computers at an economic price have only been available for around six years. It is only some thirteen years ago that they first appeared. Past studies tended to concentrate on what is possible with computers in contrast to what is actually happening. The latter studies are now starting to appear as the data is becoming available (Ortman *et al.*).

Earlier reports include Scudamore, Duttweiler, Sonka, and Adamowicz *et al.* They discuss possibilities and likely development as a result of the initial experiences in a range of countries. Survey results from the still limited number of farmers using computers are rare (Powell *et al.*, for example, report on Nebraska farmers and Ohlmer (1989, 1991) on Swedish experiences). With increasing numbers of farmers using computers it is now possible to be more positive in reporting on trends and experiences.

The responses provided by the farmers both about their ownership and use of computers, and their views on potential ownership, if they are yet to purchase, are presented. The data is analysed to explore the uptake rate, and to relate farmers and farm characteristics to ownership and use. Pryde and McCartin found that in 1986 some 6 per cent of New Zealand farmers had a business computer, whereas this survey suggests the 1993 figure has increased to around 19 per cent. In 1990 Nuthall surveyed a group of farmers receiving a computer newsletter (responses from 1,244 computer owners, and 458 non-owners) - some 8.4 per cent of producers had a computer.

2. Survey Details

2.1 Procedures

A postal survey was sent to 3,097 farmers, this being the maximum possible with the funds available. The response rate of 37.1 per cent provided significant results, as discussed below.

The stratified sample (regions, land use and area) was obtained from a listing of New Zealand farms. The numbers were based on the strata proportions with 15 regional strata, 6 farm type strata and 12 farm area

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The authors are grateful to all the farmers who took the time to complete the questionnaire. We hope the result of the survey and analysis will be of benefit to them. The financial support of AGMARDT is acknowledged - without this support the study would not have been possible. Comments of an unknown referee are acknowledged and incorporated.

Review coordinated by the Editor.

categories. The questionnaire was posted over November 1992 after being pre-tested on 30 farmers. A reminder was sent in December 1992 and another questionnaire in March 1993 to all farmers not initially responding.

After removal of invalid responses and returned questionnaires the effective sample was 2,810 with 1,042 responses (37.1 per cent). This is similar to other surveys (Novak and Stegelin). When comparing the difference between the responding sample and the population, the range of percentage difference for the different regions was +2.97 per cent to -1.39 per cent, for the farm types +5.08 per cent to -4.29 per cent, and for the farm area categories +2.26 per cent to -4.59 per cent. That is, in one of the farm type categories there were 5.08 per cent more farms in the responding sample than the population, and for the maximum negative figure, there were 4.59 per cent less farms in one of the sample area (hectares) categories than the population. This is regarded as satisfactory stratification for the sample as a whole.

A telephone survey of 57 non-responders was carried out to examine the possible bias. Forty two valid responses were obtained, the others being unsuitable (since retired, no such phone number). The survey schedule used was essentially the same as the postal questionnaire. The means and distributions obtained from the main and telephone surveys for all quantitative data were compared.

There were only two means that were 'nearly' significantly different at the 10 per cent level. The average number of computer ownership years had a significance probability of 10.6 per cent and the average hours per month of computer use on financial recording had a significance probability of 17.7 per cent. All other probabilities were much greater.

This comparative data provides considerable confidence that the results provide a good representation of the national situation.

2.2 Farm and Farmer Characteristics

Data was collected on farmer age, education level, farm type and farm size (Tables 1-3)[1].

The age distribution exhibits a significant number of younger managers, whereas the education distribution demonstrates that an appreciable number of farmers leave school before advanced secondary schooling. Despite this there are still significant percentages (24 per cent in total) that have tertiary experience. It is not possible to compare this to farming population figures. Dairy and sheep farmers tend to be younger than mixed farm types. The average ages (years) are mixed cropping 46.6, dairy 43.1, deer 49.1, sheep/beef 46.2, sheep 43.4, beef 50.3 and other 44.4 ($F = 5.04$, $P = 0.0001$: where F is the value of the mean variance ratio, and P the probability of the null hypothesis (no difference between the means) being true)).

