Personal computer use by Iowa farmers and their families:

A case study

by

Julie Ann Rursch

A Thesis Submitted to the

Graduate Faculty in Partial Fulfillment of the

Requirements for the Degree of

MASTER OF SCIENCE

Major: Journalism and Mass Communication

Iowa State University
Ames, Iowa
1988

TABLE OF CONTENTS

Page

LIST OF TABLES

CHAPTER I. INTRODUCTION

Since 1982, when a systematic study of the adoption of personal computers by Iowa farmers was begun, an estimated 13,500 Iowa farmers have purchased a computer. The annual Iowa farm information surveys have documented the slow rate of adoption of this innovation, which a number of experts predicted would be in more than half of farmers' homes by 1990. Currently, only 13.5 percent of Iowa farmers have a computer, and this is similar to adoption rates found among farmers in New York. The rate is increasing at one to one and one-half percent per year.

The same surveys in New York and Iowa have also documented socio-economic characteristics and some basic computer use information. Adopters have higher incomes, more education and more land. They are also younger. Most adopters keep more and better farm records and many also used or previously purchased outside computer analysis services.

However, these surveys have only been able to scratch the surface of how the computer is being integrated into the farming operation. Key questions remain, including how the arrival of the computer has changed the way the farmer approaches management decisions, how computers have changed the responsibilities in the farm household for keeping records, where farmers are finding information to solve their computer problems and how farmers themselves have acquired new software and hardware to make their computer more productive.

To take an in-depth look at the impact computers have had on Iowa farming, 20 computer adopters identified by the annual random samples of the Iowa farm information surveys were selected for one to two-hour

personal interviews at their farms. Case studies were then constructed for each of the 20 farms visited and an analysis of patterns of use between the farmers was made.

Since few studies have been undertaken to look specifically at computer use by farmers, a broader literature of personal computer use studies was examined to generate areas of inquiry and research expectations for the present study. Analysis was also made of information already collected about each of the farmers by the Iowa farm information surveys.

The objective of this exploratory series of case studies is to shed light on important emerging patterns of computer use by Iowa farmers. Findings can then be used -- in conjunction with other findings -- to help set a research agenda for the 1990s for farm computer adoption, use and effects.

The study begins with a review of available literature, then moves to an explanation of the case study methodology employed in this study. An examination of patterns of responses follows, in which an attempt is made to synthesize results of the 20 case studies. Since the farmers selected are engaged in different types of farming operations, have different types of management structures and represent different geographic areas of the state, generalizations must be tentative. For those desiring to examine in more detail the pattern of behavior for a specific farm type, the 20 individual case studies are presented at the end of the thesis.

CHAPTER II. LITERATURE REVIEW

Much of the work done on computers, especially farmers and computers, has only gone through the adoption stage. Practically no work has been done to see how farmers and their families are using computers once they bring them onto the farm.

In the diffusion process an innovation passes from knowledge of the innovation, to persuasion, to decision to reject or adopt, to implementation of a new idea and confirmation. The decision to accept or reject is made based on whether the practice will incorporate well into ongoing practices (Rogers, 1985, p. 163). This is where most research stops, as it does with the adoption of computers.

In this chapter the broad base of computer adoption literature is examined to develop lines of questions for the implementation stage in which the farm families in the case studies are. Four divisions are made in the literature which is valuable to the author and the farm information survey. They comprise the four subheadings in this chapter. In addition to farm family demographics, the subheading Farmer and Family Characteristics covers the technology currently being used on the farm. The subhead Computer Use covers the progression of software and hardware acquisition and also discusses the marketing and accounting practices of each farm family. The subhead Innovativeness discusses the innovations that farm families who own computers quite probably have. And the subheading Information Sources discusses the information sources each family uses in getting help or information to operate their computer.

Computers greatly increase the farmer's potential to identify, sort, retrieve, transmit, create, and apply useful information (Dillman, 1985, p. 6). One might suspect the higher the level of technology on the farm, the higher the use of computer in the farming operation.

Unfortunately, a computer is of little use if it is not incorporated into the household's activities whether it be work, education, routine activities or enjoyment (Dutton, Rogers and Jun, 1987, p. 235).

By looking at the sophistication of marketing and accounting techniques, the addition of computer hardware and software, the frequency of the family's access to computer information and the innovations in the household, as well as the level of technology on the farm, the farm family's incorporation of the computer into their household will be better understood.

The interesting facet of adoption of new technologies, which must be remembered during this entire study, is that at any point of implementing this technology or any innovation into a daily routine, rejection or disuse can occur (Dutton, Kovaric and Steinfield, 1985, p. 6).

Farmer and Family Characteristics

Dutton, Rogers and Jun (1987, p. 220) in their work on personal computers display a contrast between the adoption of a personal computer and the use patterns. They believe adoption could be followed by nonuse to heavy use of a wide variety of programs. Some Iowa farmers may be

using their computers less frequently than others. Or maybe, their children are more frequent operaters of the computer.

Quite possibly influencing the frequency of use are the networks that computer users form. What kind of networks do farmers or their families use in trading computer information and knowledge? Do farmers utilize user groups for self-help or do they seek out private industry to solve their problems? Dutton, Kovaric and Steinfield (1985, p. 10) suggest that the social and cultural environment in which the medium is used is a factor in computer adoption and use. Important socio-cultural factors associated with the networks of users are a function of their interest in computers. They also identify technical features and human factors of the hardware and software as important, but rarely studied, factors in computer adoption and use.

Some of the characteristics of Iowa farm families who own computers are higher education, more available income and larger acreages. The most recent data from the Iowa farm information survey continues to support this hypothesis. The numbers taken from the 1988 survey show the mean age of farmers who own computers to be 45. The mean number of acres owned by personal computer adopters is 269 while the mean acres rented by computer adopters is 369. These farmers are also more highly educated than the average of Iowa farmers with 32.4 percent attending some college and 20.6 percent completing 16 or more years. These farmers have also a high gross income with 48.5 percent making $200,000 or more per year and 30.3 percent making between $100,000 and $199,999.

Dutton, Rogers and Jun (1987) identified several independent factors shaping personal computing. New technology adoption is

generally closely associated with social status. The higher the social status, the more likely the individual will be to adopt the innovation. Social status is not only an accurate predictor of adoption, but also use of personal computers (Dutton, Rogers and Jun, 1987, p. 231). Although this relationship will decline as more people adopt and move the adoption curve farther into the majority adopters, at this time, the more education and higher employment status, the greater the access to computers and the greater gains of their benefits. Years of formal education is also a strong social status indicator in explaining adoption and use of the home computer.

In an earlier study Dutton, Kovaric and Steinfield (1985, p. 11) found that a family in which several members are well educated and employed in a professional or managerial position have access to more technological information and are a much better source of help to family members who are having problems with a computer than families in which no one is computer literate. Therefore, each family member may play a different role in how computers are implemented into a farming operation. This may mean a spouse or a child who works off the farm with a computer is bringing computer information home to be introduced into the farming operation or to other family members.

Family members proved to be valuable operators in the Green Thumb Box study. The Green Thumb Box was an electronic database which was provided at no charge to farmers to keep them updated on a variety of topics related to farm families. According to Rice and Paisley (1982, p. 228), 60 percent of Green Thumb Box users said their spouses also

used the Green Thumb Box. And 49 percent said one or more children in the family used the Green Thumb Box. Frequently the spouse and/or children were asked to retrieve information on behalf of the farmer.

Harris' results are along similar lines. Eighty percent of those who have a computer in their household know how to use it (Harris and Associates, 1983, p. 55). Yarbrough and Scherer (1984, p. 9), however, believe the farmer is the primary computer operator with the spouse and/or children at home being secondary users.

Computer Use

Most innovations, whether printing press, auto or airplane, have little or no initial advantage over competing technologies. The real advantages of new technologies come later as one technology is linked to another and new capabilities develop, producing unforeseen demands for unforeseen products (Dillman, 1985, p. 10).

> A technological innovation moves through a series
> of stages as it becomes incorporated into the ongoing
> activities of an individual, a household, or an
> organization (Dutton, Rogers and Jun, 1987, p. 224).

The four stages which an innovation moves through as it becomes incorporated into the activites of a household have been categorized as invention, initiation, reinvention and institutionalization. Invention is the development of the innovation. Initiation is the entry into the household of the product, while the reinvention or adoption describes the fitting the innovation into a setting. Finally, the institutionalization makes the innovation so much a part of the lifestyle that it is soon forgotten that it is a new activity (Dutton,

Rogers and Jun, 1987, p. 224). By finding out what types of programs farmers are operating we can determine if they are modifying the computer to fit into their operation such as generating spreadsheets which are specific to their operation or modifying existing programs or if they are simply using the software that is available and not reinventing the application.

Dutton, Kovaric and Steinfield (1985, p. 8) see personal computing moving through four stages beginning with the limited use of a few applications through the heavier use of many applications. They constructed a four-celled table with the patterns of personal computing. In the first cell the individual has brief user time and is very limited in what applications are used. Cell two is a sporadic, brief user but he uses the computer for a wide variety of applications. Cell three finds a heavy, regular user of a limited variety of programs while cell four is heavy, regular users who have a large variety of things they perform with their computers (Dutton, Kovaric and Steinfield, 1985, p. 9).

The progression from cell one to cell four corresponds with the purchase of additional and more sophisticated hardware and software. Dutton, Kovaric and Steinfield concede, however, that actual use patterns may narrow as the individuals refine what they want their computer to do and find the correct applications for those specific jobs (Dutton, Kovaric and Steinfield, 1985, p. 9). Iowa farm families may fall into the logical progression from cell one through cell four or they may refine what they want the computer to do and actually go backwards in the number of applications the computer has in their operation.

Farmers may not be using computers in similar ways. Some families, or even family members, may be heavy users of the computer, while others may make light use of the comptuer or not use the computer at all. According to Rogers (in Dutton, Rogers and Jun, 1987, p. 238), the distribution of home computers is skewed. The curve indicated a small number of heavy users and a large number of light users. Other agricultural information channels indicate a similar pattern, a small group of heavy users and a large group of light users. A similar pattern emerged in the Green Thumb study. A few farmers used the Green Thumb Box heavily while the remainder made light use of it.

One part of the problem of reinvention may be the perceived difficulty in mastering the computer. Rogers, Daley and Wu (1982, p. 5) found the second most important negative consideration prior to computer purchase was anticipated learning difficulties. Cost was the number one consideration. Are Iowa farm families experiencing these same anxieties? If they are, what type of training are they obtaining when they first acquire a computer and are they receiving additional help from the vendor or private industry? It could be quite possible this anxiety causes the farm family to bypass all training and to chose solving the computing problems by themselves.

Although other types of training are used by general public, Jose found printed sources of computer information seemed to be the least threatening and most useful for farmers (Jose, 1984, p. 8). Since computers are new, farmers feel safest learning about them in their own home and with their acquaintances.

Different family members may have quite different uses for the computer. The same may be true of different types of farmers. Ettema (1984, p. 382) found that within user groups of Green Thumb, differences in use of information technology exist. The different amount of uses of a technology is due to motivation to get that type of information. The motivation can be traced to the ability of the information to solve the problems of the users. Do farmers see the computer as a powerful tool which is able to solve a majority of his problems or do farmers only use the computer for the purpose it was purchased for and not try to apply it to other needs?

Ettema found Green Thumb use was the factor most strongly related to reported benefit. He also found the adopters of Green Thumb were generally committed to the innovation and didn't need so much as want the system (Ettema, 1984, p. 394).

Venkatesh and Vitalari (1983, p. 14) asked respondents if they had a specific use in mind prior to the purchase of a home computer and if so what the use was. Seventy-one percent had a specific use in mind. Iowa farm families may have an intended use of the computer when it is purchased, but the question is whether they follow through with that intention and if they add other functions for the computer to perform.

In Venkatesh and Vitalari's 1983 study when respondents were asked to rank the perceived importance of the specific uses, business applications were the number one answer. Following in perceived importance was hobbies/education, word processing, finance/home management and entertainment/games. The number one intended use was hobbies/education, with business applications, finance/home management,

word processing and entertainment/games. The number one actual application was word processing. Following that was business applications, entertainment/games, hobbies/education and finance/home management. Generally, usage patterns indicate that the perceived importance of uses or intended uses before the purchase did not match the actual usage patterns (Venkatesh and Vitalari, 1983, p. 33).

Rogers (1985, p. 99) found similar results with the highest use of the home computer being entertainment such as games, followed by personal word processing, work-related word processing, home budgeting, child learning aid, adult learning aid, business management and database access. This could mean that Iowa farm families purchased a computer for a specific job, but the actual application of the computer was different.

Of the farmers Jose surveyed during a microcomputer extension program in Nebraska (Jose, 1984, p. 5), 46 percent chose keeping financial records as their number one reason for purchasing a computer. The advantage of computerized record keeping is the increased attention to detail. By design, computer records are more detailed to use the computer to its fullest potential. Therefore, farmers are not only learning about computers, but are simultaneously learning about accounting (Jose, 1984, p. 7). A farmer's record keeping may have changed since acquiring a computer.

Fifty-four percent of Nebraska farmers indicated they would spend more time than they currently do on record keeping and the remaining 46 percent split evenly on expecting to spend the same amount of time and

expecting to spend less time on record keeping (Jose, 1984, p. 5). But in general, Nebraska producers weren't ready to devote more time to computerized management than they do to their current record keeping system (Jose, 1984, p. 8). Iowa farmers may be keeping records the same way only using the computer to do their calculations instead of a calculator. Or possibly farmers are changing the way they keep their records.

The farm family may perceive owning the computer has saved them time or money also. Clearfield and Warner (1984, p. 290) found 59 percent of Green Thumb users reported saving time and 42 percent reported that it saved them money.

The second most important use of the computer, according to Jose, was analysis of alternatives. Farmers are willing and anxious to plan and compare alternatives (Jose, 1984, p. 7). Iowa farmers may be using decision aids programs prior to spring planting or in calculating break even points for livestock.

The varied ways of using the computer seem to be linked to length of ownership. Initially financial/home management use appears high, but declines with an increase in the length of ownership. Word processing also increases with the length of ownership (Venkatesh and Vitalari, 1983, p. 26).

If length of ownership affects the type of application the computer operator is doing, it may also affect the perceived capabilities of the computer. Farmers who own their computer longer may understand the computer better and be able to apply it to more situations than farmers who have newly acquired a computer.

According to Venkatesh and Vitalari (1983, p. 27), length of ownership also affects the perception of the computer's potential. The more recent the purchase of the home computer, the sharper are the feelings the device is complex and frustrating. The longer the computer is owned, the less frustrating and complex the computer is viewed. Also among the group who did not have computer experience prior to adoption of a home computer, the level of satisfaction with the computer is generally lower during the early period of ownership, but increases during the second year. The users without previous experience are also less satisfied with dealer assistance and standardization of manufacturers' products, software reliability and general documentation (Venkatesh and Vitalari, 1983, p. 33). In the Harris study, seventy-five percent say the expectations of the computer were fulfilled upon purchase, although they were somewhat satisfied rather than completely satisfied (Harris and Associates, 1983, p. 56).

Numerous obstacles to and constraints on consumer's acceptance of videotext, such as the users' browsing habits and educational and economic factors dictate the demand for computer systems (Rice and Paisley, 1982, p. 224). In the Green Thumb study excessive delays in information updates caused farmers to select only the most important frames (Rice and Paisley, 1982, p. 227). Although two-thirds of Green Thumb Box users were satisfied or very satisfied with the experiment they would expect a more technical system if they were paying for it. They wanted it to be more reliable and more frequently updated (Rice and Paisley, 1982, p. 232). Therefore, Iowa farmers probably expect high quality results from their computer with anything less being a

disappointment with the machine.

The amount of time spent using the computer may increase or decrease over time depending upon the frustration level or the accomplishment level. Paisley (1983, p. 157) found Green Thumb Box use decreased during the year of availability. This decrease may have been due to the slowness of changing information or it may be a function of the innovation. The use of the Green Thumb Box also changed with the change in seasons. Case et al. (1981, p. 9) found Green Thumb usage among younger and larger farmers was more likely to change seasonally. Farmers are more likely to use the computer more during the winter than the other three seasons. Older farmers were more likely to quit using Green Thumb all together. Also Green Thumb marketing information was used more by larger, younger, more innovative farmers. Quite possibly the Iowa farmers who own and are using computers are younger and more innovative.

In the 1983 Harris study, eighteen percent of adopters indicate using their home computers less than what they originally anticipated when they purchased them. Approximately twenty percent are not able to run their computer proficiently (Harris and Associates, 1983, p. 236).

Information Sources

Mason (1963) and Rogers (1983) found after a practice is adopted by an influential, his use of the mass media and authoritative sources remains high. Both Mason and Rogers attribute post-adoption information seeking to dissonance reduction. Computer adopters have a need for

reinforcement that their decision was correct. They will continue to seek information during the implementation and confirmation stages. Farmers may continue to purchase or subscribe to magazines until they are convinced they have purchased the right software and equipment.

Orr, on the other hand, disagrees with this reasoning of why farmers are continuing to seek information. He found in his work with the Iowa farm information survey that farmers not only continue to seek information, but increase information seeking activities after computer adoption. Orr hypothesizes one reason for the increased information seeking after adoption could be that the operation of a microcomputer requires higher levels of information than many other high involvement innovations (Orr, 1986, p. 67).

Yarbrough and Scherer agree. Computer information sources are more complex than in other innovations. The number and diversity of information sources increases as the farmer passes through the adoption stages from aware to practice adoption (Yarbrough and Scherer, 1984, p. 18). They also found the information source tends to be additive as the farmer passes through the adoption process. Computer information acquisition is higher after adoption than before the decision to adopt the computer is made (Yarbrough and Scherer, 1984, p. 16).

Computer information may come from a variety of sources. Socio-cultural factors such as friends, co-workers and computer users both inside and outside of the home are very influential in the adoption and extent of use of the home computer (Dutton, Rogers and Jun, 1987, p. 232). Iowa farm families may have found a group of friends or

neighbors who they turn to for help in solving computer problems. Others may turn to the computer store where they purchased their machine. Still others may prefer not to counsel with anyone and to solve their problems by themselves through use of the manuals. If a farmer or his family is plugged into a computer network, that operation may have more applications for their computer than the other families.

Rogers (1985, p. 95) found that interpersonal networks were more important than the mass media in providing awareness-knowledge about computers. This is unusual and quite the opposite of most earlier diffusion studies. Generally, the mass media play an important role in creating awareness about the new innovation. Rogers found 55 percent of his respondents first heard about home computers from co-workers. Based on this finding it seems important to look at the interpersonal sources of computer information farmers and their families use. These same networks may have been very influential in helping the family decide that they needed a computer and type of computer to purchase. Possibly just talking about their own computer to others, these farm families have influenced others to purchase a computer.

In the Green Thumb experiment, the project itself was newsworthy. Over two-thirds of user households reported giving or receiving information about Green Thumb in conversations with persons outside their families (Case et al., 1981, p. 12). Farmers may talk to their neighbors about their computer and either share information or explain the value of owning a computer. Iowa farmers may talk to each other about computers because they are newsworthy.

Rogers, Daley and Wu (1982, p. 28) found friends, work associates and computer stores are the most cited types of computer information. All three are interpersonal types of information.

The networks of friends, co-workers and computer users both inside and outside the home influence the amount of use a computer receives. This socio-cultural setting is a network of hobbyists, retailers, vendors, users and others who are linked through magazines, friendships, electronic mail, common interests and shared ambitions (Dutton, Kovaric and Steinfield, 1985, p. 12). The more a person gets into this network, the more he will use the computer in his life. He will use it more regularly and increase the applications for which he uses it. He begins to integrate it into everything he does and applies it to a large variety of everyday skills (Dutton, Rogers and Jun, 1987, p. 233).

