Computer Adoption and Use by Ohio Farmers

By Marvin T. Batte

Abstract

Farmers are continuing to expand their use of computers. Computer adoption by Ohio farmers currently stands at 44 percent. Financial accounting remains the most often used task of farm computers. The Internet has become an important tool for farmers, one which they evaluate highly.

Computers have become an everyday tool for office workers and managers in many sectors of the economy. The U.S. Department of Commerce reported that in 2000 about 54 percent of the U.S. population used a computer at least occasionally. About 90 percent of children between the ages of five and seventeen are computer users. Forty-five percent of the U.S. population reportedly uses e-mail, and 36 percent report the use of the Internet to search for product and service information. The use of the Internet by individuals has increased 20 percent annually since 1998 (U.S. Department of Commerce).

One might question if a parallel adoption of computers is occurring on farms. In the early 1990s, computers were used by only a modest proportion of farmers. A survey of 13 agricultural states conducted in 1991 by the North Central Region research committee, Farm Information Systems, found that adoption rates varied widely among the states studied, ranging from 14.4 to 40.2 percent with a mean (weighted by number of farms in each state) of 26.7 percent (Batte et al.). Corn Belt states were much more similar, ranging from 22 to 32 percent adoption, with a mean of 26.5 percent. Adoption patterns were similar in all states studied: computer adoption was found to be inversely related to operator age and positively related to operator education level and farm size. Also, the tasks for which the computer was used was similar among the states.

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Over the past decade, information options available to farmers have changed substantially. During this period the Internet has developed to provide a rich mechanism for electronic communication, and electronic commerce has emerged in the past two to four years. In 1991 the primary business uses of the computer included business financial accounting, correspondence, and crop and livestock record keeping (Batte et al.). Although some farmers used electronic information services to gather information and to analyze prices, these uses were not widespread then. Have the new Internet-based opportunities changed the way that farmers use the computer or their evaluation of its usefulness in farm management?

This article reports current computer adoption estimates for Ohio farmers. The types of computer applications used are examined, as well as use of the Internet to support farm management decision making. Data are derived from a mailed survey administered in March 2003 to random sample of all Ohio farmers with sales greater than $40,000.

Results

Gross sales for the sampled farmers averaged $179, 472. This compares to the 1997 Census of Agriculture average for Ohio of $220,986, also computed for farms greater than $40,000 of sales. About 20 percent the sample had sales of $250,000 or more (versus 21.4% for the census). Operator age averaged 54.7 years (census average was 50.4 years); about 3.5 percent of the respondents were under 35 years of age, and 18 percent were over 65. The majority of farm operators had a high school degree or less (64%), and 36 percent had some college education or a college degree. Finally, about 57 percent of the farmers worked full-time on the farm (52% for the census), about 34 percent worked off farm year-around, and just over 9 percent worked seasonally off the farm.

Farmers were asked if they *used an office computer in any aspect of your farm business*. Just over 44 percent responded in the affirmative (Table 1). Percent adoption for a similar Ohio sample in 1991 was 32.1 percent (Batte, et al.). The adoption rate varied significantly by size of farm, age of operator, level of operator education, and with off-farm employment of the operator. For farms in the smallest sales category, only 36 percent of the operators had adopted an office computer.

However, for farms with over $500,000 of sales, computer adoption was nearly 72 percent. A t-test of the difference of means for farmers above and below $250,000 of sales suggested a statistically significant difference at the 0.01 probability level.

Computer adoption tended to be negatively related to the age of operator. The average adoption rate for farmers who were age 50 or younger was significantly (0.01 probability level) greater than for farmers older than 50. About 54 percent of the youngest farm operator group had adopted a computer, whereas only 22 percent of the oldest operator group had adopted. On the other hand, there is a positive (and significant) association between operator education level and computer adoption. Just over 31 percent of those with high school education or less had adopted a computer, but more then 67 percent of those with a post high school education were computer adopters. Computer adoption was significantly lower for full-time farmers – those operators who did not work away from the farm (38%) – than for those who worked away from the farm seasonally (52%) or year-around (54%). Perhaps the higher adoption for farmers working away from the farm is due to the computer exposure/training that they receive in their off-farm employment and their transfer of this technology to the farm business.