Table 1: Farmer's Age Distribution

Age Group (years)	Per cent	
< = 30	9.4	
31 - 40	29.0	Mean 44.72
41 - 50	31.3	Std.dev. 11.09 years
51 - 60	21.5	Minimum 21 years
61 - 70	7.6	Maximum 80 years
71 - 80	1.2	

Table 2: Farmer's Formal Education Levels

Highest Level of Formal Education	Per cent
No formal education	0.2
Primary school	3.5
Four or less years of secondary school	60.0
More than four years of secondary school	11.0
Two or less years of tertiary education	14.4
More than two years of tertiary education	0.9

Table 3: The Farm Type Distribution

Type (Greater than 50 per cent income from activity)	Per cent
Mixed Cropping	10.0
Dairying	37.1
Deer	1.4
Sheep and Beef	17.4
Sheep	24.7
Beef	7.0
Other	2.4

[1] As a measure of farm size, all activity was converted into a stock unit (SU) equivalent using the parameters sheep = 1.1, beef = 5, dairy cattle = 7, goats = 0.9, deer = 1.75, pigs = 2.5, horses = 7, crops = 15 SUs/ha, all 'other' land uses = 6 SUs/ha.

3. Computer Uptake

3.1 Uptake Rates

Scudamore believes, as do many others, that computers will become an integral part of farming. This has not happened yet. Gibbon and Warren discuss some of the barriers to adoption and conclude that reducing 'the cost of experimentation' (allowing producers to try a computer without a large outlay) would be a major benefit. Education must also be an important factor. Studies in the United States (Putler and Zilberman, Batte *et al.*, Jarvis) clearly show that there is a strong correlation between a producers' level of education and computer ownership.

It is likely education breaks down the barrier of a fear of the unknown and, perhaps, a belief that a computer is too complex. It will be shown that a similar conclusion is also possible in New Zealand. Age and farm size also seem to be important in most of the studies. In contrast, Baker found that in agribusiness the age and education of the manager was not important - in these cases the size and type of business was relevant. All these conclusions clearly have implications for extension and computer software professionals.

In this sample, 24.4 per cent of respondents owned a computer with a further 9.2 per cent having access to a computer (Table 4). Of those with a computer 19.3 per cent use it for business purposes leaving 5.1 per cent who do not. The 19.3 per cent contrasts with the 6 per cent quoted above for 1986. These figures can be compared with the U.S. situation - 15 per cent of New York dairy farmers (1988), 25 per cent of Californian farmers (1986), and 16 per cent of Ohio farmers (1990) (Batte *et al.*).

Table 4: Computer Ownership in New Zealand: (N = 1035)

Category	Per cent
Own a computer	24.4
Have access to a computer	9.2
Do not own or have access	66.4

The average length of ownership was 4.1 years (Table 5).

If the trend continues the numbers of new entrants to computing should continue to rise. The expected number of years before the non-owners anticipate they will purchase had a mean of 3.3 years (Table 6).

Table 5: Length of Computer Ownership (N = 240)

No. of Years	Per cent
≤ 1	25.5
1.1 - 2.0	10.8
2.1 - 3.0	15.4
3.1 - 4.0	7.9
4.1 - 5.0	10.0
5.1 - 6.0	9.6
6.1 - 7.0	4.6
7.1 - 8.0	6.7
8.1 - 9.0	2.1
9.1 - 10.0	5.8
>10.0	1.6

Mean = 4.15 years.
Std. devn. = 3.19 years.
Range 0.01 to 20.0 years

Table 6: The Number of Years Before Buying (or Starting to Use for Business) a Computer (N = 681)

No. of Years	Per cent
≤ 1.0	8.0
1.1 - 2.0	9.2
2.1 - 3.0	5.6
3.1 - 4.0	2.8
4.1 - 5.0	8.2
>5	3.2
Don't Know	14.1
Never	48.6

Mean = 3.28 years.
Std. devn. = 2.51.
Range 0.1 - 15.00

Of those responding 19.3 per cent use a business computer, 11.4 per cent don't know when they will purchase, 39.2 per cent believe they will never purchase, 27.5 per cent will purchase over the next five years, and 2.6 per cent will purchase in more than 5 years. It has taken about 13 years to reach a one fifth penetration and it will take another five years to achieve a further quarter penetration. The speed is increasing. It is suspected it will be even greater than this as the 40 per cent who believe they will never purchase are undoubtedly mistaken in the sense that some will, and others will be replaced by younger managers.