Younger farmers with large personal networks who were innovative tended to use the Green Thumb Box in a continuing manner (Rice and Paisley, 1982, p. 233). This suggests younger farmers may have more applications for their computers, especially for future applications, when compared to older farmers.

Rogers believes that the most important of interpersonal networks can be traced to the enthusiasm that home computer owners expressed with their system. They preached to all who would listen about the redeeming values of owning and using a home computer (Rogers, 1985, p. 97). Again a friend, family member or neighbor may have influenced the farmer to purchase a computer.

In the month prior to the survey, Rogers et al., found home computer owners talked about computers to 13 people, encouraged an average of eight others to purchase a computer. They also indicated they liked to display their computers as well (Rogers, Daley and Wu, 1982, p. 7).

Green Thumb users reported demonstrating it to an average of 16 people each and passing Green Thumb information along to a similar number of people (Case et al., 1981, p. 9). From this it seems logical to ask the farm families if they have ever had a computer demonstrated to them on another farming operation and/or if they have ever demonstrated their computer to others. Iowa farmers may not be so cordial as the general public in demonstrating their computers. Farmers tend to be a more independent group and may not want personal information being demonstrated to others.

Farmers may be getting their information from sources other than personal networks. According to a South Dakota extension survey, the single best source of information about computers was workshops (51 percent), followed by co-workers (21 percent), magazine or newspaper articles (7 percent), books (6 percent) and computer dealers (3 percent) (Jorgensen, 1984, p. 77). No one who attended the extension workshop where the survey was taken used computer exhibit information. Nebraska farmers said they most frequently used neighborhood sources of computer information (67 percent), followed by magazines (59 percent), cooperative extension (50 percent) and newspapers and television (30 percent) (Biehl, 1984, p. 155). Again it seems logical to ask farmers what their most valuable source of computer information is.

In a study conducted in the Twin Cities, people who work with
computers are more likely to have a home computer or are interested in
purchasing one. Fifty-six percent of Twin Cities area uses a computer
or computer reports at work. Thirty-seven percent have hands-on
involvement with the computer as users or programmers. These 37 percent
tend to be white-collar workers with a college education. They also had
training or education in computers. This training ranged from short
term training workshops to long-term learning on the job or in school.
Not all of those who worked with computers have had training (Harris and
Anderson, 1984, p. 2).

In 1983, one quarter of working individuals nationwide use a
computer at work (Harris and Anderson, 1984, p. 23). Of the workers who
own a home computer, 50 percent use a computer at work (Harris and
Anderson, 1984, p. 25). Two-thirds of the respondents indicated prior
to purchasing their computer, they had some experience either at work, a
friend's home or a computer store. They also purchased one peripheral
device initially and purchased an additional peripheral later. They
also knew, on the average, about five home computer owners before their
purchase (Rogers, Daley and Wu, 1982, p. 6). Iowa farm families may
have member who is working outside the farming operation with computers
and bringing that knowledge home. Those family members as well as other
friends may have influenced the farm family to purchase a computer and
decide what type of computer should be purchased.

Harris and Associates (1983, p. 50) found 45 percent of the general
public know how to use a computer. More classify themselves as a

beginner than either an intermediate or advanced. Over half of all computer users say they use a computer at work.

Personal computer users who had worked with a computer before, either at work or in school, had fewer problems, were more interested and have a greater number of work-related projects to perform on the computer (Dutton, Rogers and Jun, 1987, p. 233).

Unfortunately, farmers don't follow this pattern of using a computer at another job prior to purchasing one, according to Jose. He suggests that prior experience isn't an indicator of interest in microcomputers. Farmers are interested in home computers because they can use them when they wish and have the records remain confidential (Jose, 1984, p. 6).

If the adult members of the household are not bringing in the computer information from work, possibly the children are the ones implementing computer information learned in the classroom. Parents who would not purchase a home computer might do so at the children's urging, after high use at school. Eighty-one percent of households with both a computer and children report the children using the computer. Fifty-three percent report that children first learned to use the computer at school (Harris and Anderson, 1984, p. 20). Children may influence their parents in using a personal computer, rather than vice versa as it is usually assumed in television use (Dutton, Kovaric and Steinfield, 1985, p. 12).

The diversity of how information gets to the farm family -- through children bringing the information home from school, family members working with computers or friends supplying information -- supports

Yarbrough and Scherer's belief (1984, p. 14) that the type of channel for computer information transfer is not critical. They believe that it is more important what channels are available and which ones the change agents use than the quality of the channel itself.

Innovativeness

In addition to social status, personal attributes such as individual habits about computing and communication technology as well as the business management perspective of the farm operator are important factors in computer implementation.

According to Dutton, Rogers and Jun (1987, p. 232), computer adopters have a higher interest in, and more positive attitudes toward, science and technology. Rice and Paisley (1982, p. 228) measured innovativeness of the farmers in the Green Thumb Box study by adding the number of innovations that a farmer adopted.

Home computer owners are more likely to have previous experience with general computer products such as digital clocks, programmable pocket calculators and video television games. They also have experience with telephone answering service, call waiting/forwarding, computer prepared income tax statements, automatic bill payment, automatic deposits, automated teller, microwave oven, alternative long-distance telephone service, cable television services, speed dialing, digital computer panel in car, credit cards and video recorder (Dickerson and Gentry, 1983, p. 232).

Other technologies which are related to computers and are available to the average household include cellular mobile phones, videotext, home banking, electronic shopping, electronic bulletin board, home security networks and database reference systems (Venkatesh and Vitalari, 1986, p. 179).

Electronic devices such as satellite dishes, VCRs and FM band radios found on Iowa farms may be associated with computer use. Of the Nebraska farmers surveyed in 1984, 85 percent had microwave ovens, 52 percent had 2-way radios, almost 25 percent had VCRs and video games, but none had solar collectors or solar water heaters (Biehl, 1984, p. 155).

Hooks, Napier and Carter (1983, p. 312) categorized high technology farmers by measuring the use of technologies such as on-farm drying equipment, spraying equipment, metal grain storage equipment. Intermediate technology was measured by the use of herbicides, early timing of operations, wet harvest with mechanical drying, high number of plants per acre. Low technology indicators were use of organic fertilizers, use of custom-blended fertilizers, installation of plastic drain tile, crop rotation. They also looked at the attitudes toward farming as a business, and the differences between the current farming practices and ten years prior.

It seems appropriate to talk to farmers about their farming practices to see if farmers who own computers are indeed more innovative. Also understanding the farmers' attitudes toward farming as a business may give insights into why a computer was purchased. Accounting practices may be one reason the computer was implemented and

it is important to see if the record keeping system changed or if the computer is really handling the same type of records previously kept on paper.

According to Hooks, Napier and Carter (1983, p. 319), correlations between the high technology practices and farming as a business were significant. Similar results were found for the intermediate technologies. The farmers who were currently more innovative were also more innovative ten years ago.

Farm size is also positively related to the adoption of other innovations (Clearfield and Warner, 1984, p. 290). Larger farmers tend to be full-time farmers who had also adopted other innovative practices. Part-time farmers operated smaller farms and were younger, more educated and had not farmed as long as the full-time farmers. However, overall, younger farmers adopt more innovative farming practices than older farmers (Clearfield and Warner, 1984, p. 292). The farmers in these case studies may be part-time farmers and it would be interesting to contrast full-time operators' computer use with part-time operators' use, especially if the part-time operator's second job was computer-related. Other comparisons can be made between younger farmers' computer uses and older farmers' implementations. There may also be a clear distinction between the plan a younger farmer has for his computer in the future and the older farmer.

A negative relationship existed in Green Thumb study between willingness to pay and both age and number of years in farming (Clearfield and Warner, 1984, p. 290). This means the younger the

farmer, the more willing he is to adopt a new innovation such as Green
Thumb and he is more willing to pay for this new innovation than his
older counterpart who has been farming longer.

In the Harris and Anderson study (1984, p. 9) a similar finding
appeared. Younger age groups are more likely to purchase a computer
than the oldest group, 50 and older. Thirty-five percent of the 30 to
49 years-olds are interested in purchasing and 15 percent already own a
computer. Only 9 percent of those who are 65 or older are interested or
are already owners.

In the Harris and Associates study, between age groups and among
levels of education a difference exists as to how likely an age group is
to know how to use a computer. The youngest group (18-19 years) were 52
percentage points more likely to know how to use a computer than the
oldest generation (65 and older). Also 52 percentage points separate
the likelihood to know how to use a computer from those who have
finished four years of college and those who never finished high school
(Harris and Associates, 1983, p. 53).

Iowa farmers seem to follow the same pattern. Adoption of
computers by farmers is not even over all groups. The younger farmers
who have a higher income and who are better managers are the ones who
are adopting. Better management include keeping more accurate and
complete financial accounts, keeping enterprise accounts and using cash
flows. It also means hedging and/or forward contracting. The farmers
who already practice one or more of these find a computer more valuable.
If a farmer doesn't use any of these managerial practices, he will have
a harder time identifying the uses of a personal computer (Scherer and

Yarbrough, 1984, p. 8).

Ending Thought

Although the literature about computer adoption is abundant, details of what farm families are doing with their computers is almost non-existent. The four subheadings covered in this chapter were chosen because they seem to identify areas which are of the greatest interest to the author and greatest benefit to the ongoing farm information survey.

This literature review helped develop a spectrum of questions which could be asked of the 20 Iowa farm families selected who used a computer. The questions were developed only to trigger the farm families' memories to explain more about their computer and farm. In developing the questions, it was necessary to split one of the subheadings from this chapter, Computer Use, into two separate areas of interest, computer hardware and software acquisition and management sophistication.

The final five areas of interest which were questioned during the on-farm interviews are:

1. the level of technology on the farm versus the level of technology in computer use
2. computer hardware and software aquisition
3. sources of computer information
4. level of management sophistication
5. innovativeness

The implementation of the computer into the farming operation can be traced by discussing these topics with each farm family.

CHAPTER III. METHODOLOGY

A multiple case studies approach was chosen for this research because it is meant to be an exploratory and descriptive project from which a more detailed understanding of farm computer use will be obtained.

Yin (1984) says a case study is appropriate when we have no control over the behavior of the respondents and when the study focuses on contemporary events. "The case study is preferred in examining contemporary events, when the relevant behaviors cannot be manipulated" (Yin, 1984, p. 19). The case study method uses direct observation and systematic interviewing techniques. A case study has a distinct advantage when "a 'how' or 'why' question is being asked about a contemporary set of events, over which the investigator has little or no control."

To begin to form the correct questions to ask the interviewees to get at the heart of the important issues, the case study begins as a survey would with a detailed literature review. This helps focus the interviews and develop sharp, straightforward questions.

A case study is not generalizable to a population or universe. It helps develop theoretical positions and understand what the small sample is doing (Yin, 1984, p. 21). "The essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or a set of decisions: why they were taken, how they were implemented and with what result (Yin, 1984, pp. 22-23).

Case studies can explain causal links that are too complex in real life for survey instruments to accurately detect or experiments to detect. This study is using a multiple case design where replication is the key. Each case study family has been asked identical questions. Through this replication comparisons will be made across, not within, cases (Yin, 1984, p. 47).

The research design for this study was developed after careful review of the relevant literature. Since little had been done in the post-adoption stage of implementation, most of the information was drawn from adoption research. Five areas of interest developed from the literature review.

1. the level of technology on the farm versus the level of technology in computer use
2. .computer hardware and software acquisition
3. sources of computer information
4. level of management sophistication
5. innovativeness

A line of questioning was developed which followed these five areas of interest generated by the literature review. (See Appendix A for actual questions.)

The literature in the Green Thumb study suggests using the farm family, not the individual farmer, as the unit of analysis. The family in this study is defined as anyone associated with the operation of the farm, whether he is a brother, cousin, partner or member of the immediate family.

Yin calls for the researcher to define the problems or issues to be studied and develop a case study design. Then a pilot case study is developed, tested and the original design is revised (1984, p. 55). The

pilot study for this research was conducted on four Illinois farmers who were known computer users. These farmers were easily accessible, geographically convenient and willing to be interviewed. While listening to the farmers and their families' answers, the interviewer was flexible and willing to follow the line of their answers. Yin (1984, p. 56) states that data collection is not routinized. He suggests the interviewer must be adaptive to see other trains of thought as opportunities to capitalize on while supporting the lines of questioning.

The pilot test is not a pre-test. It is used to assist in developing lines of questioning. The lines of questioning allow the interviewer to keep the interview focused while using rich open-ended questions. The farmer then has the opportunity to offer his own insights into his personal computing functions (Yin, 1984, p. 83).

After the pilot study, the interviewer returned to the major professor to refine the lines of questioning as Yin (1984, p. 59) suggests so bias does not appear. Since the four farmers and members of their families were able to articulate answers to the questions with little confusion, virtually no changes were made in the lines of questioning. The major finding in the pilot study was that more than one family member definitely needed to be a part of the interview, if more than one family member operated the computer. Each family member could be doing something totally different with the computer. In two of the pilot studies the spouses were the primary operators with children also being important. In the other two cases, the farmers were the

primary operators, with one spouse using the word processing package and the other spouse not using the computer at all.

The actual sample of farmers contacted for the case study was randomly selected from a pool of 67 computer-owning farmers in the Iowa State University Agricultural Experiment Station project number 2725. The original farm information survey mailing list was a random sample drawn from the Wallaces Farmer mailing list for the first time in 1982. Overall, 27 farmers were contacted. Twenty farmers actually allowed the interview to be conducted. One said he didn't own a computer and six flatly refused. Two of the six refusals were justified by the drought in the summer of 1988. They indicated they would have conducted the interviews if they had not had to haul so much water to their livestock. The remaining four farmers were definite refusals.

Once the farmer agreed over the telephone to conduct the interview, a time was scheduled for an on-farm visit. The interview was generally scheduled for early morning or early evening. This on-farm visit allowed the interviewer the opportunity to observe the farm as well as interview the farmer.

Once the 20 interviews were completed, a matrix was constructed. Yin (1984, p. 100) suggests putting the information gathered in the multiple case studies into different arrays or matrices of categories. Each farm family was assigned a case number in the order they were interviewed. Then the topics of most interest were listed along the side of a spread sheet and the answers to those lines of questioning were abbreviated in the correct cell.

Yin also suggests putting information in chronological order. This has been done with farmers' computer use. Also, the chronological aspect of looking at when software and hardware were purchased was cataloged in the matrix. In addition, the length of ownership was asked to see if newer users used the computer more frequently, about the same, or less frequently than their counterparts who had been operating a computer for a longer period of time. Computer time use was ranked, as was diversity of application patterns.

Yin (1984, pp. 100-101) suggests dividing the study into four or five categories and talking only about the variables in that category for all of the cases, then moving on to the next category. This will be done in Chapter 4. Conclusions drawn from these results will appear in Chapter 5, while Chapter 6 will include the actual case study interview responses.

CHAPTER IV. RESULTS

In these case studies, each of the five areas of interest described in the literature review are examined. All case studies are discussed in each topic area. Appendix B contains the matrix from which this information was developed. Within each of the interest areas a summary table will be included to help clarify the results.

The first area of interest to be discussed will be characteristics of the farm as well as the level of technology used in the operation. Farmers and their families were questioned about the size of the farm, what crops and livestock were raised and what tillage practices were used.

The type of hardware and software used will make up the second area of interest. Questions in this section deal with the brands of hardware and software, the timetable in which each additional piece was purchased as well as the sophistication farm families have in developing software to fit their own personal needs. Another topic of interest in this section was the browsing habits for new software determining whether the family used a computer store or whether the family members preferred to use magazines to browse. Also the characteristics of the room in which the computer was located were noted.

Who uses the computer, how they use it and where they get their information is the third interest area. Computer training, knowledge of other farm computer operations, the use of computer networks and influences on the choice of type of computer are under consideration.

The fourth interest area is concerned with the management techniques under which the farm families operate. The degree to which the computer has been implemented into the farming operation or the family's lifestyle as well as the perceived advantage of having the computer and any changes the computer has made in the farming operation are investigated.

The use of other electronic innovations in the farm families' homes is the fifth area of interest. Whether farmers follow a pattern of adopting other innovations along with computers or if electronic gadgets are predictors of type of computer use are considered.

One final subdivision which was not found in the literature review, but seemed appropriate to ask, was what the family had in mind for their computer in the future. They were also asked about the adoption gap which leaves 85 percent of Iowa farmers not owning computers. These may provide some insights into attitudes towards the importance of the computer in their lives.

Before these interviews ever occurred a host of demographic information about these 20 farmers was available from the Agricultural Research Experiment Station project 2725. Overall these farmers are larger than Iowa's average farm operators with the 268 acres being the mean acreage owned while the mean acreage rented was 382.7 acres. As a group these farmers are younger than the average Iowa farmer. Their mean age is 42.4 years. As would be expected, they are also more highly educated with 50 percent having completed some college and 20 percent receiving a bachelor's degree. Twenty-five percent completed high

school. Forty-five percent had gross incomes over $200,000 while an additional 30 percent had gross incomes of $100,000 to 199,999. Other characteristics about the farms that were discussed during the on-farm interviews are included in the first area of interest.

Farm Background

Farmers in this study who owned computers farmed from 160 to 1500 acres. Seventeen of the farmers interviewed farmed over 308 acres, the average size farm in Iowa in according to 1987 Iowa Department of Agriculture Statistics. These farmers may benefit from economics of size which may make a computer more attractive and useful. Of the three farmers who till less than 308 acres, two of them (12, 19) use the computer in a small business enterprise they operate in addition to their farm. The computer does not stay in the home. It is at the off-farm office. Although the other smaller farmer (9) says he bought the computer for farm records, the major emphasis during the interview was on the educational value for the children.

Fourteen of the farmers (1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 14, 16, 18, 19) had production livestock. Of these, nine (1, 2, 3, 4, 5, 6, 7, 11, 16) were doing enterprise accounting. However, two of these nine doing enterprise accounting (2, 11) are not using the computer to keep the accounting. Four of these nine (1, 3, 4, 5) changed to enterprise accounting when they got their computer.

Ten of the twenty farmers (1, 2, 3, 6, 10, 11, 12, 18, 19, 20) had hired labor. Six of the ten (2, 3, 10, 11, 12, 19) had full-time help,

while the remaining four (1, 6, 18, 20) only hired additional help, either relatives or students, during the busy times of the year. Seven (1, 3, 4, 5, 6, 16, 19) farmed in a partnership and one (11) farmed in a corporation with his father. The remaining 11 farmed independently.

Hardware and Software Acquisition

Farm families own and operate a wide range of computers. They were asked during the interview when they purchased their computer, what brand of computer they bought, what software they are using and when they acquired the software.

The big three brands of computers are IBM, Tandy and Apple. The Apple IIe and IIc were the most widely found type of computer with ten farmers (2, 3, 4, 7, 8, 9, 11, 14, 15, 18) owning them. Interestingly enough, two of the Apple owners want to purchase IBMs within the next five years. One of these Apple users (7) has completely abandoned his computer because it has broken so often. He thinks an IBM would have better accounting programs and would fit with his current accounting system better. The other potential Apple defector (15) has a brother who owns an IBM. He believes by owning an IBM he could trade software and information about the computer easier. He says Apple software is too expensive.

Three IBMs, one unnamed IBM-clone and two Tandys that emulate IBMs total to six IBM compatible systems (1, 5, 6, 10, 16, 17). One Commodore 8032 (19), one cassette Tandy TRS80 (20) and one Radio Shack Model 4 (12) were found. In addition, one Macintosh was being used by

farmer 13. His son had purchased a Mac, so when the son left, the father purchased a Mac.

Only one farmer had purchased his second computer (10). He had originally owned a Tandy TRS80.

Only one hard drive was being used. It was purchased new and had only been owned for 1 year by farm family 1.

Three other farm families (4, 11, 17) had owned their computers less than 2 years. One computer, which had been purchased as new equipment, had two 3 1/2-in. drives. The other two families had purchased used Apple IIes which have two 5 1/4-in. floppy drives.