Table 1. Computer adoption, computer usefulness and computer usage levels by various farm and farmer characteristics

Measure	Percent of Sample	Computer adoption percent	Computer Usefulness[a]	Hours of computer user per month
Full Sample		44.4	3.5	16.4
Gross farm sales				
$50,000 - 99,999	44.7	35.7	3.3	11.7
100,000 - 249,999	35	46	3.4	14.6
250,000 - 499,999	14.8	55.9	3.7	20.4
Over $500,000	5.5	71.7	3.9	33.1
Age of operator				
35 or Less	3.5	53.6	4	26.4
36-50	36.9	52.6	3.5	14
51-65	41.7	46.5	3.5	18.2
65 and over	17.9	21.9	3.2	18.1
Education level of operator				
High School or less	63.8	31.5	3.3	16.9
Post-High School	36.2	67.3	3.6	16.4
Operators Working off the Farm				
None	56.9	38	3.6	20.5
Seasonally	9.4	52.1	3.3	15.5
Year Around	33.8	53.9	3.4	12.7

[a] Farmers were asked to indicate the extent that the computer has improved the business by either saving time or providing better business information. 1 = Not at all; 5 = Very Much

Computer-adopting farmers were also asked to indicate the extent to which they felt the computer had improved their business either by saving time or providing better information (Table 1). Farmers responded to a five item scale, where one represented no improvement, two indicated little improvement, and five represented much improvement. The mean response for all computer adopters was 3.5. This usefulness score varied with farmer and farm characteristics. Average usefulness score increased with gross sales (significant at the 0.01 probability level) and were significantly higher (.05 level) for farmers with post high school educations relative to those with high school or less education levels. Farmers working full-time on the farm also reported higher usefulness scores for computer use (significant at the 0.05 probability level). Usefulness scores appear to diminish with increased age of operator, however, these differences were not statistically significant when comparing those 50 and older to those younger than 50.

Computer users also were asked to estimate the number of hours per month the computer was used for business purposes (Table 1). The average for all computer adopters was 16.4 hours per month. This is up somewhat from the estimate of 14.8 hours given by a comparable sample of farmers in 1991 (Batte, et al.). Hours of usage increased significantly with increased farm size, and usage was significantly larger for farms with full-time operators. It is instructive to note that full-time farmers were less likely to adopt the computer, but used the computer more hours per month and gave it a higher average usefulness score than did farmers who worked away from the farm. Usage hours did not vary significantly with operator age or education level.

Tasks for which the computers used

Farmers who have adopted computers were asked to indicate those tasks for which the computer was used and the frequency of use for each task (Table 2). Financial record keeping was the primary computer task in 1991 (Batte et al.), and remains so today. Eighty-nine percent of farmers with computers used the computer for financial record keeping (Table 3). Nearly 58 percent of computer-using farmers indicated they used their computer often for financial record keeping. This was far and away the most frequently completed task. More than 76 percent of computer adopters indicated they used the computer for e-

mail correspondence. Production (crop and livestock) record keeping was also reported by 76 percent of computer users.

Table 2. Frequency of computer use for completing various tasks

Task	Percent Using	Frequency of Use				Mean[a]
		Sometimes 1	2	3	Often 4	
		Percent				
Keeping financial records	89.1	4.4	10.9	15.9	57.8	3.05
E-mail	76.3	12.1	19.5	16.3	28.4	2.14
Keeping production records (crop or livestock)	75.5	10.8	16.1	20.9	27.8	2.17
Word processing (correspondence)	75.5	15.3	25.8	11.4	23.1	1.93
Accessing the Internet for other information[b]	73	5.2	18.8	22.4	26.7	2.17
Commodity price tracking on the Internet	55.1	10.2	15.1	15.4	14.5	1.44
Computerized tax computation/filing	33.1	8.4	9.1	7.5	8.1	0.82
Online banking or bill paying	28.6	8.2	10.9	4.3	5.2	0.64
Buying farm inputs over the Internet	26.4	14.9	8.8	2.1	0.6	0.41
Online trading of stocks, bonds or other financial investments	16.5	4.9	6.4	3.7	1.5	0.35
Filing regulatory reports (e.g., pesticide use)	15.6	6.1	6.7	1.8	0.9	0.29
Selling your farm products over the Internet	12.7	7	3.9	1.5	0.3	0.21
Online trading of agricultural commodity contracts (futures/options)	9.2	4.9	2.7	1.5	0	0.15

[a] The mean score is calculated by assigning values of one through four to values of sometimes through often.
[b] Other refers to all information seeking from the Internet beyond those identified uniquely in this table.