If the purchase date distribution is combined with the anticipated purchase date distribution it is possible to

obtain an idea of where on the traditional sigmoid uptake curve New Zealand farmers are currently located. A good fit, after leaving out the 'Don't know' and 'Never' data, is obtained using the following exponential sigmoid equation:

$$Y = 104.7/(1 + 1.042e^{-.342X})$$

Where

Y = The cumulative per cent of producers owning a business computer.

X = The number of years of ownership[2].

While a non-linear regression technique was used to obtain the curve (Gauss - Newton method utilizing a Taylor series expansion - Pindyck & Rubenfeld, p.228) so that the normal statistics are not strictly valid, they give some indication of the usefulness of the equation. The equivalent of the F statistic (5342.17) suggested the equation was highly significant and the R^2 of 0.9976 indicates it explains most of the variation. If a cubic function is fitted to the data using linear regression a reasonable, but a less logical, fit is obtained. However, in this case the coefficients are valid. The R^2 was 0.9686 and F = 380.45 (pr = .0001).

A visual check of the plots suggested the exponential sigmoid was a better fit (Figure 1). Remember that producers who said they would never acquire a computer or who were non-specific about when, were not included. The curve suggests farmers are acquiring computers at the maximum rate they are ever likely to, and that this will proceed for another 8 years. However, if an allowance is made for the 'nevers', this maximum growth time span is likely to be longer as many 'nevers' will change their minds and younger farmers will take the place of retiring people. Thus the total number of farms eventually having a computer will be much greater than the current figures indicate, thus extending the segment of maximum uptake in the sigmoid curve.

3.2 Factors Affecting Uptake

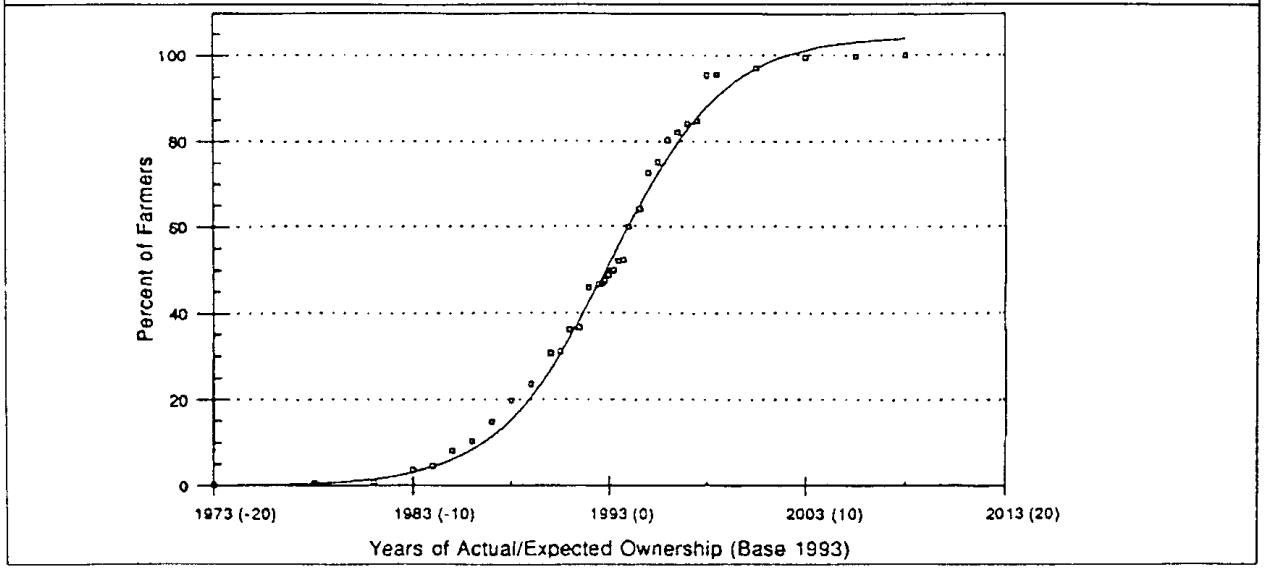
Respondents were classified as to age, education and farm size (Tables 7-11).