A printer was a standard option at the time of purchase. Only one farmer (20) did not purchase a printer at time of purchase. He never purchased a printer and has discontinued use of the computer. Three farmers (9, 10, 11) owned colored monitors. One of these three (11) owned both a monochrome and color. The color monitor was for the children's games and the monochrome monitor for the farm record keeping.

Of the five farmers who owned modems (1, 4, 5, 6, 10), four of them purchased the modem with the original computer equipment. However, only one farmer (4) is currently using his modem. He is sending purebred cattle registration papers to the breed association over the telephone. The farmer who did not purchase his modem as original equipment (10) used it to subscribe to a private database like AGNET or EXNET. Another farmer (8) who is not currently using his modem had previously subscribed to a database service. They shared the complaint that it cost too much money to use because they were novices in operating the system. Therefore, their computer time costs grew while they didn't get

much information. Farmer 8 is considering picking up the service again as part of a free introductory offer and then dropping it when the free account expires.

Five farm families (6, 9, 10, 11, 14) have added hardware to their original computer. Farmer 6, an IBM user, added additional memory in his second year of ownership. At 2 1/2 years he added a graphics card and at almost four years he had to replace the keyboard. Three Apple users (9, 11, 14) bought joy-sticks shortly after purchase. Farm family 9 bought a color printer two weeks after purchase and a mouse several months after purchase. Within the last year, farm family 9 ordered an external drive from a magazine and added memory. Farmer 14 added a color monitor 2 1/2 years after purchase for sons. As stated above, farmer 10 purchased a modem.

Twelve of the twenty farmers (1, 3, 5, 6, 7, 9, 10, 12, 13, 15, 17, 19) are considering either adding new equipment to their computer operations or buying a new computer. Four farmers (3, 6, 10, 17) are thinking about adding a hard drive, while the farmer who is operating a 20 megabyte hard drive (1) is thinking about upgrading to a 40 megabyte Winchester drive. Two farmers (3, 5) indicated they are thinking about adding more memory to their machines, while five (7, 10, 12, 15, 19) said they wanted to purchase a new computer. Farmer 7, who is currently a non-user, was one of the farmers who indicated a desire to purchase a new computer. Two farmers (9, 10) want to buy 3 1/2-in. drives.

Table 1. Brands of computers found and hardware used

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC[a] (OF 11)	OTHER (OF 3)
Own computer	6	11	3
Use computer	6	10	2
Owned less than two years	2	2	0
Added hardware	2	3	0
May add hardware	5	5	2
Buy new computer	1	2	2
Have modem	4	1	0

[a]Since Macintosh is part of the Apple line, the farmer who owned a Mac was classified as an Apple user.

Thirteen farmers (3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 17, 18) had a similar approach to software. They either programmed the package themselves, had someone program it for them or developed spreadsheets to fit their particular operation. Five farmers (1, 2, 15, 16, 19) preferred to have Pioneer or someone else develop the program so they could just plug their numbers into generic slots. Two farmers (7, 20) are not using their computers, therefore have no approach to software.

A focal point is the intended use of the computer when it was purchased versus what the farm family is actually doing with the computer after it was purchased. The family that purchased the computer with the idea that it was to be implemented into the farming operation

may indeed be using the computer very differently from the family who purchased the computer for their children's educational gain.

Thirteen farmers (1, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, 18, 20) said one of the primary reasons they purchased the computer was for farm record keeping. Eleven (5, 6, 8, 9, 10, 13, 15, 16, 17, 18, 20) had purchased or written the software to let them accomplish their intended use.

Five farmers (1, 2, 3, 4, 6) said keeping livestock records and/or figuring rations was one of the intended uses of the computer when it was purchased. Of these five, two (3, 6) purchase or wrote programs to accomplish those goals.

Three (7, 8, 14) said one of the major intended uses for the computer was the children's edification. All three of these families who said they purchased the computer at least partially for their children's edification own Apples. One set of parents (14) purchased the computer strictly for their boys' use. The boys in turn wrote a program for their parents to use for accounting. The parents (14) only use the computer for quarterly statements and continue to keep a notebook with the bills and checks written down as they did before computer adoption. All the mother uses the computer for is as an adding machine to make that work easier.

The other two farm families (7, 8) said in addition to being for the kids, they purchased the computer for farm record keeping. In the end, farmer 7 never used his computer for record keeping. The primary operators of the computer until it broke for the final time were his children. They had educational software. The children in farm family 8

are older and using the computer as a word processor. Farmer 8 is using the computer for farm records as well as decision aid programs.

Two of the farm families (7, 14) bought educational games at the time of purchase of the computer. The other farm family (8), in which the children were older, pirated the Appleworks software, which they wanted to use, immediately. These three individuals bought the computer with a purpose in mind and they used it for that purpose.

The adults in these families are either not doing anything with the computer themselves (7) or are only doing one thing with the computer (14). The farm families who purchased the computer for the farming operation are doing a wider, yet somewhat limited variety of activities than these people.

Two families (11, 5) said one of the major reasons for purchasing a computer was word processing. An additional two families (12, 19) purchased a computer for a small business they ran in addition to their farming operation.

The latter two farmers till under 308 acres. Farmer 12 only runs a soil testing program with his computer. He had purchased a database and word processing package, but he rarely uses them any more. The spouse in case 19 started using the computer for their small business, but when she saw how detailed the records were for the business, she decided to put the farm records on computer also.

The other farm family under 308 acres (9) is doing a lot of things with their computer. They are a younger couple who said farm record keeping was the reason they purchased their computer, yet during a

majority of the interview they reiterated the importance of their
children learning to use the computer.

Table 2. Computer software and applications

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
Use specific software	4	8	1
Use generic software	2	2	1
Children intended use	0	3	0
Accomplished intention	0	3	0
Records intended use	6	6	1
Accomplished intention	5	5	1

All but three farmers (11, 15, 20) have acquired or written
additional software. Some of the software was pirated by children
through school while other programs were purchased. Of the 17 farmers
who have programs other than the original purchase, six (7, 8, 12, 18,
19) of those families purchased software close to the time of the
computer purchase and have not purchased anything since then. The other
eleven farmers seem to be growing in their software acquisition,
although some are not yet using the new programs.

Seven farmers and their families (2, 3, 7, 15, 16, 17, 19) say they
never browse in computer stores. Farmer 14 and his spouse said they
don't browse, mainly because they only operate the computer for one
program which their boys wrote. However, their boys go to computer

stores and read the industry publications frequently.

Five farm families (6, 9, 10, 12, 13) said they either do little or no browsing at stores because they subscribe to computer magazines which keep them up-to-date better than a computer store. With magazines they can decide if the program is what they might want. They have the luxury of being in their own home and reading at their leisure. They can think mull the decision over for a while. If they are interested then they would travel to a store to check the program out themselves. The remaining seven (1, 4, 5, 8, 11, 18, 20) say they browse in computer stores. Even case 20 who is not currently using the computer is browsing for educational software produced on cassette for his daughters.

Of the five farm families who said they browsed by looking through magazines, three (6, 9, 10) of them had purchased additional equipment. All three said they saw something in a long copy ad in the magazine and either ordered it from the advertiser or went to their computer store to check it out.

Of the other two farm families who purchased additional hardware, in one family (14) the children both browsed through magazines and computer stores. The mother, who operated the farm accounting program, did not browse. She and her husband left the job of finding out about new computer programs up to the children. The parents were not interested particularly in doing anything other than what they could already do. The children were trusted to make the buying decisions.

Table 3.   Browsing habits for new information or products

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
Browse in computer stores	2	4	1
Browse with long copy ads	2	2	1
Purchase after long copy	2	1	0

Nineteen of the 20 computers were in office settings. Two of the computers (12, 19) were not in the farmhouses. They had been moved to an off-farm business office. Eight of the ten Apple owners (2, 4, 7, 8, 9, 11, 15, 18) had their computer located in a room not only designated as an office, but also a toy room, recreation room, family room, dining room or bedroom where all family members had access to the computer without feeling intimidated. One Apple user (3) had his computer in a business office, but he had no children at home and his spouse didn't like his computer. She preferred the one at work, so he has no need to centrally locate the computer. The final Apple user family (14) had the computer located in the son's bedroom since the son was the primary operator. The mother did her record keeping in his room.

The Macintosh owner follows the Apple owners. His computer is centrally located in the living room. When his son was home and the farm records were kept on his computer, it was located in the son's bedroom. But now that the son lives in Alaska, farmer 13 bought his own Mac and located it in the living room.

No pattern of computer location was evident for IBM or IBM-clone users. They tend to be split between strictly office and office/playroom. Two farmers (1, 6) had strictly farm offices where the computer was located. Farmers 5, 10, 16, 17, 20 had the computers located in office/playroom settings. Farmers 12, 19 did not have their computers in the house.

Table 4. Computer location

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
Central computer location	4	9	1
On-farm office location	2	1	0
Off-farm office location	0	0	2
Located in child's room	0	1	0

Operators, Training and Sources of Information

Questions were asked about what computer training the farmer and his family had received on the computer, who was the primary operator in the family and what each of the other family members did with the computer.

Eleven of the farm families interviewed (1, 3, 4, 5, 6, 8, 11, 13, 15, 16, 18) had the farmer as being the primary operator when accounting and farm record keeping were the jobs. In five cases the spouse (9, 10, 14, 17) or the mother (19) kept the accounting records. In case 19, the

mother found keeping the livestock equipment accounting on the computer gave her so much more information that she decided to keep their farm records on the computer too.

In four cases (2, 7, 12, 20) the computer was not used for accounting. In two cases (1, 8) the spouses gave up their job of record keeping because of the computer. Case 1 will be resuming her responsibilities this year because she will have time to learn the system. The other spouse will not because she wants nothing to do with the computer.

In three households (7, 14, 20) children are the primary operators. In two of these cases it is because the computer is basically worthless to any adult member of the family. The kids either played games (7) or just punched buttons (20). In the other case (14) the boys understood how the computer works and have written the farm program into which their mother enters quarterly data.

Ten families (3, 4, 5, 8, 9, 10, 11, 14, 15, 18) said word processing was an important function to a primary operator of the computer. Yet, spouses and children seem to be the ones who are doing the word processing. Children who are living at home, as well as those who have apartments of their own and are attending college or working, like the word processing feature. Two of the spouses (5, 11) used this function when the computer was purchased. Word processing was one of the main reasons these two families purchased computers when they did. Both of these women were taking classes at the time the computer was purchased.

Five farmers (2, 10, 13, 16, 17) use the computer for decision aid programs either in grain or livestock. No spouses run these programs. Interestingly enough, two of these farmers (10, 17) want their spouses to do the accounting, but they prefer to run the what if programs themselves.

One spouse (9) believes in the computer so much that she has computerized her household inventory, designed banners and resumes for others, implemented a birthday/anniversary database and developed a farm telephone database.

Only one farmer (5) lets his partner use his computer. This is his son-in-law. Farmer 5 lets him keep his half of the farm records on farmer 5's computer.

In nine of the cases (2, 3, 4, 5, 8, 12, 13, 16, 20) at least one female in the household, either spouse or daughter, did not use the computer at the farm. In family 16, the spouse is not opposed to using the computer. She has small children and can't concentrate on using the computer when they are around. In family 15, the spouse keeps her own beauty salon records on the computer, but she generally does quarterly statements and then quits. She doesn't enjoy operating the computer.

In two cases (1, 11) where the father of the farmer is still living, he asks for and reads the printouts, although he would not operate the computer. Out of the fifteen cases where children were still living at home (1, 2, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 20), eleven sets of parents (2, 7, 8, 9, 10, 11, 14, 15, 17, 18, 20) allowed them access to the computer.

In three cases (9, 14, 19) the farmer doesn't operate the computer himself. In these cases the spouse does the computing. One (9) needed a telephone number from the computer when his spouse was gone, so he has now learned how to operate the telephone number database, but still the spouse is the most computer proficient. Farmer 14 never uses the computer and he doesn't want to know how. These two farm families said the one of the major intended uses for the computer was their children's education. Farmer 19 didn't purchase the computer. His son did. His spouse operates the computer. He sees no advantage to using a computer because he never looks at the records. He never looked at the ledgers when they were on paper either.

Only three farm families (10, 13, 18) said they don't know anyone else who owned a computer. Very few of the seventeen who said they knew computer owners talked to these people about their computers and how they use them. Four of the seventeen (1, 2, 4, 9) said they either had gone computer shopping with someone else or were asked to help another with computer problems. None of the farmers indicated they talked frequently with someone about computers, unless it was a family member or a farming partner. Six farm families (3, 5, 8, 9, 12, 13) reported demonstrating their computers, but as one farmer described the demonstration, "It's a game to them. Although you put in about the correct figures for projecting profit, it is still just a bunch of numbers. They like to see how close they get, but it isn't real."

Only one of the four farmers who have demonstrated their computers (9) have demonstrated any type of accounting package and that was to family members and friends. Two of the other farmers (8, 3)

demonstrated decision aid programs which are pretty generic. The farmer
for whom the program is being run is able to put in his own inputs and
generate a fictitious set of numbers. The final farmer who demonstrated
his computer (12) was selling a soil testing service so he would have to
demonstrate his product before another farmer would buy. He never
demonstrated to local farmers, but to farmers from across the United
States.

Five of these six demonstrations used very non-involving types of
information. The sixth demonstration was to people who were close to
the family. In all six cases, the family member who was doing the
demonstrating was not giving out confidential information to a neighbor
who was watching the demonstration.

The trend seems to be that farmers know neighbors who own
computers, but they don't know how other farmers use them. This may be
due to the veil of privacy surrounding income figures. Many farmers are
very touchy about the amount of money they make. Since a large share of
the farm families interviewed use the computer for accounting, telling
others about how a program works may divulge some of their income and
expenses.

The many brands of computers that farmers own may be problematic
for the development of a computer communication network. Three farmers
(2, 5, 17) mentioned the fact that different computer hardware made
trading information about computers not worth their time.

Farmer 5 said the other farmer whom he knew had a computer for at
least as long as he did, but he was an Apple user and since farmer 5 was

an IBM user, they didn't exchange information. Farmer 2 indicated the same problem when he went to help the sale barn set up their computer. Because he was an Apple owner and they had purchased an IBM, he wasn't as proficient at helping them as he could have been if the computer would have been an Apple. Farmer 17 wants to start a users group in his area, but since they don't all own the same equipment, he's afraid it won't be very beneficial to get one going.

It seems farm families are having a difficult time adapting what they learn in theory about any type of computer to their personal computer. Farmers are usually very good at modifying an idea so it fits their farming operation. Farm family adults aren't able to generalize between seeing one type of computer operating a program and searching for a similar program to work on their system. One farmer (4) said he really didn't want to browse until he understood how his computer worked. Then he could think of many applications for it. This must be true for many farmers who have never before used a computer. Computers are the kind of innovation that require hands-on experience before the applications can be seen for the farming operation or even for the household. In case 19, once the mother saw what kind of records could be generated with the computer at the business office, she put the farm records on the computer.

A similar situation occurred in case 9, where the spouse saw what kind of inventory records could be kept on the farming operation and decided to inventory her house for insurance.

Generally farmers believe entering accounting on the computer takes more time than keeping ledger books by hand, but they have better

records when they are done. In addition the computer makes doing taxes and end of the year work easier. Thirteen farmers (1, 2, 4, 5, 6, 8, 9, 13, 14, 16, 18, 19, 20) said keeping farm records on the computer was as time consuming, if not more so, than keeping records by hand. But the majority said they had more complete records when they were finished. Five farmers (3, 10, 11, 15, 17) said the computer saved them time by being easier to understand where the farming operation stood at any one point in time. One (12) said it saved time writing soil instructions for people. The remaining farm family (7) never used their computer so couldn't say whether it saved time.

Farmers agreed that certain seasons were conducive to operating the computer and other seasons were not. The interesting part is the seasons that farmers named were not consistent. Some felt spring and fall were the bad seasons for computer work, while others thought those months were the months they used the computer the most. The most frequently cited season was winter. Not only is it warmer in the house, but it lets the farmer plan for the next year and project yield and production costs prior to spring purchases.

Computer use is sporadic at best. The average amount of time varies from family member to family member. Kids appear to be heavier users of computer time than the parents. Six of the fifteen families who still had children living at home (2, 7, 8, 14, 15, 20) logged more hours on the computer than their parents.

When asked how many hours per week they used their computer, farm families were not always able to give an estimate. Some family members

talked in terms of hours per quarter while others would talk about hours per month.

Table 5. Estimated hours of use[a]

	DON'T USE	< OR = 2 HRS.	3-5 HRS.	6-10 HRS.	5 TIMES	7 TIMES
Adults	2	9	4	3	1	1
Children	1	1	2	1	0	0

[a]In six families where the children were extremely young, no estimate was made for their use on the computer because it was sporadic at best.

None of the farmers interviewed said their computer breaking down would cause the entire farming operation to come to a screeching halt, although they seem important enough to warrant timely repair. Three farm families (4, 6, 9) would want access to a replacement machine while their computer was being repaired. Two families (6, 9) would expect the repair shop to provide a replacement while the third farmer (4) would go to his brother's to borrow his computer. Three farmers (12, 15, 19) said if the computer was too expensive to fix, they would not fix it, but would buy a new computer. The computer on family 7's farm has been broken for two months and instead of it being repaired, they are considering buying a new computer. Farmer 20 wouldn't repair the computer and wouldn't replace it. Since he doesn't use it, there is no reason for it to be fixed.

Farm family 19 presents an interesting perspective on this question of the computer's importance in the farm family's lives. The primary operator, the mother, said if her current computer broke, she would buy the exact same model, even though it was eight years old because she getting along just fine operating it. The father, who has never operated the computer and thinks computerized inventory would be a bigger pain than it is worth, said he wouldn't replace the computer. The son, who reads the monthly profit and loss statements and does the hiring, firing and designing for the livestock equipment business, said he would replace the computer with a newer model that would do small business accounting as well as generate blueprints for his equipment and trucks.

Two farm families (5, 16) don't know where they would take the computer locally to have it repaired. Farmer 16 purchased his computer through his local bank and the company from which he bought it folded. Farmer 5 has no close city. He is three hours from Kansas City or Des Moines.

Eight farm families (2, 4, 7, 8, 9, 11, 14, 18) bought Apple computers because the local school owned Apples. Two of these eight (4, 11) said there weren't any other IBM people in the area to help set up that system while there was local support, either through the school or local farmers, to operate the Apples. Yet from information presented earlier we see farmers are not networking to share their computer expertise. It must just be comforting knowing that others own the same type of computer and that help is available locally.

A family member owning a computer also seems to be a strong influence on what type of computer is purchased or what type of computer should have been purchased. Five farmers (4, 6, 8, 13, 15) had either brothers or friends who were operating the brand of computer they decided to purchase and they said these people were influential in the decision to buy their brand of computer. Farmer 15 is an Apple user who purchased an Apple because three men he worked with owned Apples. Now his brother has an IBM and farmer 15 wishes he could purchase an IBM.

Banks and financial institutes are also influential in the type of computer purchased. Farmer 7 abandoned his computer in part because his accounting service told him IBMs were the only computers to use for farm accounting. He now wants an IBM. Farmer 16 also listened to his bank to purchase his computer which is an IBM, but he didn't get everything he was promised in that computer deal.

When dealing with an unknown such as computers, farmers tend to look for a knowledgeable person. In the case of computer purchases, that knowledgeable person seems to be a family member or someone who the farmer is willing to bring into the ground floor of his farming operation. He must trust that person with the knowledge of his accounting system.

Two families (5, 19) indicated that the salesman had influenced their choice of computers. Six farmers (1, 3, 10, 12, 17, 20) said they had no influences on buying a computer. They were just looking for the machine that would do what they wanted it to do.