Table 3. Tasks for which the computer is most important on this farm

	Percent citing this task as:	
	Most important	First, second, or third most important
Keeping financial records	61.2	76.7
Keeping production records (crop or livestock)	9.3	49.1
Accessing the Internet for other information[a]	5.6	38.2
E-mail	6.5	31.7
Commodity price tracking on the Internet	9.9	29.8
Word processing (correspondence)	3.1	28
Computerized tax computation/filing	2.5	9
Online banking or bill paying	0.9	5.3
Buying farm inputs over the Internet	0	4.3
Online trading of stocks, bonds or other financial investments	0.6	1.9
Filing regulatory reports (e.g., pesticide use)	0	0.9
Selling your farm products over the Internet	0.3	0.6
Online trading of agricultural commodity contracts (futures/options)	0	0
All Internet-based applications[b]	23.7	73.5

[a] Other refers to all information seeking from the Internet beyond those identified uniquely in this table.
[b] Any Internet-based task (tasks 3, 4, 5, 8, 9, 10, 12, 13) is identified as most important.

The use of the Internet for information gathering and for transactions is now an important application of the farm computer: About 55 percent of computer-using farmers reported price tracking on the Internet, 29 percent performed online banking or bill paying, 26 percent reported the purchase of farm inputs using the Internet, 16 percent traded stocks, bonds or other financial instruments online, 13 percent sold farm products over the Internet, 9 percent reported online trading of agricultural commodity contracts, and 73 percent use the Internet to access information other than that listed previously.

For the items listed in the Table 2, farmers were asked to identify those tasks that were most, second, or third most important for their farm business (Table 3). Nearly 77 percent of computer-adopting farmers indicated that financial record keeping was one of the three most important tasks completed using the computer. This was followed by production record keeping (49.1%) accessing the Internet for other information (38.2%), e-mail (31.7%), commodity price tracking on the Internet (29.8%) and word processing/correspondence (28.0%). Use of the Internet has truly become an important use of the computer on farms. When all Internet-based tasks are grouped together, these are identified as one of the three most important computer tasks by 73.5 percent of farmers with computers. It is also interesting to note that the relative frequency that Internet uses are ranked as "importance" does not vary (at the 0.10 level of significance) across operator age, education level, off-farm employment, or farm size.

Summary and Conclusions

Computer adoption is increasing on farms, although at a modest pace. Relative to 1991 benchmarks for Ohio, computer adoption increased from 32.1 to 44.4 percent. However, computer adoption rates are much higher for the largest farms, and are higher for more highly educated farmers. Computer usage intensity also increased slightly during the period since 1991, from 14.6 to 16.4 hours per month. Although these adoption and usage numbers are derived from an Ohio sample, I anticipate that they are representative of the Midwestern states, and probably the nation. Evidence from the 1991 survey of 13 states across the nation found very similar adoption patterns with age, education, and other farm characteristics (Batte, et al.).

Financial accounting remains the most often used task of farm computers, with 89 percent of farmers with computers reporting such usage. However, the use of the Internet for communication, for transactions processing, or for information retrieval more broadly, is an application that was largely unavailable in 1991, and which is now used by about 80 percent of the farmers with computers.

There are a number of implications for farmers and farm advisors. There is clear evidence that farmers' usage of computers has changed. Although financial accounting is the most frequently completed task, the use of the Internet is increasing dramatically. General searches – e.g., the *Google* search – on whatever topic most interests the farm manager appears to be an important use of the computer today. This suggests that farmers, as others throughout society, have embraced the Internet as an important information resource. There is also substantial evidence of increased usage of the Internet for transactions or marketing decision support. More than a quarter of all computer-adopting farmers, and more than 33 percent of such farmers with sales exceeding $500,000, reported using the Internet to purchase farm inputs. This may foreshadow a greater reliance by farmers on electronic commerce and communication with business partners in the future.

References

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