Table 7: Age Related to Computer Ownership

Category	Average Age (years)	No. of Respondents
Do not own	45.65	647
Own a computer, but not used for business	44.70	51
Own a computer, and use it for business	43.29	195
Have access only	41.00	93
(F = 6.09, P = .0004)		

[2] X goes from -20 to +20 with 1993 being 0. The data goes beyond these dates but the curve for periods beyond ± 10 years is virtually horizontal to the X axis.

Figure 1: Computer Uptake Rate



Computer owners tend to be younger, but the differences in the means are not great, though significant (less than a 1 per cent chance of being the same P = .0004).

The data also suggests larger farms are more likely to use a computer for business, and in the case of farm capital and total stock units (which includes an allowance for cash crops) this relationship tends to be stronger and significant. The 'have access only' category relate particularly to larger farms (Tables 8 and 9). Larger properties are evidently prepared to hire their computer assistance.

Table 8: Farm Land Capital Value Related to Computer Ownership

Category	Average Capital Value ($)	No. of Respondents
Do not own	438,132	687
Own a computer, but not used for business	429,849	53
Own a computer, and use for business	485,510	200
Have access only	471,063	95
(F = 2.43, P = 0.0636)		

Table 9: Total Stock Units Related to Computer Ownership

Category	Average Stock Units	No. of Respondents
Do not own	3,146	679
Own a computer, but not used for business	3,124	52
Own a computer, and use for business	4,561	192
Have access only	6,208	95
(F = 20.21, P = .0001)		

Tables 10 and 11 clearly show the relationship between computer ownership, or intended ownership, and formal education. That is, the higher the formal education, the more likely a farmer is to own, or intend to own, a computer. The differences in the cell per centages are highly significant.

Table 10: Education Related to Computer Ownership

Category	No Formal	Primary	Secondary ≤4 years	Secondary >4 years	Tertiary ≤2 years	Tertiary >2 years
			(percentages)			
Do not own	100.00	88.89	72.70	55.36	53.79	47.75
Own - but not business	-	-	6.25	20.54	11.03	16.22
Own - use for business	-	11.11	15.63	19.64	27.59	33.33
Have access only	-	-	5.43	4.46	7.59	2.70
(χ^2 = 76.139, P = 0.0)						

Table 11: Education Related to Computer Ownership and Purchase Intentions: Highest Formal Education Level

Category	No Formal	Primary	Secondary ≤4 years	Secondary >4 years	Tertiary ≤2 years	Tertiary >2 years
			(percentages)			
Own a Computer	-	16.67	20.27	25.26	33.33	37.00
Will buy	-	16.67	22.61	34.74	29.37	42.00
Maybe buy	-	-	11.70	9.47	13.49	9.00
Never buy	100.00	66.67	45.42	30.53	23.81	12.00
(χ^2 = 76.47, P = 0.0)						

The data on ownership and farm/er attributes was used to assess the probability of ownership through logit analysis. Given the significant relationships between education and total stock units with computer ownership it was logical to use these variables.