Table 6. Influences on purchasing brand of computer[a]

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
School influence	0	8	0
Family/friends influence	1	4	0
Financial institution influence	1	1	0
Salesman influence	1	0	1
No influence	3	1	2

[a]Totals to more than 20 because some families cited multiple influences on their computer choice.

Twelve of the farm spouses (1, 2, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20) said they were employed on the farm. One spouse (15) has her own business out of her home while another (19) is employed in the livestock equipment manufacturing shop just west of her house. Neither of these two have outside computer contact. Five spouses (3, 4, 5, 13, 17) were employed off the farm and did not have any computer experience through their jobs. One spouse (11) was a grad student who had computer contact through the university. Spouse 7 had prior computer training on her last off-the-farm job.

Two farm families (3, 11) said they received help from the local high school teacher. One of these families (3) had the program they were running for the hog operation programmed specifically for their operation. The high school teacher was one of the co-authors for the

program so when it had a hitch, farmer 3 had no qualms about calling

him. He was already an insider. Farmer 3 doesn't use this person any

more possibly because he is no longer writing any programs for the

farmer. Also farmer 3's children are no longer in high school so the

association between the teacher and the farmer may have faded over time.

Farmer 11 also contacted the high school teacher when his family

first purchased the computer. One of their influences for buying an

Apple was because the school had them so they must have felt secure in

calling the teacher for help in starting up the software. They only

asked for help in the beginning. The family never called the teacher

once numbers were entered in the computer.

Seven farm families (1, 6, 9, 10, 15, 16, 17) said they have called

the computer store or the computer company when they have had problems

with their computer hardware or software. Two of the farm families (9,

10) said they didn't have very good luck with the computer stores and

they finally had to figure the problem out themselves.

This seems to be the most common farm family attitude -- figuring

the problem out themselves by using the computer manuals. Seven farm

families (5, 8, 11, 12, 13, 18, 19) say they just figure the problem out

themselves rather than asking anyone. Two farmers (4, 14) ask their

children or children's friends how to correct the problem. Two farmers

(3, 11) called the high school teacher for help once. One farmer (2)

couldn't recall a specific problem while two other farmers (7, 20)

hadn't used the computer enough to get into a problem.

There is a difference between IBM users and Apple users in where they go to seek help. Five of six IBM users will return to or call a computer store for help when they have a problem. Only two of 11 Apple users said they will call the computer store to have a problem solved.

Table 7. Where farm families go for computer help[a]

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
Computer store for help	5	2	0
Teacher for help	0	2	0
Read manual on own	1	3	3
Children for help	0	2	0

[a]Total to more than 20 because one family had called the high school teacher and from then on figured the solution out themselves.

Computer training can be a valuable place to learn how to operate a computer. Many people learn faster and more easily when someone shows them how to work a program than when they have to read the manual. It is much easier to stop an instructor to ask for information to be repeated or to ask a question if something doesn't make sense than it is when reading a manual. All of the farm families had at least one member of the family who had taken at least one session on computers or had worked on computers at a previous job. Whether the family members were happy with the training they received is quite another matter.

In four farm families (2, 3, 13, 15) only children had any type of computer training. The adults in the household looked to the children or the children's friends for help in operating the computer. In four additional families (4, 8, 14, 18) both an adult and a child had some computer training. In three of these four (4, 8, 14) the children or the children's friends solved the parents' problems, sometimes long distance over the telephone. Children in the family who have computer knowledge seem to be a valuable asset to the adults in these case studies. Farmer 18 had his masters degree in mechanical engineering, so he needed little programming help, but his daughter taught him how to perform graphics commands. In two of the four cases where both an adult and children had training (4, 18) it was the farmer rather than the spouse who had computer training.

In the other two families (8, 14) the spouses and the children were the only ones who had taken computer courses. In family 8 the spouse took the class, but doesn't like the computer and doesn't use it. In family 14, the spouse depends heavily upon her boys to help her when any problems occur. She says the class she took was on programming and she really didn't want to know that information. That's ironic because what she needs help with the most is commands for copying and formatting disks.

In five families (5, 6, 12, 16, 20) only the farmer had computer training.

In four families (7, 9, 10, 19) the spouses were the only members of the family to have taken any computer courses. These spouses are the primary operators. Family 7 is a special case because the computer is

no longer functioning, but prior to it breaking for the last time, the spouse was the one going to school to learn to do record keeping on the computer. Spouse 9 is definitely the computer operator. She says her husband may have the ideas of how to implement the computer into their farming operation, but she is the one who figures out how to physically do it. Spouse 10 had not taken any computer classes, but had computer experience and training from a previous job which was counted as computer training. She utilizes her brother -- a Texas Instruments repairman -- for serious problems. Spouse 19 had a session with the computer store, but they talked above her level of understanding.

In three families (1, 11, 17), both parents had taken at least one class in computers.

The mother in farm family 19 had used daughter-in-law for information. Once her oldest son got divorced, the daughter-in-law left and so did the mother's source of information.

Table 8. Family members who have had computer training

	HAD TRAINING
Only farmer	5
Only spouse	4
Only children	4
Farmer and child	2
Spouse and child	2
Two adults	3

The variety of family members who take computer courses doesn't help pinpoint who the information source is. A case may be made for Yarbrough and Scherer's belief that it doesn't matter what channel is used as long as the information that the farm family receives is valuable. Any member of the family has the potential for being an information source. It is a factor of who has the opportunity to attend the training.

Five of the adults (1, 5, 7, 11, 14) who had computer training of some sort were not satisfied with what they learned. The most frequent comment was it wasn't about my brand of computer or it was about programming and I don't want to do that. A sixth adult (8) was not happy operating the computer and therefore didn't like going to her computer class.

The other ten adults (4, 6, 9, 10, 12, 16, 17, 18, 20) were satisfied with the computer training they received.

Management Style

The type of farming operation the family is running influences the level of management sophistication. Questions covered in this area include the return on investment in a computer and changes in accounting or marketing practices since computer adoption.

Seven farmers (1, 2, 10, 13, 15, 18, 20) say the computer has not saved them money or at least not enough to pay for itself, but one of those (1) said it paid for itself by providing sanity in livestock record keeping and farm accounting. The remaining twelve farmers (farmer 7 never used his computer so the question does not apply), says

the computer has paid for itself.

Two cases (9, 14) believe that just the educational value for their children has been the way the computer has paid for itself. Others are more numbers oriented and say the computer has helped them make management decisions especially in heavy input enterprises such as feeder cattle, feeder pigs, purebred livestock, laying hens, livestock equipment manufacturing and soil testing operations (2, 3, 4, 5, 6, 11, 12, 16, 19).

Table 9. Computer value[a]

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
Paid for itself	2	3	2
Not paid for itself	4	7	1

[a]Total does not equal 20 because farm family 7 never used the computer, therefore the question is not applicable.

Four farmers indicated they either were using or wanted to use their computer in marketing. Farmer 2 uses his computer to calculate a break-even price which he uses in his speculating and hedging, while farmer 14 thinks calculating break-evens might be a useful facet of the computer. Farmer 13 wants a modem so he can access grain market information while farmer 16 has a charting program to chart the markets so he can start using forward contracting and options better. However,

farmer 16 has not yet used the program.

The group of farmers in these case studies basically have a solid understanding of marketing their products. Seven (2, 4, 6, 7, 8, 16, 20) have hedged or used options while three more (10, 15, 17) indicate a desire to learn about hedging or options. Eleven farmers (1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20) are forward contracting. These farmers are more sophisticated than the three (5, 9, 19) who take the price given on the day of delivery.

It is interesting to note that computers have not dramatically altered how farmers carry out business. Four farmers (1, 3, 4, 5) changed to keeping enterprise accounting when they purchased their computer. This was because the computer gives them more detail so they want to set their records up in more detail to take advantage of the computer's ability to be so precise. They are the exception to the rule. The majority of these farm families are continuing to do what they had done prior to computer adoption. Three farmers (6, 8, 16) used enterprise accounting before acquiring a computer so their record keeping practices didn't change much. Nine farm families (9, 10, 13, 14, 15, 17, 18, 19, 20) kept general ledgers on the computer while four farmers (2, 7, 11, 12) do not use their computers to keep their farm records, but instead choose to keep handwritten records.

The three families (6, 8, 16) who kept enterprise records by hand prior to computer adoption as well as the nine families (9, 10, 13, 14, 15, 17, 18, 19, 20) who keep general ledgers on the computer are doing the same thing as before they purchased the computer. The four families who have purchased computers, but are continuing to keep their records

by hand, strengthens the idea that farmers will continue to do what they were doing prior to computer adoption.

Table 10. Farm accounting systems

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
Changed to enterprise accounting on computer	2	2	0
Enterprise accounting prior to computer and then put on the computer	2	1	0
General ledgers similar to pre-computer	2	5	2
Records not computerized	0	3	1
Computerized records prior to computer	1	4	1

Six farmers (2, 7, 9, 11, 12, 16) sent some kind of records off the farm to be computerized prior to owning a computer. They used the local bank, Production Credit Association, Moorman's hog records, or Central or Southwest Iowa Farm Business Association. Two farmers (2, 7) have continued to send their farm accounting off-farm since acquiring the computer. Two (9, 16) have changed to using the computer to keep their records that were previously sent off-farm. Two farmers (11, 12) have discontinued using the computerized service and have not put their

records on their own computer.

Generally the job assignments between farmer and spouse have stayed the same with the adoption of the computer. In all but two families (1, 8) the bookkeeper continues to keep the accounts even after computer adoption. In one of these two families (1) the primary record keeper will resume her responsibilities in the coming year because she will have time to learn the computer program.

Other Innovations

In other studies, computer owners tended to be the type of people who own more than one electronic device. It seems farmers who own computers also own electronic devices such as VCRs, microwave ovens, automatic dialing phones, Dataline, Agriview, private band radios and programmable calculators. Seventeen farmers (6, 12, 19 excluded) in this case study owned VCRs. Two of the farmers who didn't own VCRs didn't allow television in their homes because they have small children and they don't want the kids to become dependent on it. The other farm couple was in their 60s and didn't own any electronic innovations, although their son who does not live with them, but was the individual who purchased the computer, did use several innovations.

Nineteen of the farm families (excluding 19) had microwave ovens. Three farm families (2, 4, 11) own or rent a video recorder and two more (8, 20) are considering buying one. Dataline is also found in many of these farming operations. Eight farmers (1, 2, 3, 6, 10, 16, 17, 20) have Dataline in their home and one farmer (9) has access to Dataline at

the cooperative. Farmer 7 has access to some F.M. band radio information through his neighbor, but he doesn't couldn't name the service.

Family 19, who was the oldest farm couple interviewed, did not have any electronic gadgets, although their son who purchased the computer had a cellular telephone and VCR. From the tone of farmer 19's voice, Dataline wouldn't do him any good because he won't sell something he doesn't physically have in his possession. One of the farmers (2) who has Dataline also has Agriview. This is the only Agriview user found and he is not using it as much now since he has Dataline.

Ten farmers (1, 2, 3, 5, 6, 8, 11, 16, 17, 18) have C.B. or F.M. band radios. Most of the farmers who owned C.B.s said they had either abandoned them totally or opted for private F.M. band radios.

Only one farmer (4) had made the progression from a programmable calculator to owning a computer. Farmer 20 wanted to make the reverse move from a computer, which he only used for two years, to a programmable calculator. Two farmers (3, 18) had solar heating units for their homes, although only farmer 18 was using one. Farmer 3 had owned his solar heating unit for some time, but it was still boxed and sitting in the machine shed. Farmer 7 said he also had solar powered electric fences.

Five farmers (1, 2, 4, 10, 13) owned automatic dialing telephones. Three farmers (2, 15, 19) have telephone access in their farm vehicles. Two farmers (3, 11) have telephone answering machines.

Table 11.   Innovations which farm families own

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
VCR	5	11	2
Microwave oven	6	11	2
Access to Dataline	5	3	1
C.B. or F.M. radios	5	5	0
Autodial telephones	2	3	0
Telephone in vehicle	0	1	1
Answering machines	0	2	0

Although electronic gadgets may be a predictor of computer ownership, they are not a good predictor of computer use. The two farmers who had abandoned their computers (7, 20) owned as many electronic devices as the other 18 farmers who were still utilizing their computers. VCRs and microwave ovens are the two top electronic devices farm families have in their homes. Nineteen of the families had microwaves and seventeen had VCRs. These two innovations are so widely diffused that they cannot be used to divide up the 20 families. Even if microwaves and VCRs are dropped from the list of innovations predictors, no clear pattern of innovations influence on computer use develops.

Because a farmer has Dataline doesn't mean he is any more interested in using his computer in marketing than the farmers who don't use Dataline. Of the eight farmers who have Dataline in their home,

only two (2, 16) are using their computer in marketing. One is calculating break even prices for his feeder cattle while another has a hedging program he wants to start using. However, IBM users more frequently own Dataline'than Apple users. Out of the six IBM users in this study, five were using Dataline. Only three out of 11 Apple users subscribe to Dataline.

Future Use

An interesting facet about current computer use is that it may predict future computer use. Two hypothetical questions were also asked of these farm families. One was asked to see if they had a plan for their computer and the other was intended to let them hypothesize why computers are not diffusing faster among Iowa farmers.

The seven farmers (8, 13, 14, 16, 18, 19, 20) who did not have any specific plans for what they would be doing with their computers in five years are not currently doing very much exploring with their computers. They basically use the computer for one or two specific jobs and don't try to make other applications for it. They are perfectly content with what they have and aren't interested in anything new. Two of these (8, 18) said they probably would be running the same programs as they are currently running, unless something really good came along. Yet they couldn't say what would be good enough to make them change what they were doing with the computer. Two (14, 16) of these suggested things that can be done with computers, but really doubted whether they would be doing that or not. And the final two (13, 19) said they planned on retiring so they wouldn't be doing anything in five years with a computer.

The five farm families who are considering purchasing a new computer are extremes on the scale. They are either extremely happy with what they have and want to expand it (1) or they are not able to do what they want with the computer and want to purchase a new one in hopes of having the capabilities to run the programs they want (7, 15) or upgrading to a bigger computer to run more complex programs (10, 12).

The thirteen farmers (1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 15, 17) who had ideas about what they wanted to be doing with computers in five years generally were doing more with their computers than the six farm families who had no idea what they wanted to do in five years. If they are more interested in the computer now, they are more interested in what they can be doing in the future with the computer.

In family 19, the son has definite ideas about what he wants a computer to be doing in five years, yet he isn't the operator. The mother who is retiring is the primary operator. The son says he wants to get a new computer which will allow him to do accounting, inventory and blueprints. Farmer 20 who has completely quit using the computer says he won't be doing anything with a computer. He may buy one for the kids, but he doesn't want anything to do with it. He is looking for a programmable calculator for his record keeping system.

The thirteen farmers who had ideas about what they would be doing in five years gave answers from vague goals to specific programs and hardware they wanted to be operating. Five farm families (1, 7, 10, 12, 15) are considering buying new computers within five years. One of these families (1) is considering purchasing a second, upgraded computer for the farmer and his spouse and a third computer for the kids. Two of

these farmers (7, 15) are Apple users who are switching to IBM because they know others who are proficient at operating IBMs and they want to be as computer literate. Two additional farmers (17, 20) said they may be buying an inexpensive computer specifically for their children.

Two farmers (10, 17) mentioned hard drives as pieces of hardware they want to add within five years. Four farmers (3, 4, 9, 15) said they wanted to keep field histories and even draw field maps on the computer. Three farmers (2, 7, 11) said they will start keeping their farm records and accounting with the computer. Two farmers (4, 6) want to get out of production agriculture and have time just for doing computer farm accounting for other farmers. Two farm families (9, 10) mentioned adding 3 1/2-inch drives.

Table 12. Future use of the computer

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
No specific future plans	1	4	2
Had specific future plans	5	7	1
Plan to buy new computer	2	2	1
Plan to buy hard drive	2	0	0
Plan to keep field maps	0	4	0
Plan to keep accounting	0	3	0
Keep others' accounting	1	1	0
Plan to add 3 1/2-in. drive .	1	1	0

Farm families were asked to hypothesize why over 85 percent of Iowa farmers don't have computers. They consistently gave four reasons for this gap in adoption. Six farmers (1, 5, 8, 14, 15, 16) said other farmers were not financially able to purchase computers due to the economic conditions presently associated with farming. Nine farm families (2, 3, 4, 7, 9, 13, 15, 16, 18) said farmers don't understand computers and/or they don't know what a computer can do for them. Seven farmers (6, 7, 8, 10, 16, 17, 20) said the average age of farmers is old and the older the farmer is, the less he will want to change. He has gotten along so far and will continue the way he has been for the past years. Five farm families (9, 10, 11, 12, 19) responded that the average size of an Iowa farm is too small to justify the time it takes to set up a computer program. It is easier for the smaller farmer to keep his records on paper.

Table 13. Hypothesized reasons to explain the gap in computer adoption

	IBM/TANDY/CLONE (OF 6)	APPLE/MAC (OF 11)	OTHER (OF 3)
Financially unable	3	3	0
Don't understand computer	1	8	0
Farmer too old	4	2	1
Farm too small to justify	1	2	2

CHAPTER V. CONCLUSIONS AND IMPLICATIONS

So what does this wealth of information that has been gathered about these 20 farm families mean? Are there patterns evident? Although farmers are doing relatively few things with computers, they may be more important in the near future. Several of the farmers in the case studies indicated they knew young farmers who had just purchased a computer within the last six months. This may mean that computer adoption is a function of age as well as money flow.

Currently a key aspect in computer adoption and implementation is a family connection who understands computers and how to operate them. The family members, as well as books and manuals, are the most used source of computer information. This may change as more younger farmers are able to become full-time farm operators. The family member who is knowledgeable about computers may not be as important if the farmer has college or other computer training. Several patterns seem to appear in this initial study.

Information channels

As Yarbrough and Scherer (1984, p. 14) suggest, farm families do not discriminate in their choice of information channels through which to receive computer information. They readily take any channel, other than direct farmer contact, they can receive. From the results section, we have seen that a variety of farm family members are taking classes with no specific pattern of who takes the classes. Families where children are the information sources are getting their information from what the children learn in school.

Farm families are also relying heavily upon their reading skills to understand and operate their computer. This is characteristic of farmers -- they prefer to figure out the solution on their own without paying for help in solving the problem. Using the computer manuals is also a safer avenue to approach the problem at hand than going to a person and trying to explain what is happening. This is in accordance with Jose's work (1984, p. 8).

The primary operator of the computer also depends upon who has had the most training and who is interested and understands how the computer works. The results of this study showed primary operators as well as secondary operators spread across family members. This supports the 198_ Harris finding which said 80 percent of those who have a computer in their household know how to use it and Rice and Paisley's findings that the spouse and children of farmers receiving Green Thumb Box service also operated it.

Farmers are not, however, utilizing the potential pool of knowledge from their neighbors who own computers. They are not calling upon their neighbors for help or demonstrating their equipment to others. Farmers tend to know at least a few other individuals who own computers, yet they rarely share computer knowledge.

Several factors may contribute to this problem. The first may be the sensitive nature of applications the computer has on that farming operation. As any student is taught in conducting research, the most sensitive questions are asked last. One such question deals with income. A large share of farmers in these case studies, 13, said they

purchased the computer to keep farm records -- a very confidential issue. Farmers may not be willing to invite neighbors into their homes to view how they are doing financially, even if it is in the line of demonstrating a computer.

This is not consistent with what Rogers, Daley and Wu (1982, p. 7) or Case et al. (1981, p. 9) found when the computer was being demonstrated to 13 people per month and the Green Thumb Box to 16 people per month. Farmers in this study are not demonstrating their equipment probably because the information they use their computers for most often is financial.

Respondents to questionnaires often hesitate to talk about their financial situation and farmers are no exception. The five farmers in this study demonstrated non-involving decision aid programs to neighbors or if they were demonstrating accounting, it was to a close friend or family member who would hold this information confidential.

Another possibility is that there are not enough computers diffused among farmers. They may know people who own them, but they are not good enough friends to discuss important information which may be included in their financial records.

The problem of hardware and incompatibility may also be keeping farmers from trying to trade information or forming user groups. Especially when computers are new, farmers are not likely to understand how to apply a function that his neighbor tells him about to his own personal computer situation. Children may be much better at this. In general, they have more exposure to computers and a better grasp on what is compatible, what can be transposed to other computers or programs and

how to reinvent the innovation. No literature has addressed this problem and it seems it would be something that will only continue to worsen.

Farm families are not getting their computer information from off-farm jobs as some other studies have found. Only two wives had off-farm contact with computers so the Harris and Anderson (1984, p. 25) findings stating off-farm employment helps in operating a home computer do not hold true for these farm families.

Farmers apparently aren't trusting establishments like Pioneer to give them advice about types of programs to operate and help with their computer software, either. Somehow these types of businesses must be utilized or the farmers will continue to not implement the system into their operation. There must be some neutral middle man between the corporation and the farmer to help the farmer and yet give him the feeling of confidentiality that friends and family give him now.

In addition, farm families who use computer magazines to browse tend to read the long copy ads looking for new software or hardware for their system. They are also the types of farm families that have purchased additional equipment and have plans for their computers in the next five years.

Farmers and their families may be too busy to go browsing in computer stores. That may be one reason why they do not rely upon computer stores for information. Another reason they don't use stores may be the perception that computer stores don't understand agriculture, therefore can't help apply software to farm problems.

Schools as Information Channels

As we saw in the results section, Apple users have strong ties to the local school system. Eight of the ten Apple users named the school as being an influential force in the purchasing of that brand of computer. Three farm families also admitted to pirating software from the school systems basically because they felt their tax dollars paid for it and they should have access to it.

If Apple users are to be reached, the literature, classes, software or whatever is needing to be disbursed would be most effectively done through the school. High school teachers were also important in two families as sources of information. If teachers were trusted enough, they could be a valuable link for the farm family. High school teachers could have access to the most current literature while farmers may not receive information unless they are on a computer mailing list.

These Apple users purchased the computer for their children, especially their education. They make sure the computer is located in a centrally accessible space. In addition, when parents intended for the computer to be an educational experience for their children, that is what the computer was used for. The parents purchased educational software and although other applications may be set up, the primary purpose and use was for the children.

In contrast IBM users seem to be using the computer dealers to get information. Yet when using dealers many farmers and their families feel that computer stores are not able always to help them.

Family members also are a strong influence on what type of computer equipment is being purchased. The knowledgeable person about computers

also has to be a trusted person when it comes to the farm's financial situation. Family members are safe. They are the second most cited source of influence in purchasing a computer.

Further research is needed in understanding how the computer has changed the lifestyle of the farm family. It seems currently to be affecting the children most. They are the ones who are maximizing the time on the computer and implementing it into their school homework and play time. As younger farmers and their families adopt the computer, will they make the computer a more central part of the farming operation? The younger farmers in these case studies had more innovative ideas for the computer, but had not implemented them yet. This will be a critical area to watch over the next five years.

Farmer Characteristics

Dutton, Rogers and Jun (1987) were correct in identifying demographic characteristics such as larger acreages, higher education levels and more income as being associated with computer ownership. Hooks, Napier and Carter (1983, p. 319) were also correct in saying that the more a farmer treats his farm as a business, the more innovations he would use. The Iowa farmers definitely display those characteristics.

The earlier study done by Dutton, Kovaric and Steinfield (1985, p. 11) was also supported by the data found in this study. Families in which at least one member is skilled technically in computers are the ones that are a better source of information than families in which no one is a computer expert. The computer experience however is not

usually an off-farm job.

Dutton, Rogers and Jun (1987, p. 232) said computer adopters have a higher interest in and a more positive attitude toward science and technology. Dickerson and Gentry (1983, p. 232) and Venkatesh and Vitalari (1986, p. 179) also found use of other new technologies was related to computers.

While it may be true that ownership of other innovations is a good predictor of acquiring a computer, this study's results show it is not a good predictor of computer use. The diffusion of VCRs and microwave ovens is so widespread that even the computer rejecters own and use these pieces of equipment. Although the linkage of ownership is there, the use linkage is not.

The four farmers who held additional jobs were not more innovative with their computers. They were doing the same things the other farmers were doing. All of these farmers were young so no comparison can be made between older and younger users.

Reasons for 85 Percent Non-adopter Rate

As we saw in the results section, four reasons were consistently given by farmers for the 85 percent non-adoption rate in Iowa. The most often given response was farmers don't know what a computer can do for them or they don't understand computers. This may show the frustration that these 20 farmers have experienced in computerizing their own operations. They may be admitting that not knowing what the computer will do either is or was one of their problems.

Other reasons cited concerned age, economics of size and financial condition.

The Harris study results saying that the younger age group of non-farm individuals were more likely to own a computer was upheld in this test. In the results section, the average age for these 20 farmers was 42.4 years.

In this study the smaller the farm, the more likely the computer is to be used for a small business that the farmer operates in addition to the farm. In one case the farm family began integrating the computer into their farming operation after the wife saw the detailed output she received from her small business accounts on the computer.

The other possibility when a farm is small is that the computer was purchased for the children's use.

Computers Critical to Farming Operation

Farmers do want their computer to be fixed in a timely fashion if they break down. None of the twenty farm families indicated that the farming operation would come to a screeching halt if the computer indeed would break down, but all but one would fix it or purchase a new computer. The ones who wanted access to a replacement computer while theirs was being fixed are three farmers who make heavy use of their computers. Obviously the more something is used the less dispensable it is in the family's life.

Two problems associated with repair are the distance farmers are from the dealer, and the fact that in some cases the dealer has gone out of business since the computer was purchased. Although not reported in

the case studies, several farmers mentioned the problem of computer dealers coming and going while they were left holding the bag. The ones that it did not happen to were still careful to say they either purchased their computer at a reputable dealer for a little more money because they were afraid that the cheaper place would be out of business in two months or that they wondered about where they should buy a computer because computer stores come and go so quickly.

Those benefiting the most from computer ownership

In general farmers don't believe the computer has paid for itself, but they do think it can be beneficial. Farmers who have more specific record keeping needs are the ones who see the most advantage to owning a computer. Labor intensive operations such as livestock or small business operations said computers help them make better management decisions.

Assessment of payback also depends upon whether or not the computer was purchased for educational purpose for the children. For educational purposes, it doesn't have to break even money-wise; it is more important if the children have some perceived means of being more successful or less stressed. The farm families who purchased the computer for financial record keeping are less forgiving. They want the computer to pay for itself in dollars and cents on the balance sheet.

Farm business practices are not changing because of the computer. Although four farmers in this study changed to enterprise accounting from general ledger accounting, the majority of farmers are still doing

what they were doing prior to computer adoption only putting it on the computer. The four who changed to enterprise accounting cited additional detail as a benefit of computerized record keeping.

The larger share of the 20 computer owners are continuing the same record keeping practices they did prior to computer adoption. Both the ones who put their records on the computer in exactly the same form as they did by hand and the ones who do not use their computers for record keeping support the idea that farm families don't know how to use their computer in new ways. They continue to do what they did prior to computer adoption.

Another supporting piece of evidence is the fact that with a few exceptions, the same people in the farm family continue to keep the record books after computer adoption.

Farmers who had ideas about what they wanted to be doing in five years generally were doing more with their computers than those who had no idea what they would be doing with their computer in five years.

Conclusion

From these case studies generalizations to the population of Iowa farm families cannot be made. Additional research needs to be undertaken such as what is being purposed in conjunction with the Iowa State University Agricultural Experiment Station project 2725.

This is a new phase in the farm information study which has been on-going at Iowa State since 1982. The purpose of this study was to develop some general hypotheses about the farmers who own computers and to see the applications of the computer on a farm. From these, an

understanding was developed of what is happening on these 20 farms and how certain types of farmers may be using the computer compared to other farmers. The family connection as well as the function of age and management technique are key in understanding how the computer was implemented into the farming operation. These are areas which need to be explored in greater detail. Understanding who the farmer turns to with each type of problem and where he goes when the family member doesn't know the answer are other areas which merit study.

From these 20 case studies a survey will be developed to send to farmers who are known computer users. This case study will help shape the questions which will be asked on the questionnaire so meaningful responses will be given. The projected mailing date is in 1989. The mailing list of known computer users will be generated by combining the adopters in the two random samples and using the select samples which were mailed to in 1982, 1983 and 1984.

The networks through which farm families receive information are so wide and so varied it may be impossible to generalize to the entire population of Iowa farmers who own computers.

Many questions have developed in this study which have no answer at this point. The only answer is to continue to study these questions.

CHAPTER VI. CASE INTERVIEWS

Case 1 -- IBM XT Clone, used for record keeping, other new uses developed, used frequently, will expand system, both spouses use.

Farm family 1 farm 1200 acres of corn and soybeans outside of a large metropolitan area. They have purebred cattle. He is in a partnership with his father. They use part-time hired labor -- mainly university students. They don't do any no-till or minimum tillage.

Farm family 1 purchased their computer about one year ago. They own an IBM XT clone with 20 megabytes memory, monitor, modem, wide carriage printer, and one floppy drive. They began looking for their computer as soon as they got married and continued looking for four to five years. They really weren't influenced by anyone to buy an IBM clone. Their initial search was to check into computers to see if they really did want to invest in one.

Their original purpose for purchasing the computer was keeping track of their purebred cattle -- the pedigrees as well as the vaccination shots and the client lists. They also wanted to do their accounting on the computer.

Farmer 1 and his spouse began assigning a six-digit number to their cattle as soon as they began looking for the computer. They knew someday they would want to put all their records on the computer and wanted to be ready to dump them all at once.

Farmer 1 and his spouse agree that it is the hardest to find software. Farmer 1 disagrees with the old saying find the software you

want and then purchase the hardware. He thinks if you buy an IBM compatible computer you can then try out different types of software and then purchase the kind you need and will use.

Farmer 1 thinks there are three stages in computer ownership. When you go to the computer store and the salesman shows you all the wonderful things a computer will do, you think the computer can do anything. When you get it home and start playing with it, you think it can't do anything. And finally after you've worked on it a while, you understand what it can do.

Farmer 1 got demo software and began trying them out. He liked to look at the software at his leisure. He was able to poke around and make mistakes. The demo of the financial package he finally purchased was sent to him for $25, including the complete guidebook.

The first software farm family 1 purchased was WordPerfect. This is spouse 1's. She does all the client lists and thank you letters or letters including the registration papers with this. She doesn't know how to mailmerge, but farmer 1 found that out and is going to teach her how to use it soon. They purchased WordPerfect the day they purchased the machine.

They then looked at database accounting packages, but since neither of them had any computer experience, they decided to keep looking. They attended a seminar on FMS from Illinois in Story City and decided to purchase the demo. Then they played with it for awhile. They purchased the demo in July or August, and then purchased the program in November of 1987. After purchasing the accounting program, they attended a two day seminar, but they thought it mostly explained what the program could

do and didn't tell them how to operate the system.

Farmer 1 immediately began entering 1987 accounts. He feels that it took him one year's worth of information to feel comfortable in knowing where entries should go and how the accounts work. He called the computer for this first year a "glorified adding machine."

They have owned their purebred program for about one month at the time of the interview. They purchased it through a Texas company. The name of the Texas Company was provided through their purebred association, the American Simmental Association. They aren't completely satisfied with the information it keeps, but they are looking at having it modified. They only paid $70 for the software and will be updated for life. The $70 also includes one year of telephone support.

Farm family 1 never uses decision aid programs because the programs usually require Lotus 123 and they haven't purchased that. Farmer 1 did however suggest that might be the next program they look into. They did use their computer printouts from FMS to take to the banker who said they were exactly like the form he had to fill out and with the forms he could knock an hour off the time he usually has to spend working on loan applications. The cash flow is a whole lot easier according to Farmer 1 because he can just call up last year's and substitute numbers.

Farm family 1 have converted the children's nursery into an office. Farmer 1 has a desk with Dataline on it. To the right of the desk sits the computer and printer. They actually look like an extension of the desk in an L-shape. To the left of the desk set two file cabinets full of client records and cattle pedigrees.

Farmer 1 was the primary operator for the 1987 record keeping period largely due to the timing of the program purchase. Since it was Christmas time, spouse 1 was busy with the holiday and taking care of the kids. She didn't have time to learn the system. Since then she has played with the 1987 data and will take over the record keeping for 1988. They anticipate the changing of the guard during spring fieldwork and farmer 1 will probably never return to entering the accounts.

Farmer 1's father hasn't kept the books since 1974 so there is very little reason for him to use the computer, but he does call farmer 1 and ask him to look stuff up on the computer for him. Their children are too young to be too involved with the operation of the computer. The oldest is 5. But the kids play computers now. The 5 year old uses a calculator that he calls his computer. All the kids know how to turn the computer on and where the enter button is. Farmer 1 sometimes lets the kids hit the enter key for him when he enters data. Farm family 1 believes some day down the road they will buy a "cheapie" computer -- Apple is what spouse 1 used in the same breath with cheapie -- for the kids to play with. While I was there, the littlest boy picked up the plastic keyboard cover and started playing with the keys telling his mom he was "putin'."

They have had no computer training, other than the two-day seminar. Farmer 1 has attended many seminars on computers over the past six years, but has never taken a course or a lesson. Everything they have learned has been through the manuals. Spouse 1 learned to use WordPerfect through a tutorial program.

They had some problems when installing the DOS. They called the store where they purchased the computer and received some help from them, but mainly what they know about computers has been acquired through seminars farmer 1 has attended and told spouse 1 about and then what each of them read and discuss in the manuals. In the DOS problem, the hard drive had to be reformatted before the DOS could be installed. Farmer 1 almost lost his mind over that, said spouse 1. They both thought the computer couldn't be wrong. Since it was new to them they must be the ones making the mistakes, not the machine.

They talk to three or four farm families in the area about computers. They told of one couple who purchased their computer a year and half ago and told Farm family 1 they would be keeping records before Farm family 1. To this day the computer they own will only play songs. They were promised help writing the programs for their record keeping and didn't receive help from the man who sold it to them. This couple's kids use the computer, but the couple is thinking of purchasing another one. This time they want farmer 1 to go along with them to buy it, if they decide to purchase one.

Farmer 1 believes these people should do just what he did though and buy the hardware and test drive the software. "Just because it works for one person, that doesn't mean the next one's going to like it." And it is impossible to find the software without the machine.

Farm family 1 received a certain number of hours of toll free support when they purchased their FMS accounting program. They can purchase more time and haven't used up what they have right now.

When asked if they ever just stop into a computer store to browse, they said last week grandma kept the kids so just for fun the couple met uptown and went computer shopping. They were looking at the bigger hard drive which they had told me about earlier, but they were also looking for a narrow carriage printer. Someday they want to print out checks with their computer and not write them by hand. Farmer 1 feels printers are cheap enough that he can have two so he doesn't have to change the paper. His cattle records require wide paper, but letters use standard size.

When asked about enterprise accounting, farmer 1 said sheepishly that he had in November begun the books as enterprises, but had subdivided the cattle into such small groups that it was too complicated so he returned to general ledgers for the 1987 year. Now that he has one year's worth of records on the computer and understands the entries, he is going to try enterprise accounting for 1988. He has three categories set up: cattle, hogs and crops. Farmer 1 said if he could get this to work in 1988, he wanted to divide the crops into corn, soybeans and hay.

Although farmer 1 thought the cash flow sheet was easier, overall the computer doesn't save time and probably takes more time. But he knows his records are more accurate and more detailed because it is all broken up by month and they have a running total which they never were able to have before. Farm family 1 also said their 1099's were a dream. The FMS program had this as an option which they chose and they thought they were extremely helpful.

Farmer 1 said he had just come off a marathon of data entry with

putting the pedigrees on record so he had been using the computer every night. He and spouse 1 estimate they use the computer nearly five times a week when they are not in marathon data entry sessions.

Although the computer has not paid for itself monetarily (they estimate they currently have $4,000 wrapped up in hardware and software), they haven't regretted buying it. They both laugh that it probably saved their sanity. It is easier to recall information on the computer than on paper records.

Currently, spouse 1 is keeping a double set of records on the cattle. The computer program is not completely what they want or need. Spouse 1 needs a program that allows her to indicate when a letter is sent to the client and if the pedigrees have been transferred or if semen is to be collect for their use, etc. The current program also has a glitch because although the dams' names can be entered beside her six digit identification number, the sire can only be identified by a two digit number. They have numbered the sires they use, but they have a hard time remembering which bull belongs to which number. Until these problems are solved by finding an integrated program which can be a database as well as a word processing program, spouse 1 is going to continue to keep two sets of records. Farmer 1 emphasizes that he will find a better way, either through hiring it written through the university or purchasing another's services so they won't have to keep the paper records.

Right now they have paper records for the 1987 accounting, but in 1988 they won't and they won't have from now on.

Farm family 1 have an accounts receivable and accounts payable option, but they haven't used it. Farmer 1 thinks they will set up the accounts receivable this year, but probably never use the accounts payable. Spouse 1 pipes in, "you know once you get used it it, you may use things other than you originally planned to use." She agrees they will probably only use the account receivable, but they may find they like the account payable also. You just never know until you try it, they say.

Although they forward contract, they never use the computer in figuring grain prices or target prices.

Other innovations that they use are a VCR, microwave oven, speaker phone, automatic dialing telephone, 2-way radios, Dataline and pocket calculators. They are thinking about buying an answering machine.

Currently they don't use the modem, but farmer 1 wants to look into AGNET. One of his student workers had asked him about it and farmer 1 was interested. He thinks he could really benefit because it is a free call, but he was skeptical about whether the information would be valuable or not.

When asked if the computer broke down today, how serious a problem that would be for your farming operation, Farm family 1 said they have most of the information backed up, but it would be a disaster if they lost all the information. They really don't think their farm would shut down because they still have the cattle on paper records. Once their cattle are all on the machine and no records were on paper, they couldn't live without it.

Farm family 1 said it would be hard to say what computers will be

doing in the next five years. Currently they are looking at a faster, bigger hard drive. They want to purchase within the next year or two because they are running out of memory. They store all records on the hard drive. They only make back-up floppy copies which spouse 1 wants to have put in the bank safe deposit box, in case the house burns down. Farmer 1 says he has become impatient with the hard drive on the computer. At first it was as fast as lighting, but now with information in it, it is slower. Farm family 1 say they have heard a computer could monitor how much a cow had eaten, when she came in heat or it could run the corn dryer. Don't know if I'll be doing any of these. Spouse 1 thinks in the next five years, if the computers get cheap enough, they will put one in the cattle barn and connect it with the one in the house through telephone lines. That way they don't have to write things down there, they can just type it in in the barn and be done with it. Farmer 1 agrees that would be a lot handier. Spouse 1 "Maybe by then the computer may be so much a part of our lives that we can't live without it."

Farm family 1 believes only 85 percent of Iowa farmers own computers because nobody has any money. When people start spending money again, then farmers will start buying computers.

When farm family 1 had a specific problem, just they kept working on it. At first spouse 1 was afraid that she would erase something, but once she understood she couldn't hurt it, she just started playing with it. It takes less time than reading the manual and she doesn't always understand the manual.

Case 2 -- Apple IIe, Appleworks plus other software, learned from children, spouse does not use, he has helped others set up programs, used for rations and cost-estimating.

Farm family 2 lived in a big city for 4 years. Farmer 2 worked in mid-management in a company and saved enough money to come back to farm. Farmer 2 had worked a job during the night and then custom farmed for one spring season, but it got to be too much and he decided to farm full-time. Spouse 2 was a surgical technician and continued to work for a year after they moved to a farm, but then she quit her job and took over the hog operation.

They farrow to finish 1100 head of hogs and feed 1000 to 1200 head of fat cattle. They farm 1300 acres of corn, soybeans and alfalfa. Farmer 2 employs a full-time hired man.