Given

$$Z = \log\left(\frac{P_i}{1 - P_i}\right)$$

where P_i is the probability of the i^{th} individual owning a computer used for business, the equation obtained was

$$Z = 0.3048\ E + 0.0704\ S - 2.9159$$

where

E = education level using the codes 1 to 6

S = total stock unit range code (1 = 0-1000 SU,.... 14 = 13001-14000, 15 = >14000)

The relationship was highly significant, the coefficients were similarly highly significant and Tau - c[3] was 0.621 indicating a high correlation between predicted and observed probabilities. Using the relationship the probability of a farmer with various combinations of education and stock unit codes having a computer can be calculated. The probability of ownership rises to nearly 50 per cent for well educated farmers with a large property. In contrast, small farms with a manager without formal education has only a 7 per cent chance of being a computer owner. There is a range of options between these two extremes.

If the same analysis is carried out for farmers intending to purchase a computer a similar equation is obtained. For those intending to purchase in three or less years the equation is:

$$Z = 0.4394\ E + 0.00374S - 3.1751$$

and for greater than three years:

$$Z = 0.2464\ E + 0.0451S - 3.0375$$

The relationships were highly significant but the stock unit coefficient was not. Tau - c was 0.629 and 0.594 respectively.

4. Computer Use

4.1 Profitability Beliefs

With increasing numbers of producers investing in computer systems it is likely most believe reasonably significant benefits are available. As yet studies demonstrating *ex post* that a computer investment has been profitable are not available. Various studies have, however, reported that farmers believe computers have been profitable. Examples include Jofre - Giraudo *et al.* and Nuthall. The value of computerised decision models has also been studied. For example, Debertin *et al.* found a percentage of farmers using a centrally operated linear programming model believed the assistance was beneficial. Respondents beliefs on whether their computer has been profitable was examined in four categories (Table 12).

Table 12: Computer Profitability (N = 224)

Category	Per cent	Per cent with Don't Knows Removed
Has been profitable	45.1	65.2
Just breaks even	8.5	12.3
Does not cover costs	15.6	22.5
Do not know	30.8	

The comparable figures for 1992 reported by Nuthall are 'profitable' 56.3 per cent, 'break even' 11.5 per cent,'not covering costs' 10.3 per cent and 'don't know' 21.9 per cent. The greater number believing in the good economics of a computer in this study is in part due to all respondents being business users of computers. It is clear, however, that around three quarters of respondents who have an opinion believe a computer system has covered the costs. In the U.S. Batte *et al.* found 83 per cent of a sample of Ohio farmers believed their computer was 'useful', and Novak and Stegelin found 93 per cent of their respondents were 'satisfied' with their computer experiences.

[3] Tau - c measures the amount of association between ordinal variables by calculating the predictability of the order of a pair of ranks on a dependant variable from knowledge of the order of the pair on the independent variable. Value ranges from -1 to +1.

The age of respondents in the various profitability categories (Table 13) suggests younger farmers tend to believe their investment was profitable, though this conclusion is only marginally significant. When profitability was related to land value and total stock units there were no obvious correlations.

Table 13: Computer Profitability and Age

Category	Average Age (years)	No. of Respondents
A profitable investment	42.5	95
Just breaks even	43.5	17
Does not cover costs	47.7	20
Do not know	43.4	55
(F = 2.10, P = 0.1016)		

For education there was a tendency for those with a higher level of formal education to have an opinion (i.e. most of the 'don't knows' had an education code of 1 or 2). A logit analysis showed that there was a slight increase in the probability of a farmer believing the computer was profitable as formal education increased (Table 14). This limited relationship was highly significant.

Table 14: Probability of Believing a Computer is Profitable According to Education

Highest level of Formal Education	Probability
Primary	0.55646
≤ 4 years Secondary	0.58425
>4 years Secondary	0.61150
≤2 years Tertiary	0.63808
>2 years Tertiary	0.66384

4.2 Areas of Use

To direct software development and extension work it is useful to understand how farmers use computers. A range of studies have been conducted throughout the world (Stewart, Dancey, Nuthall). Common conclusions are that computers are primarily used for financial management. This study reinforces such conclusions and is particularly important as it is contemporary and the sample was randomly selected (Table 15).

Table 15: Hours Per Week Devoted to Various Computer Uses (N = 226)

Hour Range	Business	Accessing Central D.Bases	Entertainment	Education	Community Work	Other
			(percentages)			
0 - 1.0	20.4	81.9	31.3	38.0	69.0	52.1
0.1 - 2.0	34.4	-	20.6	22.5	16.4	17.4
2.1 - 3.0	11.3	9.1	3.6	8.5	5.5	4.3
3.1 - 4.0	13.4	-	10.7	9.9	3.6	4.3
4.1 - 5.0	7.5	9.1	8.9	8.5	3.6	4.3
5.1 - 6.0	3.2	-	3.6	1.4	-	-
6.1 - 7.0	0.5	-	2.7	1.4	-	-
7.1 - 8.0	1.1	-	0.9	1.4	-	4.3
8.1 - 9.0	0.5	-	-	-	-	-
9.1 - 10.0	3.2	-	12.5	7.0	1.8	4.3
10.1 - 11.0	-	-	-	-	-	-
11.1 - 12.0	1.6	-	-	-	-	-
12.1 - 13.0	-	-	-	-	-	-
>13.0	2.6	-	5.4	1.4	-	8.6
N =	186	11	112	71	55	23
Average one*	2.84	0.06	2.13	0.99	0.39	0.46
Average two+	3.41	1.34	4.30	3.15	1.57	4.49

* Based on 226 users. + Based on the number actually performing each function

The average total hours of computer use per week is 6.87. This is less than the 9.51 found by Nuthall. This is no doubt due to the fact that all the respondents in the Nuthall (1992) survey were business users. Furthermore, Nuthall in 1992 found 6.67 hours were spent on business compared with this study's 2.84. Clearly entertainment is an important use of so called farm computers. Of the 226 respondents replying to the question, 112 said their computer was used for an average of 4.3 hours/week on entertainment. In Nuthall's specialist farm computer survey the average entertainment use was 0.92 hours/week.

When the hours per week spent on business activities are related to farm and farmer characteristics there is very little apparent correlation. There is, however, a tendency for IBM or IBM compatible (& CP/M) computers to be associated with higher business use. This is a significant difference. (Average hours/week for IBM, IBM compatible & CP/M computers was 3.7, for all others 2.0.)

The main business uses are financial recording, budgeting and word processing (Table 16). Nuthall similarly found financial recording and farm budgeting were most important functions; though word processing surpassed budgeting in the time used. Stock recording was not nearly as important relatively, though the average hours spent were greater. Both surveys found feed budgeting, payroll work, enterprise budgeting, and production recording were relatively insignificant activities on average, though, of course to some individuals they were important functions. A relevant question is whether these figures would change given more suitable software, particularly with respect to production records (paddock, field, production plot records and analysis) and feed budgeting. These latter two might well be integrated.

Wordprocessing, spreadsheet, and specialist financial recording and analysis software are the important types of software (Table 17). Farmers' practices in using their computer vary from weekly to when they have spare time (Table 18). The majority are specifically setting aside time for their computing - this is how it should be organised. Even so, a significant proportion still devote 'spare time' to bookwork. When trying to relate these patterns to farm and farmer attributes there were not any clear correlations other than with business hours per week on a computer. It was found that those devoting a regular time each week were those spending the most time per week on business computer use.

Table 16: Details of the Business Use of Farm Computers (Hours/Month on Various Functions) (N = 195)