Farmer 2 doesn't practice no-till or minimum till cropping. Farmer 2 uses the local fertilizer dealer's crop scouting services. He is also a test farmer for Dual, Lasso, Garst, Pioneer. He usually gets 150 to 200 acres of corn and 100 acres of chemicals free each year.

Farmer 2 purchased an Apple IIe four years ago because the school had used them. When he purchased the computer he bought two floppy drives, a printer, monitor and keyboard. He purchased it locally because the man was an ag person. He could have purchased it cheaper but Farmer 2 wanted the service. When he talked to kids in the computer store in the city, they were worried about leaving at 5 p.m., not serving him.

The original software Farmer 2 purchased was a land purchase program

and a livestock/crop/finance program. He also got Appleworks which consists of spreadsheet, word processing and database. He also got Ag Disk which is a set of templates for Appleworks. He also has acquired three Iowa State programs since then. Three years ago he got a beef cattle ration analysis. About a year and a half ago he acquired a beef cow ration analysis from an Iowa State student and just last year he bought a feedlot budgeting program. Farmer 2 didn't really know what all kinds of programs he had. He had to rummage through the floppy files to make sure just what he owned.

The software Farmer 2 is using is not exactly what he wants. He likes some of the IBM software but he won't ever change computer hardware because it will cost too much money. He feels the software he has is not detailed enough for non-feed costs.

Farm family 2 uses the computer at the bank to do a cash flow analysis, but their computer, which is an Apple IIe, is used for livestock rations, land values and crop management. Farmer 2 says he doesn't spend a lot of time at the computer "playing" with the ration changes. If he feels unhappy with a ration, he may try to adjust it, but he doesn't just crank numbers through for fun. He is not a computer buff.

The original intent of the computer was for the farm. From working in a middle management job, Farmer 2 saw the advantage of using a computer. When he purchased the computer, he really didn't know what he wanted it for, but he knew he wanted it. He thought he might do rations with it.

The computer is located in the dining room just around the corner

from Agriview and Dataline. Both of these are sitting on top of the television in a corner of the kitchen. You can't see Dataline from the desk on which the computer sits, but it is about four steps from one to the other.

In farm family 2 there are two boys ages 17 and 13. They both use the computer, although the 17-year-old uses it more than the 13-year-old. The kids use it for Appleworks. Farmer 2 says Spouse 2 doesn't like the computer and he's not sure she whether she wants to understand it.

When Farmer 2 first got the computer, he learned to operate it by asking his son to help him. Farmer 2 has had no training on the computer. At the time of the computer purchase, his son was 13 years old and went to summer school for a computer class. Farmer 2 would take his son to summer school, go home to chore and return when it was time to go pick the son up. During the ride home from summer school, Farmer 2 would pick the son's brain for computer information. This same son will be a senior next year and will take a computer class offered as a semester course in the high school. The son is the main source of information now because he has grown with the computer.

Farmer 2 named two farmers specifically and says there are three or four more in the area who are currently using computers. He also thinks the farmers who are 25 to 40 years old are the ones who have computers in the area. He says a lot of these farmers purchased the computer for their kids. The local Purina dealer used to come to Farmer 2 to get help figuring some rations. They would use his computer. Now the feed

dealer has his own computer, but asked Farmer 2 to come to the feed mill and help them figure out how to run it. Farmer 2 gave his local bank a copy of his programs to use with other customers. He has also supplied them with cost analysis sheets for feeding cattle so farmers who want to borrow money for buying feeder cattle will be asked how much they will weigh, what they will eat and how much profit can be made and then the farmer is shown the printouts and the break even points.

Farmer 2 states he isn't a coffee-shop type so he rarely talks to neighbors about computers. Yet later in the interview he says the local sale barn just got a computer last week and they "hauled him up to the sale barn" to help them set it up. Because it was an IBM compatible, farmer 2 felt he wasn't very proficient, but he was able to help them starting it up.

Farmer 2 doesn't go looking for additional computer information. He says, "computers aren't my hobby. The main objective of owning a computer is to make percent of net off my gross." He never browses for new information.

Farmer 2 uses a professional farm record keeping association company. Farmer 2 keeps the record book and the association does his taxes. The guy who runs this association uses a computer to keep track of everyone's businesses. Farmer 2 says he should keep the records on his own computer, but Spouse 2 originally did the farm records on paper and she wanted to give that up because she was doing so much work outside, so Farmer 2 took over the records and he didn't have time so he hired this company.

Farmer 2 estimates his children each use the computer two hours a

week while he uses it an average of one hour per week. Farmer 2's use depends on if he is happy with the current ration or not. He suggests he is probably not using the computer to its fullest potential. But it works for him and he's not going to knock it.

Before he had a computer, Farmer 2 used the feed salesman as a computer. He used to have him calculate all the rations out. Now the computer does it for him in no time at all. He also has the feeds he raises analyzed so he can change the standards which are defaults in the ISU programs to numbers which accurately reflect what he is feeding his livestock.

Farmer 2 is not as concerned with using the computer on crops. Once a year he figures out input costs and that's about it. Farmer 2 doesn't rely on the computer as much to make his marketing decisions for crops either. He has a friend who is a commodity broker whom he uses for trading and he relies on his information as well as gut feelings. Farmer 2 believes there are no variables in crop production after planting. That's why crop computer use is different from livestock computer use.

Farmer 2 speculates and hedges and has been playing on the board for the last nine years. He does straight hedges on his own products and speculates on plywood, silver, gold and others. But he has separate accounts. On the day he was interviewed, he had positions in soybeans, corn and cattle.

Farmer 2 uses the computer to tell him where the break even point is so he knows at what price he can sell. He always wants to make $.40

per head per day on cattle so he uses the computer numbers to establish the weight he can buy the feeder calves at. He adds this profit margin to the break even point the computer gives him to make the final break even point he must get. He also figures how much it is costing him to keep the cattle on feed to wait for the market to move compared to the money he could make by turning over the lot and starting with a new group of feeder calves.

It has saved money by helping Farmer 2 decide what the cheapest way was to store high moisture corn. He also saves money by feeding lower cost feeds while still keeping the ration a good growing ration. It hasn't paid for itself.

Farmer 2 and his family own a VCR, a camcorder, four or five calculators, a microwave oven and self-dialing telephones.

Spouse 2 and Farmer 2 use private band radios to communicate while they are around the farm. They have had them about eight years. They also have a phone patch so Farmer 2 can answer the telephone and make calls from his pickup or the tractor. Farmer 2 has Dataline and Agriview. He doesn't use Agriview much any more because he uses Dataline now.

If the computer broke today, Farmer 2 would not be too upset because he is currently happy with the rations and it is too late to do many more crop cost comparisons for this spring. He would wait a week before he took it in to be fixed.

In five years, Farmer 2 believes he will start his bookkeeping on the computer or will have someone to do his bookkeeping on the computer. He plans on continuing to grow in the cattle business, but not in land

acquisition. In five years his oldest son will be done with college and he would like for him to return to the farm and run the office. He wants both sons to be proficient in marketing and therefore introduced them to Dataline and Agriview and the sons use it. The boys trade some of their own stocks. The oldest son thinks he would like to get into land management and Farmer 2 thinks that work would be 70 percent computer work. Farmer 2 stresses the importance of his kids learning to run the computer.

Farmer 2 thinks farmers in Iowa don't have computers because farmers are probably scared of computers. He has people ask him if it won't erase his records. He also thinks that other farmers think owning a computer is a waste of money. The costs can't be justified just because they can't physically see the return. Farmer 2 says if he is shown unbiased research, he is willing to try something new.

Farmer 2 could not remember a specific incident where he had computer trouble and to whom he talked for help.

Case 3 -- Apple IIe, uses custom Basic program plus commercial software, expects to expand computer use, spouse does not use but children do, very early adopter, switched to enterprise accounting with computer.

Farmer 3's farm is divided into three areas. He keeps records for his own farm operation which is a finishing operation for feeder pigs, row crops and a 70 head cow/calf operation. The cow/calf operation is

mainly his college-aged son's project. He farms a total of 1500 acres. He is also one of five members of a sow corporation that produces the feeder pigs for the five partners to finish. The third farm venture is a family corporation elevator. Farmer 3, his father and his older brother run the business which sells fertilizer, chemicals and seed. Their son does the crop scouting for them during the summer and they apply the chemicals that needs to be applied.

Farmer 3 purchased his Apple IIe seven years ago. He got two floppy drives, a printer, monitor and keyboard at the time of purchase. He reported no influences on buying an Apple. Farmer 3 indicated he is in the process now of updating his computer. He wants more memory because a program which he wants to run requires more. He thinks he will add 64 K and a hard drive in a couple of months. A good friend has just updated his computer to a hard drive and purchased an inventory program. The friend has given farmer 3 a copy of the program. Since it needs a hard drive it will be a couple of months before they will be using the program.

His original intent for the computer was to keep hog records. Farmer 3 has a balance sheet with the last ten years of input costs. On that balance sheet the point at which the feed costs had peaked and profit had been the lowest was the year they decided to get a computer. Farmer 3 felt with a computer he could tell at all times where he stood in spending and making money. After purchasing the computer farmer 3 had gone back and entered data from 1978 through 1980 so he could do these comparisons. The main reason farmer 3 integrated the computer

into his farming operation was to project profits and expenses. He felt it would be the easiest and quickest way to get a finger on where they were going. The banker agreed that it was the best way to turn their farming operation around.

When farm family 3 purchased their Apple IIe, they didn't get any software. They had the daughter's boyfriend write the hog program. He was a computer science major at the University of Iowa. The boyfriend, a high school teacher who was interested in computers and farmer 3 authored the program for the farrowing operation. The boyfriend also wrote programs for keeping track of the number of fat hogs sold per month, the grade and yield, billing for the sow operation's feed costs, pig schedules, feeder pigs sold, boars sold, the number born alive to each sow, pigs produced per sow per year and number of liters to a sow. All this is in Basic.

Farmer 3 says the computer expanded their record keeping ability. Before they kept good parity records, but now they figure profit and loss, total income and total costs each month. They and the banker have a copy of it. Both farm family 3 and the bank know where the operation stands.

Within a year of the original purchase, farm family 3 purchased a word processing program and decision aid ag software which they say they haven't really used to its fullest potential. They have also purchased games immediately after buying the computer, but they aren't really sure how many they have now. The son is the one who uses the games. Farmer 3 also says he got a Cargill program which figures break-even prices for cattle.

Farmer 3's brother and father really don't want anything to do with the computer. His daughter, who is a senior in college, and his son, who is a freshman in college, use the word processor for papers they write for school. His son also uses the games. Before farmer 3 buys any more software he wants to use the software he has.

The computer is located in farmer 3's office. It is on the desk beside Dataline. It is just off the back door where the mud room is so farmer 3 has easy access to it. Spouse 3 works in a real estate office in the local community and uses an Apple in her work. She prefers Appleworks to their family word processing package because their word processing package is too cumbersome. Therefore she (Spouse 3) never touches the computer at home. She has a microwave cookbook on the computer which she used to use at the old house because the computer was adjacent to the kitchen, but now that the computer is in farmer 3's office, she doesn't use the cookbook any more. It's too much of a hassle.

Farmer 3 says he never had any training on his computer. He learned by trial and error through reading the manuals. He also said his daughter's boyfriend gave him quite a few hints in the one day that he come to set up the hog program.

Farmer 3 estimates he talks to about five farmers, a lawyer and the blacksmith who use computers. He has also talked to a local high school teacher. Farmer 3 discusses computers the most with one friend, but that isn't frequently.

Farmer 3 said he has never demonstrated his computer to another

farmer and he has never gone to another farmer's place to see what he's doing with his computer. But later in the interview he said he has had neighbors call and ask him to run a program to determine if the acreage being farmed warrants purchasing a new combine.

Farmer 3's record keeping system changed from general ledger to enterprise accounting when the computer was purchased. The hog business records became more detailed. The family and the bank have a printout every month.

Farmer 3 and Spouse 3 haven't gone into a computer store to browse for a long time. Farmer 3 says when he started looking at all the different programs it got so confusing, he just stopped being interested, especially when none of them fit his farm. Using a computer isn't easy. "It is something you have to work at," he says.

Farmer 3 estimates he spends two hours a week using the billing program for the sow operation and the elevator. His hog programs are only updated monthly.

Farm family 3 agreed that the computer has saved time and money in their hog operation and billing for the elevator. Farmer 3 says it has paid for itself in dollars and cents, while Spouse 3 thinks it has given them a lot more peace of mind.

Farmer 3 did not wish to discuss his marketing practices.

Farm family 3 has an answering machine, microwave oven, VCR, Dataline, security system for their house and a rotor for their television to pick up other stations since they don't get very good reception. They say this is cheaper than a dish, yet they get more channels than a normal antenna. They have purchased a solar heating

unit for their house, but never used it. They still have it in storage. They both use programmable calculators. Spouse 3 uses hers with her real estate work more than farmer 3 uses his. They own and use both CB and two-way radios. The elevator has two-ways and the family uses CBs.

When asked how serious a computer breakdown would be, farmer 3 says it would not be a real catastrophe. They could get it fixed easily. They don't depend on the computer everyday and it's not needed immediately like other things are.

In five years, farmer 3 would like to get all his farm records on the computer. He wants to enter each cow's bloodlines and each field's history of fertilizer, chemicals, crop, etc. He would also like to find a good feed efficiency program for his hogs. Farmer 3 would like to find a program that would integrate all the information he keeps now in one big file, but everything he has looked at is so cumbersome that he hasn't purchased anything. Instead he has continued to use different programs for each thing he keeps track of on the computer.

He also hasn't found a program specialized enough for his operation and he can't afford to pay a programmer to write one for him. His daughter and the guy who wrote his original program are no longer dating.

The reason 85 percent of Iowa farmers don't have computers is because extension is so good. Farmer 3 believes the extension office has programs which farmers can use and they don't have to invest the money in their own. Farmer 3 also thinks farmers don't have the exposure to the computer to understand how it can be used. A lot of

people use other bookkeeping systems which they are used to and seem to work. Farmers tend to resist change.

Farmer 3 had one of his most serious problems when the billing program which the daughter's boyfriend wrote had an error on it. One of the print functions caused the machine to lock up. Farmer 3 couldn't bypass it by himself, so he called the high school teacher who came over and showed him how to bypass the print function. Farmer 3 never regularly talked to this teacher: he only called him in a bind.

Case 4 -- Apple IIc, extensive prior experience with programmable calculators, spouse does not use much, son uses, farmer may do computer work for other farmers, uses Appleworks database and other programs.

Farmer 4 and his son operate a 65 head purebred cow/calf operation. They own 700 acres and rent another 100 acres. They also have a commercial cow/calf operation where they sell the calves and the bulls for service. Farmer 4 at one time fed 5000 head of feeder cattle and farmed 2200 acres, but he decided to get out of that business. He had hired labor when his farm was bigger, but not now. Farmer 4 hired a crop scouting service one year, but thinks his acreage is now too small to justify having the service.

Farmer 4 owned a programmable calculator which kept all his cattle records, but then it wore out. For a year he went back to keeping records by hand and decided that was for the birds. It was then that Farmer 4 decided it was time to purchase a computer. He had used the programmable calculator for eight years. It took him about six months

to get the thing programmed to keep his records because the guy who was doing the programming of the calculator wasn't an agriculture person. He not only kept the purebred records on it, but also the feed rations for the feedlot cattle.

When he purchased his computer he had been watching the newspaper sale ads and knew about what a system should cost. He then saw a classified ad in the paper and bought his Apple IIc from an individual who wanted to get rid of it. In the deal he go two floppy drives, monitor, printer and modem. He thought he would never use the modem, but he is now one of three breeders in one purebred breed in the nation who is sending his registration papers in over the telephone lines to the national headquarters and also receiving the information back the same way. He has to send it in ASCII which was hard for him and his daughter's boyfriend to figure out how to accomplish.

The reason farmer 4 bought an Apple was because the year before his brother bought an Apple and they wanted to be able to trade software and if his ever broke down, he could use his brother's. He also indicated the school had Apples and that influenced him. Farmer 4 has a farmer friend who is having a hard time getting started with the IBM because no one around has an IBM to help him.

When he bought the computer, Appleworks, Printshop, Newswriter and other basic programs came with the deal. And within two to three weeks after buying the computer he got Ag Disk from a vocational agriculture teacher. Farmer 4 says he doesn't use all the Ag Disk programs. The one he uses most changes mileage into the number of acres in a field.

He also figures loan rates and soybean losses. He also has all of his books on the database program which he set up using the Appleworks database. Last year he coded the information, but this year he has divided into character strings which are standard so anyone who reads the books can understand where the money went.

Farmer 4 used a database to construct a cattle program to keep records on his purebred herd. It is based on the dam, her calf and its sire. It also includes the bloodlines and who the calf was sold to and for how much. There is also a place for remarks about the buyer. He also has a mailing list of breeders and clients which he uses to generate labels for his cattle sale. He also does thank yous and other cattle business letters.

Farmer 4 uses the Newswriter and Printshop program for sale bills or writing newspaper ads. It cost him less to run newspaper ads because the newspaper didn't have to typeset it.

Farmer 4 has been looking for a program to run feed rations for him and he is looking also for a calendar program that will tell him what date is 280 days from today, to record the expected due date of a cow bred today or to figure the adjusted 205 day weight or the adjusted 365 day weight. His programmable calculator had the function and he hasn't been able to find a program that will do that for him.

Farmer 4 says he will pick up any software which is free and take it home to try it out. He sometimes sends for stuff out of magazines too.

Farmer 4's computer is set up on a desk in the basement. The basement looks like a family room with a bar and entertainment center

and pool table. Farmer 4 has a big office in a trailer next to the house, but he says since he doesn't feed as many cattle any more and since he spends so much time on the computer, he moved it into the basement.

Spouse 4 says she is just not interested in the computer. She used one when she substituted for a few days at the high school, but she would rather use a typewriter for her letter writing. She does sometimes use the computer for word processing, but mainly she plays games on it, but not for a very long period of time. They are just too complicated.

Farmer 4's son uses the computer some for calling up cattle records, but doesn't use it a lot. He took an Appleworks class in high school, but farmer 4 was not sure what the classes were.

When he got the computer, his daughter was a senior in college and her boyfriend, who is an industrial engineer who works with computers, was the one who helped farmer 4 figure out how to operate the computer. Farmer 4 learned to use his computer by reading a book his daughter's boyfriend bought for him. He says Appleworks is pretty self-explanatory because you have on screen help for every function. It also helped that his son had the Appleworks in high school. Farmer 4 says learning to run the computer wasn't nearly the problem that programming the calculator was. The guy who programmed the calculator didn't know anything about farming.

Currently, farmer 4 is taking a college course on Appleworks offered by the local community college. He thinks he has known how to

do a lot of what has been taught so far, but he has always gone about it the long way. He is learning the shortcuts now.

Farmer 4 says he talks to his brother about computers. They share programs. And now that he is in the computer class he talks to a couple of farm wives in the class about special farm problems.

One neighbor up the road asked him to go with him to find a computer to do books. He likes using the computer so much, he has run an ad in the local newspaper to do book work for other farmers or small agribusinesses. He has a couple of men who are talking about having him do the books.

Farmer 4 has gone to his brother's to see how his computer operates, but he has never demonstrated his computer to anyone.

Spouse 4 is a dental hygienist with a dentist in the area. The dentist is purchasing a computer for his office and she thinks they will eventually network computers in the office so each examination room will have a terminal to call up people's dental records. Currently she doesn't use one.

When farmer 4 goes to town and has a little bit of extra time, he always stops in at the computer store to see if anything is new. He didn't go in to browse until he got a real grasp on what the computer was doing for him. Before he owned his computer farmer 4 couldn't understand what the people at the computer store were saying.

Farmer 4 changed his accounting system from general ledgers to enterprise accounting when he purchased the computer. He now has each enterprise coded and separated.