Range of Hrs/Month	Farm Budgets	Stock Records	Payroll	Enterprise Budgets	Production Records	Word Proc.	Financial Records	Spread Sheet	Feed Budget	Other
					(percentages)					
0-1.0	23.1	33.3	70.0	72.4	52.4	49.1	15.3	44.8	35.7	35.3
1.1-2.0	22.3	18.2	10.0	24.1	28.6	20.4	22.8	32.8	42.9	17.6
2.1-3.0	9.7	3.0	5.0	-	9.5	5.5	7.6	3.4	7.1	5.9
3.1-4.0	17.1	13.6	5.0	-	-	12.0	20.2	8.6	14.2	-
4.1-5.0	8.2	6.1	-	3.4	4.8	3.7	5.1	-	-	11.8
5.1-6.0	1.5	4.5	-	-	4.8	0.9	5.9	1.6	-	5.9
6.1-7.0	0.7	-	-	-	-	-	0.8	-	-	-
7.1-8.0	9.0	6.1	-	-	-	0.9	-	-	-	-
8.1-9.0	0.7	1.5	-	-	-	1.9	-	-	-	-
9.1-10.0	3.7	6.1	5.0	-	-	2.8	7.6	1.7	-	-
>10.0	3.6	7.5	5.0	-	-	3.7	7.5	1.7	-	11.8
N =	134.0	66.0	20.0	29.0	21.0	108.0	118.0	58.0	14.0	17.0
Average hrs one*	2.72	1.59	0.23	0.20	0.20	1.58	2.93	0.70	0.14	0.47
Average hrs two+	3.91	4.61	2.20	1.25	1.77	2.85	4.79	2.34	1.89	4.88

* based on 195 users

\+ based on the number actually carrying out each function

Table 17: Business Software Use (N = 253)

Type	Per cent Having
Word processor	58.9
Spreadsheet	49.8
Database	17.4
Specialist financial	52.6
Specialist production	7.1
Payroll	4.3
Other	5.1

Table 18: Frequency of Business Computer Use (N = 198)

Category	Per cent
Regular period each week	35.9
Regular period each month or two	27.8
When have spare time	22.2
On a rainy day	11.1
At the end of the financial year	0.5
Other	2.5

5. Summary

Fourteen years ago farmers regarded professionals who suggested computers could be useful on a farm as either stupid, or at best eccentric. Contemporary survey data suggests that the majority of farmers now accept that a farm computer can be useful.

To explore how far computers had penetrated on to New Zealand farms, and to quantify the adoption rate, now and in the future, a postal survey was carried out over late 1992 and early 1993. A stratified random sample (location, land size, and farm type) of some 3000 farms gave a 37.1 per cent response rate. This rate is similar to other postal surveys. A comparison of the survey data with both national statistics and those of a sample of non-responders contacted by telephone suggested the sample was representative of the population.

In 1986 approximately 6 per cent of New Zealand farmers owned a computer. This current survey indicates the figure is now around 24 per cent. Some of these computers are totally recreational, leaving some 19 per cent of managers using their computer for business purposes. Of the remaining 75 per cent of farmers, some 39 per cent believe they will never purchase a computer with the majority of the remainder believing they will purchase in the next five years. In reality, it is likely the 39 per cent of farms will end up with a computer even if it won't occur until there is a new manager.

An analysis of the past purchasing pattern, and the anticipated one, indicates the current adoption rate is the maximum it is likely to attain in that farmers are approximately half-way along the sigmoid adoption curve. It would appear the current adoption rate will continue for at least as long as computers have been available, and probably longer. At this stage the farmers that are most likely to have a computer have experienced formal education for a longer period than the others, and are likely to have a larger production unit.

Most business computers are IBM compatible, have a 640kbyte RAM, a 40 Mbyte hard disk, a colour monitor and a dot matrix printer. MSDOS is the most common operating system, but it should also be noted Windows is becoming important.

More than 50 per cent of farmers believe their computer investment has at least covered the associated costs, while 30 per cent have no opinion. In the end, therefore, it is likely some 60 - 70 per cent will believe a computer is worthwhile. The computer owners use their computer approximately seven hours per week, but only three of these are on business. Two hours are on entertainment leaving two hours for a range of other activities including education. The range in the response data, however, is wide.

The main business uses are financial recording, budgeting and word processing. There is very little stock feed planning on average. The type of software used is mainly wordprocessors, spreadsheets and specialist financial. It appears there is a relationship between the hours put in on a computer and the regularity of its use - farmers setting aside a regular time each week or month tend to be the heavier users of their computer.

Computer owners, when asked for suggestions on how to improve farm computing, stress that better software and training courses are required. More courses are also suggested. These comments provide clear messages for people involved in research, and extension and marketing.

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