Farmer 4 uses his computer almost every night. He estimates he

uses it 10 hour a week. He says it takes him less time now than it originally did on just the mechanical things of making the computer run, but he is now spending more time trying new forms of his database out or writing new sale fliers. He says the only way he can come up with new ideas and uses for the computer to make his work go faster is to spend time experimenting with the computer.

Farmer 4 feels his computer has saved him time and money. A few days ago he needed to sort cattle. He went to his computer, indexed his cattle records and then printed a sheet in numerical order. Then when he went out to sort and a calf ran by he could easily locate the tag number and tell if it was the calf he wanted.

Farmer 4 used to hedge and speculate when he fed a lot of cattle, but doesn't do it now because he sells mostly purebred bulls. He has seen some hedging and marketing programs that look good. He has looked also at some programs that tie in with modems to market prices. He doesn't use Dataline because again, it isn't applicable to his operation. His brother sells Dataline, thought, so he has access to it.

Farmer 4 says his family calls him Captain Electronics. They have automatic dialing telephones, microwave oven, satellite dish and VCR. They rent camcorders and plan on purchasing one soon.

Farmer 4 says if the computer went down it would be devastating to his farming operation, especially since his purebred sale is less than 10 days away. Since his brother has an Apple IIe, he would just run over to his house to work on the sale bill and catalogs. Farmer 4 would have to be without his computer for more than a week.

In the remainder of 1988, farmer 4 wants to map out each farm and have the history of potash, phosphate, fertilizer, crop, yields, on file. In five years, his son will have graduated from college and farmer 4 wants to let him take over the farm so farmer 4 can concentrate on computers full time. He likes it so much he wants to do other people's book work or work for someone else.

Eighty-five percent of Iowa farmers don't have computers because Iowa farmers don't understand computers or what they will do for them, says farmer 4. Farmer 4 thinks if he invited farmers into the house, four or five at a time, and showed them just what a computer could do for them, he could sell a lot of computers. Most farmers aren't good record keepers and computers won't do any more than what's put into them.

.

Case 5 -- IBM, 1983, used generic program, Visicalc, WordStar, The Reaper; record keeping and analysis of numbers, spouse uses, children use.

Farmer 5 farms with his son-in-law. He raises 300 acres of corn, 300 acres of soybeans and 80 acres of wheat. He has 50 head of cows and calves in his cattle operation. He is in a partnership with his son-in-law.

Farmer 5 bought his IBM computer in 1983. He purchased 2 floppy drives, monitor, printer and modem. When he went to buy a computer, he knew a man near his farm who did programming and sold Ag Disk for

Apples, but the computer salesmen in the computer stores told him IBM were better machines so he decided to purchase an IBM. Also farmer 5 didn't like Ag Disk.

The software he got at the time of the purchase was Wordstar, Visicalc and some games. The original purpose of the computer was for typing and for record keeping. About one year later after looking at many accounting programs, he bought a package called The Reaper. He purchased the computer in the fall when his daughter went to college and took the typewriter with her. His wife was taking a class and needed a way to type papers. They used Wordstar first and got to know how to use it then over the winter, farmer 5 worked with Visicalc and started looking for an accounting package.

Farmer 5 disagrees with the colleges that say find the software first and then get the hardware. He thinks if a guy buys an IBM compatible first and learns to run it, then he can get the software. The demonstrations in the computer stores scare people. He thinks if farmers could fiddle with the hardware and feel comfortable with it, then they could buy software that would work for them.

His youngest daughter uses the computer for college papers, but his oldest daughter whose husband farms with farmer 5 is afraid of the computer. The son-in-law comes to the house and does his records on farmer 5's computer.

The computer is set up in the oldest daughter's former bedroom. Half of the area is an office and the other half is spouse 5's sewing room.

Farmer 5 does most of the record keeping. Spouse 5 uses the

computer as a word processor. Farmer 5 can go quite a while without touching the computer and then he'll use it.

He has corn cost projections, soybean cost projections, break even prices, feeder pig template and addresses on Visicalc. Most of these he made up with Visicalc. The feeder pig template was purchased from a magazine, but he made adjustments to it. Before he had the computer, he never did these calculations by hand.

Farmer 5 hasn't had any training on his computer. He just reads the book. Before he purchased the computer, the high school offered a class that he took. It was too much about programming and he didn't want that. He wanted to know about programs. He quit attending about half way through.

Farmer 5 says he knows an Apple user who got his computer about the same time farmer 5 got his, but they were basically the only two in the area he knew about for quite a while. In the last six months, he knows of five farmers who have purchased computers. Farmer 5 showed a friend a little about computers prior to when the friend bought his IBM clone, but farmer 5 thinks it was basically Greek to him. This friend had purchased an Atari about the same time farmer 5 got his IBM, but the friend never used it. Mostly the kids just played games on it. So he now purchased an IBM clone.

Spouse 5 is a registered nurse at a nursing home. Currently they don't use a computer, but she thinks it is coming.

Farmer 5 has been browsing around the computer stores for a spell checker and thesaurus for his son. The son will have to take a

composition class soon and can't spell. To use those two features, farmer 5 thinks he has to have more memory.

When farmer 5 started browsing for his accounting package, he really didn't see much that he liked. He wanted double entry, enterprise accounting that would have a limited amount of typing. He didn't do enterprise accounting or double entry before buying the accounting software, but he was told that was the way to go. He also wanted a program that was compatible with Visicalc. On paper, he used to keep a general ledger with monthly entries.

Farmer 5 says he spends less time in inputting farm accounts, but he plays a lot more with the numbers and gets a lot more information out. He has a bin inventory and a field inventory. He does wish he could take a course in accounting to help him figure the program out. He doesn't understand all the terms in the cash flow, profit and loss sheets and financial statements. He says the program itself was a crash course in accounting. He says its amazing that with the computer his estimate figures get closer than ever before.

The computer definitely has paid for itself. It is a lot easier now to make it pay for itself, though. He has a friend who just purchased a Japanese clone for about half of what farmer 5 paid for his.

Farmer 5 doesn't hedge or forward contract.

Farmer 5 says he has seen Agriview a few times and it looks real good. He would be interested in getting the service, but the area in which he lives can't get Iowa Public Television. A neighbor had wanted to get the FM radio band service, but the company told him to forget it because they would never get very good reception. They live in one of

the areas of Iowa that doesn't get much television or radio service from anywhere. Farm family 5 has a VCR, microwave oven and CBs.

Farmer 5 thinks he could get along without his computer for about a month without any major problems. His biggest concern is where to go to get the computer fixed. He isn't really close to anything. Des Moines, Omaha and Kansas City are all equal distance from his farm.

Farmer 5 said in five years, he supposes he needs to be more specific in applying chemicals to suit the problem at hand and the computer would help him with that. He also thought marketing is getting to be more important and he might be using his computer for that. He also might get connected with a computer advisory service.

Farmer 5 thinks the reason 85 percent of Iowa farmers aren't using computers is because money is such a constraint. Within the last year, more computers have probably been purchased, he would guess. He also thinks the banks have stopped a lot of investments. They are only letting farmers buy the most necessary equipment. Farmer 5 bought his computer before the economic problems.

Farmer 5 has one major problem with his farm accounting program which he encounters almost every time he runs it. When he is running the monthly statements, he gets an error message and the machine locks up. Farmer 5 just shuts it off, turns it back on and prints the entire document a second time. He never has any problem the second time. He has never called anybody to find out why this is happening, although he suspects it is because he is using 1.0 DOS and the program calls for 2.0.

<u>Case 6</u> -- IBM, programmer and software developer, also uses commercial programs, goal is accounting for other, will be certified accountant, has added chips.

Farmer 6 farmed with his father until this year. His father retired this year. They always kept their crops separate, but they were together in the hog operation. He farms 570 acres. Farmer 6 used a crop scouting service last year. He followed their information for spraying and such, but he decided to only take the newsletter advisory service this year. It is a weekly update about the insects found in the traps in the area. It's cheaper and about the same service.

Farmer 6 went back to college four years ago and purchased the computer at the same time. He is going to school to be an accountant. He wants to finish this summer and take his CPA test this fall. He has been going to night classes offered through a private university's off campus center.

When he bought his IBM computer, he originally got two floppies, monitor, printer and keyboard. Two years ago he ran out of memory so had to add chips. The first time he had a friend in town add the chips, but now he does it himself. He has had five chips go bad on him and also had a chip in the mother board go bad the last time. He has worn out a keyboard and just purchased a new one a few months ago. Farmer 6 would like to buy a hard drive, but he is "getting along" with what he has. He has also heard of a lot of problems with hard drives and is a little leery of them.

His first software included WordStar, Lotus and a sow record

program from Iowa State. He then got an enterprise analysis program for swine. And now he writes his own programs for sows, PIK and roll and crop enterprises in Lotus. His crop enterprise records include chemicals, tractor time, acres, variety of corn, break evens and loss per acre.

Because farmer 6 is going to be an accountant, he thinks farm accounting programs are hard to read. He wrote his own program in Basic which generates a very simple profit and loss statement and balance sheet but keeps the detailed entries in the ledgers.

Farmer 6 hopes to write more programs once he gets out of school. He thinks he wants to do at least 25 to 30 more with Lotus. He says just simple little things that would take him about two hours are selling through Pioneer for several hundred dollars.

Farmer 6's office has two large file cabinets, a large bookcase full of computer manuals and Lotus magazines, his computer and Dataline. He also has a small office copy machine beside his desk.

Spouse 6 uses the computer for writing letters and typing farmer 6's papers.

Farmer 6's dad didn't want anything to do with the computer. He told farmer 6 he was just wasting his money. Farmer 6 kept the hog records on the computer and also the records for the farms of his dad's which managed, but he never did his father's financial records for him. His dad hasn't owed money for many years and he couldn't see the need for keeping more detailed records.

In college he took a computer programming class, a spreadsheet

class and a Lotus class. These all applied toward his degree and helped
him in his farm business. Farmer 6 learned to operate his computer
through taking his courses, but also through buying and reading books.
He also subscribes to Lotus magazine which shows you how to do many
things with Lotus. It isn't specifically applied for farms, but you can
modify what they tell you to do and apply it to his farm. In the last
year and a half, farmer 6 purchased Javelin to generate cash flow
graphs. He had to buy a computer graphics card and also purchased a
letter quality printer at the time he put in the graphics capabilities.

Farmer 6 doesn't really know any neighbors who use computers. He
knows about half a dozen sharp farmers who use a computer. These
individuals gave him the idea for buying a computer in the early '80s.
He knows that two of them started with Radio Shack and then switched to
IBM so that's why he went to IBM. Farmer 6 has never seen a
demonstration or demonstrated his computer to anyone.

Farmer 6 rarely stops at a computer store to browse because he does
all his browsing through Lotus magazine. He reads all the long copy ads
and then if he is really interested he may stop in at a computer store
to see if it is what he really wants.

Farmer 6 kept enterprise records before he got the computer, but
only for two big categories, corn and hogs. Now he keeps each field's
production record separately.

Farmer 6 thinks the computer has saved him time on doing individual
records. Because he is keeping more records, overall he is spending
more time, but the increase in record keeping makes the end of the year
bookkeeping a lot easier.

Farmer 6 thinks the computer has paid for itself in the swine record. If it was used only for crops, it wouldn't have paid for itself yet, but it would eventually. He believes the computer is a mandatory tool in farming these days.

Right now farmer 6 is really strapped for time because of taking his classes, but he intends to use the time from 5 p.m. to 11 p.m. when he is in classes now to work on the computer and learn to do a lot more.

Farmer 6 speculates more than he hedges. He thinks it is hard, unless you hold an option, to do a true hedge. And options are much too expensive currently. He has never used livestock options, only corn options. He trades hogs, cattle, financial markets, gold, silver and soybean meal. He anxiously watched Dataline during the interview because the Board of Trade and the Merchantile were getting set to open.

Farm family 6 doesn't watch television. Farmer 6 has three small children and he wants them to read. They own one t.v., but they only use it to watch Iowa or Iowa State basketball games or really good programs. It is never on just to be on. Therefore they don't own a satellite dish or VCR, although farmer 6 supposed there could be some good information from those sources. They haven't really used their television for about a year and a half. Other innovations in farm family 6's home are microwave oven, Dataline, photocopier and C.B. radios. Farmer 6 and his father rented F.M. radios one year, but they were too expensive. Farmer 6 used to use an automatic teller but once he got the computer, the cash withdrawals led to such disorganization, he quit using the ATM.

If the computer broke, it would depend upon the day as to whether it was detrimental to the farming operation. Farmer 6 has a friend who runs a computer shop and he could get a replacement until his is fixed. If he were weaning pigs and weighing them like he did this morning, then a breakdown would be bad.

In five years, farmer 6 would like to get out of hogs and take on a few good clients. He would like to have fifteen to twenty farmers who purchased computers and now need help getting the accounting programs to run or farmers who want him to do their accounting and general taxes.

Farmer 6 says he thinks the average age of farmers in Iowa is old and he thinks they will be like his father. They are so near retirement age, why bother buying a computer? He thinks the older ones who do buy computers have a younger son or some other influence for them to purchase the computer. Also, many farmers don't have hired labor and they don't have the time to spend with a computer doing book work.

When farmer 6 first purchased the computer, he couldn't run the swine program. He called the computer store he purchased it from to get help. He only did that once. Now he just reads the manual and works at the problem and then reads the manual some more. He thinks it's pretty hard when he is at one location and they are at another for them to trouble shoot for him. It is easier to just figure it out himself.

Case 7 -- Apple IIe, school connection, purchased for education and farm, basically not used for farming, dissatisfaction with programs or not willing to put in time to learn, computer broke and not used.

Farmer 7 was a bit sheepish about this interview because they had purchased their computer with the idea that they would keep their farm records on it and once they got the computer, their accountants wouldn't let them use the program.

Farmer 7 and his wife farm 750 acres, of which, 660 are tillable. He plants about 272 acres of corn and 310 acres of soybeans. He farrow-to-finishes 2000 pigs per year. The remainder is in the government program. He and his wife raise boars and gilts.

Farmer 7 does his own crop scouting because he does no-till farming. He has to be up on what insects, especially cutworms, are in his field. He only applies chemicals if a problem is apparent.

Farmer 7 does low temperature drying about 90 percent of the time. This saves on fuel. He has the capabilities for hot drying, but hasn't done that for two years.

Farm family 7 purchased their Apple IIe four to five years ago. They got two floppy drives, printer, monitor, keyboard, and software.

Farmer 7 is on the school board and since the school had Apples and the kids were familiar with them, he thought that was the way to go.

When they purchased the computer they got six educational programs for the kids. He then purchased a word processing package (Fredwriter) after a couple of months. Farm family 7 had intended to buy joy-sticks for the kids, but they never have.

They purchased it with the idea that the kids could use it and they could keep their farm business records on it.

After they bought the computer they were told all the good farm accounting packages were for IBM compatibles. Farmer 7 thinks they

might get an IBM compatible in the near future and probably pay one-third of what they paid for the Apple IIe. But they don't use the computer as much as they thought they would. The children in farm family 7 use the computer the most.

Right now it sits in the corner of what seems to be an office/play room covered up with a sheet. The floppy drives have been broken for the last two months and they says they will eventually get them fixed. Later in the interview farmer 7 said that they had had trouble with each of the disk drives going bad an average of three times. He said that also led to their frustration and disuse of the computer. They also use an Iowa farm business association record keeping system now where they send in the checks and a form filled out and the association puts it all on a computer and then sends them the print out. Their accountants were the ones who said the Apple ag software had flaws in it and they didn't want to work with it.

Spouse 7 has taken a basic personal computer course and an introduction to software class, but that was when they first bought the computer and the instructors only talked about one line of expertise. They didn't talk about Apples and that's what she wanted to know about. The classes were offered through a community college.

Farmer 7 and his wife taught themselves to use the Apple, but he swears he would never do that again. If they buy an IBM, he would only buy one with the idea that someone will service it and help teach them how to use it.

Farmer 7 says the father of the boy who works part-time for him

sells programs and his brother-in-law purchased an IBM compatible. He talked to them some, but mainly the kids are using the computer. Also farmer 7 says he doesn't get much coffee shopping done since his hired man quit.

He has never demonstrated his computer or gone anywhere to see a demonstration. Farm family 7 never really used their computer so no season was a heavier use period than others.

Again, since they didn't use their computer, they haven't had any serious problems other than it broke so many times. They don't subscribe to magazines or any outside source. They basically have written their Apple computer off.

Farm family 7 never stops in town just to browse in a computer store. Farmer 7 is the type of guy who never goes to town just to browse. If he wants or needs something, then he goes and buys it. Otherwise if he isn't needing it or wanting it, he doesn't have a high interest in it.

Spouse 7 handles all the record keeping. She never used the computer, however, to keep the farm records. It was really her idea to buy the computer, but they just haven't been able to use it. Right now farm family 7 does enterprise accounting, but it is pretty general. They had hoped to get into more detail with their computer. They really will be looking for a good livestock enterprise accounting package. They want to try to keep input costs allocated to the enterprises which use them.

The computer hasn't saved time or money because it was never used. Also no estimate was made for number of hours used.

Farmer 7 has hedged in the past, but not in the last two years. He might use an option if it is feasible, but in the last two years if he had hedged he would have made a profit, but not as large of a profit as what he could collect on the live market price.

Farm family 7 has a microwave, VCR and a solar electronic fencer. They would like to buy two-way radios sometime, but again the financial situation dictates no. They don't have Dataline, but farmer 7 told me that his neighbor had an F.M. band service for market information which he has access to.

Since the computer has been broken for a while, it is not a serious problem for farm family 7. They are more interested in buying an IBM than in fixing their Apple.

Farm family 7 estimates they will buy an IBM compatible computer in the next five years. They want to write the checks, enter the record keeping and then get a livestock enterprise program. Farmer 7 says they are watching their p's and q's pretty closely right now and just are not in the position to buy much of anything.

The reason 85 percent of farmers don't have computers is because they wait for their neighbors to use it and they are generally cautious, he says. Farmer 7 says he's not as cautious. Also the average age of Iowa farmers is fairly old and they aren't going to get into something unless they have to.

Farmer 7 says the guys who make computers work are the ones who spend a lot of time on them. Right now he just doesn't have the time to work with one, even though he recognizes someone that spends an hour at

a desk makes more money than someone who spends an hour outside. Until he can afford a hired man again, he and his wife won't have much time.

Farm family 7 has never used their computer so they couldn't give me an exact problem, other than it being a lemon.

Case 8 -- Apple IIe, purchased 5 years ago, for children and farm; kids are major users for word processing (5 hours per week), used for farm record keeping, Visicalc and Appleworks, somewhat scared of computers, spouse does not use.

For all practical purposes, farmer 8 and his brother farm as a partnership, but legally they are separate farmers. Farmer 8 farms 600 acres. The reason he and his brother aren't a legal partnership is to get around the $50,000 limit imposed by the set-aside program. Their operation is corn and soybean with conventional tillage. He doesn't have any hired labor. Farmer 8 doesn't do crop scouting for two reasons. He basically knows the problems he has on his farms and uses few chemicals. Also he relies pretty heavily on Pioneer's agronomists. He does attend certain district extension meetings. He says his county extension isn't very good, but his district man, John Homes, is very good. They have on farm storage and low temperature, in-bin drying.

Farm family 8 purchased an Apple IIe five or six years ago. They bought a two-disk drive system with a printer and modem. A few months later farmer 8 bought paddles for his kids to play games on the computer.

Farmer 8 says the primary reason he bought an Apple was because the school had the same thing and his kids could use the one at home or the one at school. Another influence in the decision to buy a computer was a close friend who had a computer a year or two before farmer 8 decided to buy his.

They got the Visicalc program at the time they purchased the computer. During the following year, farm family 8 pirated Appleworks from the local high school. (The son was taking a computer class at the high school.) They also have a checking and accounting program to monthly keep track of their tax base. This program was purchased one year after the purchase of the computer.

The original planned use for the computer was for the kids to use it. But when it was sitting downstairs farmer 8 decided he needed to use it too. The computer started out as fun for the kids,. but farmer 8 saw a great 'what if' program with Visicalc. Another main reason for buying the computer was to run an accounting program.

Some of farmer 8's applications of the computer to his farm are putting in legal descriptions of the fields for insurance purposes, acreage, planting dates and production records of each field variety. Farmer 8 is also the treasurer of their church and he has the complete church membership on a disk. He kept the records on Visicalc for the last three years, but he is now moving it to Appleworks. He said there was a space constraint and he needed to overcome that. Part of the problem is with their computer needing more memory.

Farm family 8 have their computer located in the basement in an office/family room setting.

Farmer 8 used to use his modem to subscribe to an advisory service. It was fun, but expensive, so he therefore discontinued use of the service. Mainly he used information on the service about insect population during planting season.

Farmer 8 hasn't taken any classes on computers. His kids, especially his son, taught him how to operate the computer. Farmer 8 used to be afraid to poke keys. He thought he would destroy something. He just started to learn to use Visicalc and his son talked him into changing to Appleworks because it is an easier program and more powerful.

It is ironic that farmer 8 has never gone to a computer class, but spouse 8 did go to a programming class when they first got their computer, yet she doesn't use the computer.

If they have a problem, farmer 8 asks his son. That used to be easy when the son lived at home. Now he lives far away at a university. Farmer 8 still would call him for help. Farmer 8 isn't too adventuresome when it comes to computers. He does what he knows how to do and doesn't stray too far from that.

Farm family 8 knows one other person in the area who owns a computer, but this person has only purchased it within the last year. They described this man as the kind who takes classes and wants to learn everything about it.

Farmer 8 went to his friend's house to see a computer demonstrated before he bought his. He has demonstrated his computer to other farmers. He generated "bottom lines" for their operations. He says in

a way it was a game for these people and they just wanted to see what the computer would do, but in another way, they were giving numbers very close to what their figures would look like and they were interested in just what they outcome would be. He hasn't gone computer hunting with another farmer or friend.

Spouse 8 works on the farm.

Farmer 8 spends more time on the computer in the winter than in the busy times such as spring, summer and fall. When he's off the computer a long time, farmer 8 has to sit and re-read the computer manual. It is sometimes a little hard to get back in, but it just takes a little time. Farmer 8 said Visicalc still has a few programs on it that he uses and that is the program he forgets most easily, but he can still get back into it.

Farmer 8 reads the stuff that comes through the mail on computers. However, he says he hasn't read a book since he was in high school. He reads the newspaper, but he gets such terrific headaches that he only scans the magazines he gets and maybe reads one article.

He used to browse in computer stores at first, but any program that was good was priced over $2000. He thought it was hard to see that much improvement over what he has.

Spouse 8 used to keep all the records by hand. They posted everything into two sets of records. One was for the farm expenses and one was for family expenses. When the bookkeeping was transferred to the computer, spouse 8 felt like she didn't need to keep the records because she doesn't use the computer, so she is no longer associated with the farm accounting. Their computer records are enterprise

accounting, just like what they used to keep on paper, but now they are computerized.

Farmer 8's brother doesn't use the computer, but farmer 8 generates information about the brother's farms for both of them to use. Farmer 8 owns the farm his family lives on, his brother owns the farm his family lives on and they own land together. Farmer 8 generates a spreadsheet for all three types of operations and then the two brothers get together to decide what to do for the next year. His brother does all his own accounting and check writing without the computer, however.

In the winter farmer 8 spends four to five hours per day for three or four days working on the computer every couple of weeks. In the busy times such as spring, summer and fall, farmer 8 spends a lot less time on the computer.

The daughter uses the computer about five hours per week. She does all her homework on the computer. She says she's really lucky because her friends are scheduling study halls so they have the least busy times on the school computers. They have to wait in line to use them. She says she doesn't have to worry about that because she has one at home.

Farmer 8 says a computer definitely saves him time. He concedes it takes time to enter things, but he has access to a multitude of information once it is entered. Farmer 8 says it makes him more aware of what's going on with the farm. He runs some decision aid programs such as the cost of chemical applications and projected cash flows. He thinks it makes him aware of what he can be willing to spend and when he needs to say no. Ten years ago it didn't matter if he made a mistake

because times were good. Now he says he can't make too many mistakes or he won't be in business.

The daughter says it has saved her time because she can work at home on the computer.

Farmer 8 says he used to do the long hand calculations that his computer runs for him now, but the computer has made it easier. He used to use an adding machine and lose the little tapes. Then he would have to "sorta" remember what he had gotten for numbers. He says a computer is a much more efficient way to keep track of where things are going.

Farmer 8 says he has hedged some and done options once, but since the government has control of the corn, he doesn't do that much any more. He has never used his computer to market his grain or get market prices.

He has recently been contacted to receive Instant Update, an advisory service for one month free. Farmer 8 says he did this two or three years ago. They give him an access code and he has the service for one month, then if he wants to continue he can just extend his authorization code. Farmer 8 said he's been thinking about taking them up on the offer again. He hooked his modem back up this winter and within half an hour of messing with the manual he had a dial tone on the computer.

The innovations that farm family 8 have include microwave oven, CB radios (although they are not being used now) and a VCR. They have been thinking about getting a satellite dish because they enjoy sports, but because of the scrambling, they're not sure if they want to invest the money or not. They also want a camcorder and swear they should have FM

radios because they farm so many acres that are spread out.

If farm family 8's computer broke, they use it enough to get it fixed. "I'd hate to operate without it." Farmer 8 trusts and relies on it for giving him figures. He would probably let it sit a day or two if it broke during the busy season before he got it fixed.

In five years, farm family 8 will probably be doing the same things with the computer that they are doing now unless they get extremely interested in something new. But someone will probably have to prod them to do something different. Farmer 8 says his kids are in the computer generation and they need to use them. He, on the other hand, has no desire to understand computers. He wants only to do number manipulations. He's not interested in programming the computer.

Other farmers don't have computers because they are not willing to spend money on them. They may also figure they are too old to learn how to run it. Farmer 8 says he was "scared to death" to touch the wrong button when he first got it. He once had a problem and let the computer sit with the error message until his son came home from high school so he could find out how to erase what he had done. Other farmers think they have been getting along this long with computers and so they can continue to do so.

Farmer 8 said he "fried" the farm accounting program once. He said he and his son were poking buttons and they destroyed the entire program. They went back to the place they bought the program and got another one to replace it, but was vague on whether they had to buy it again, or if the computer store gave them another copy.

Case 9 -- Apple IIc, 2 years ownership, school used Apples, purchased for kids and farm, spouse is primary user, considerable software, have expanded memory.

Farm family 9 operates a 250 acre corn and soybean farm. They farrow about 70 sows and finish the pigs. They want to increase their sow numbers to 90 to 100. They have about 21,000 bushel on-farm storage. This means they sell a majority of their corn to the local elevator at harvest time. They don't have on-the farm drying either.

They have had their Apple IIc for a little over two years. When they got the computer they first bought just the internal drive and a color monitor. A couple of weeks later they bought their color printer. Several months later they bought a mouse and joy-sticks. Spouse 9 also mail ordered the second external drive from an advertisement in one of the computer magazines she gets: Insider, A+, Family Computing and Compute. They also added more memory to their computer. The computer was getting too small for keeping their farm records. They originally thought their computer could never be expanded, but now Apple has developed a way to expand a closed system.

A big influence on this family to buy Apples was that the local school district owned Apples and they didn't want their kids to be afraid to use the computers at school. The kids sometimes have friends come over to play games and the friends are afraid to touch the computer because they don't have one at home. Farm family 9 didn't want this to happen to their children.

All of the classes spouse 9 took were on Apples and she thinks that

may have helped them chose an Apple, in addition to the school influence.

Spouse 9 has a huge file of software for the computer which she keeps locked. This may be because of the small children in the house (ages 4, 5, 8 and 9) or it may be because she has worked so hard to get her software packages put together. She told me she wouldn't pirate anything unless it came from the local school unit because in a way they owned the school's software since they were taxpayers. Her software acquisition has grown over the two years they have owned the computer. She got Appleworks shortly after buying the computer. Then she purchased Printshop and several games shortly after getting Appleworks. One year after they purchased the computer they got Iowa State templates for farrow to finish and swine breeding decision aid programs. Also purchased during the second year has been Color Me, Type and Where in the World. These are all for the kids. The older girls have brought programs called MEC home from school and they copy it for the girls to use later. Spouse 9 also purchased Widespread (like Sideways for Lotus) and Jingle Disk. At the same time spouse 9 expanded the memory, she updated the version of Appleworks. Recently she purchased Macroworks and just last week bought Copy II+.

Spouse 9 doesn't write her own basic programs, but she types in the programs in the magazines she gets and then has games for the kids to use.

The original intent of getting the computer was to do farm records. They have used the computer to do their records, but one year prior to

getting their computer, the bank kept the records for them on a computer.

The computer is located in spouse 9's sewing room/office. It is set up in an office setting.

Spouse 9 is the primary user. Farmer 9 recently needed a business phone number from the computer and spouse 9 wasn't home so he tried to retrieve the number. Luckily it was one of the top three displayed because he didn't know how to get the next screen to move for any other numbers. After that farmer 9 learned how to be use the database, but he basically doesn't have time to do much more with it. When spouse 9 finds something new that she thinks will help her, she tells farmer 9 about it and they decide together if it would benefit them. Then she will go buy it.

Spouse 9 says she keeps her resume, as well as other members of their families, on the computer and updates and prints them as needed. Also she was printing a banner for a birthday party for a neighbor the morning of the interview.

Spouse 9 took three computer classes at a nearby community college. All three of these classes were for credit in case she ever decided to go back to school and finish her degree. The first class she took was in basic. The second was in database software applications. This class was taught by using Visicalc but spouse 9 designed her farm record keeping system for this class final project and then modified it slightly to use at home. The class covered spreadsheet applications, database and word processing with Applewriter. Of course, she didn't end up having Applewriter at home either. The third class was a word processing class. She took all three classes prior to purchasing the

computer. She did her homework either at the high school or the technical school. Spouse 9 also attended a two day introduction to computers sponsored by their bank and ISU prior to taking these classes.

Initially when spouse 9 had a problem she talked to the store from which they purchased the computer, but they were very little help. She has called Apple hotline because the store from which she purchased the computer told her to call there, but they wouldn't help her unless she subscribed to their service. So she rang the store and got them to call the hotline and figure it out and then call her back. Now she uses a different store. She has also talked to a high school teacher who is really into computers, but generally when she has problems she just takes her software with her and drives to the store and gets them to run it and then she can come home and work with it again. She considers them her number one source of information.

Farm family 9 doesn't know any neighbors who own computers, but farmer 9's sister got a computer the year before they did. His sister's computer was purchased for the child in the family, but the parents didn't buy any software. Spouse 9 has put a disk of games together for her nephew and now that he's older, he has been trading with friends. Farm family 9 thinks the computer isn't used for anything other than the nephew's entertainment. Farmer 9's brother bought an Apple six months ago. Their sister-in-law is a teacher and they think the primary use will be toward education.

Spouse 9 works at home and takes care of their children. Spouse 9 has demonstrated the computer to family members and friends, but she

doesn't think they understand. They enjoy the banners and pictures it can print, but they don't understand the business value.

Several people have asked farm family 9 what to buy when buying a computer. Spouse 9 accompanied her sister when she was looking for a computer, but the sister hasn't purchased anything yet.

Spouse 9 uses the computer pretty constantly, with very little seasonal usage change.

Spouse 9 browses at computer stores, but she really gets most of her new information from her magazines. The closest store she has is Waterloo and that is a good hour's drive away.

Farm family 9 uses their accounting program as a general ledger system just like they did prior to computer ownership. When spouse 9 designed their spreadsheet she made it similar to the paper records because they felt that fit their farming operation. But they are breaking the categories into more detail every year with the computer. Spouse 9 not only does the farm accounting, but the household expenses on the computer. She also has an inventory of all household furnishings, jewelry and anything else of value on the computer. She keeps track of what has been refinished, sold or given away. She also has a database for anniversaries, birthdays and the family tree for her husband's relatives since farmer 9 has 100 first cousins. She also keeps all the farm business telephone numbers on the computer.

Spouse 9 estimates she uses the computer an hour each week for accounting, but she can't estimate how much time is spent on other things.

Although entering information is a time consuming job, farm family

9 agree that it has saved them time. Farmer 9 can see how much he has made. At tax time everything is all done. Spouse 9 does books once a month and there is less error in their accounting.

Spouse 9 thinks the computer has paid for itself in the educational value alone. Their children's learning is really important to farm family 9. They have a program with which their son learned his ABCs. They also have to time their older two girls so they get equal access to the computer. If one gets 15 minutes then the other gets 15 minutes. But if Mom needs the computer, she has priority and the girls have to wait.

Farmer 9 has never hedged mainly because the size of his operation doesn't warrant it. He hasn't used an advisory service and doesn't think they would buy a modem because it is too expensive. Truthfully, farm family 9 doesn't know if their telephone lines would handle the information. They have to pay extra to have a private telephone line. Most of the neighbors are still on party lines. Spouse 9 suspects the information would be scrambled over their phone lines.

Farmer 9 says the co-op and bank has Dataline that he sometimes checks out, but mainly when he wants hog or corn prices he calls the local hog buyer or elevator.

Other innovations found at farm family 9's house include two VCRs (portable and table top), microwave oven, programmable calculators, programmable grain scales.

If the computer broke, spouse 9 would take it to be fixed as soon as possible. Since she lives so far from the city, if it broke at

4 p.m., she would have to wait overnight before she could take it in, but she would take it in first thing in the morning.

She has had the CPU and the monitor both break. The CPU was two days under the warranty expiration date. It had a bad mother board and then once that was replaced the repairperson had screwed up the on/off switch so it had to be returned again. This was done where they bought the computer. Although she didn't get a replacement then, when the monitor broke and she took it to another store to be fixed, she got a loaner monochrome monitor until hers was repaired.

In five years, spouse 9 wants a 3 1/2 inch drive. Actually by the end of next year, Spouse 9 wants to buy a 3 1/2 inch drive so the kids can use their games without fear of bending the disks. Spouse 9 says her youngest doesn't understand not to touch the exposed area on the floppies and also the kids have bent a floppy that had one of their games on it because it wasn't lined up in the drive correctly.

In five years farmer 9 wants to break the farm enterprises down, but he has to take the time to sit down and develop how he wants things split up before spouse 9 can make the computer do that. He also wants to have field maps telling what was applied to each field. Spouse 9 plans on drawing them with mouse paint.

Farm family 9 thinks that the reason most farmers don't own a computer is because they don't know what to do with one. Also if they are older, they aren't willing to learn how to operate one. Farmers have to take some time to set up their computer and develop their record keeping system. It isn't a one hour job. When spouse 9 got the machine she spent 4-5 hours everyday working on the computer so she could learn

how to run it properly. They tell others who want a computer that they take time.

Currently she can't get her Macroworks to function since they have expanded their computer memory. She's planning on taking it to the store soon and have them go over it with her, but since it's spring she hasn't had a chance to do that yet. She's backed up about two weeks worth of check entry and may go back to the old way without the macros until she has a chance to go to the store.

Case 10 -- Tandy 1000, used for trucking business and farm, spouse is primary operator, machine upgrade needed to use software they own.

Farm family 10 tills 1500 acres of corn and soybeans. They also run a trucking operation out of the farmhouse. They don't have on-farm drying or on-farm storage so in the fall they sell everything they produce. They do "crop monitoring." They know they have a problem with shattercane so they spray for that in the spring, but generally for other problem insects or weeds, they determine what is causing them problems and then spray for that. They have a fluctuating number of men who drive trucks for them.

Farm family 10 bought their Tandy 1000 about five years ago. It has a single disk drive, a color monitor and printer. Three years after the purchase of the Tandy 1000 they purchased a modem which was used to access Exnet. They quit using EXNET because the long distance charges were eating them up. They said it wouldn't be so bad if you could just

get what you want and then get back off, but they didn't know what they were doing and it took them a long time to manipulate the system to get what they wanted. Farm family 10 suggested an in-coming WATTS line with a time limit be developed so farmers could access Exnet and learn how to use it without going bankrupt.

Prior to owning this computer, they owned a Radio Shack TRS80. Farmer 10 laughs when he tells that it only had 16K of memory. He said he wrote a couple of programs for it like a wet corn to dry corn conversion. He estimates that he purchased it about nine years ago. He says he bought that computer for novelty. Records weren't really the main concern then because the family wasn't farming like they are now. In the last few years the farm has grown and the trucking operation started and has grown. He did an accounting program on it, but the Radio Shack was outdated so fast that they stuck it in a closet and went to buy a new, expandable computer.

The first software that farm family 10 had for this machine was Finance Manager. It was purchased at the time of computer purchase. Last year, farmer 10 got V-P Planner (a database program) and also some extension programs. Neither of these two programs can be run on their computer because they have to expand the memory before they will operate. They want to pull the two programs together to make one integrated record keeping system. The system they have now is not exactly what they want. Farmer 10 wants to take pieces from the extension package and then design his own with the database program.

Spouse 10 also uses a program called Deskmate which she keeps

track of all the trucking employees wages. She couldn't remember when they got that program.

Farm family 10 says that the farmer who buys a computer has to have an idea of what he wants the programs to do before they will be beneficial. Farmer 10 wants programs that are already developed. He doesn't want to come into the house after working all day and monkey around setting up programs.

The original purpose for buying the computer was to keep farm expenses and to run farm programs. Farm family 10 says the computer can only do about half of what they wanted to do. They would prefer to find a program that is integrated on which they could keep all their records. They started using the computer for farm records and then expanded it to their trucking operation.

Farmer 10 says no one was really influential in his computer   • purchase.

The computer is located in part of the living room which looks like an office. There are file cabinets and Dataline to the right of the computer. It is neatly covered with plastic covers.

Spouse 10 is the primary user. She does the trucking billing once a week which takes about one hour tops. And once a month she sits down and updates the employees' records. The farming operation entry is also about once per month.

Spouse 10 keeps all the accounting records for the farm and the trucking operation. Farmer 10 runs decision aid programs. The children in farm family 10 use the computer a little bit. The older two who are 8 and 9 do a little word processing. They have one computer in their

school (K-6) to share, but since the older grades get first access, these two have very little time on the computer.

Farmer 10, who isn't the primary operator, says computers need to be more user friendly. He says he spent two weeks trying to learn how to use the computer and then when he sits down now sometimes it is gone. He lost the knowledge of how to make it run. It can be frustrating.

Spouse 10 said she worked with computers at prior jobs, but she has never had any formal training. She said she used the manuals to learn how to operate their programs. Anyone who is familiar with computers can pick up a new program, she thinks.

Spouse 10's brother is a repairman for an electronics firm, so when they have a problem, he is the one they call. But farm family 10 emphasize that they really haven't had any major problems.

Farmer 10 didn't know of anyone around his area that owned a computer. He said a neighbor west of his place bought one last fall, but he didn't know anyone else.

Farmer 10 has never gone to another farm to see a computer demonstrated and he has never demonstrated his computer to another farmer.

Spouse 10 is not currently employed off the farm.

One of their primary sources of information about their computer is general agriculture magazines. They sometimes see things in the magazines they want to buy and then go to a computer store. Sometimes they go to a computer store to browse too.

Prior to acquiring a computer, spouse 10 kept the records in a

ledger. The computer records they currently keep are very similar to the general ledgers they used to keep.

Farm family 10 thinks the computer has saved them time. It has been most helpful in record keeping. Since their farming and trucking operation has changed so fast, they can't keep up with their computerization of the operation. Farmer 10 estimates he needs to spend $800-1000 so the computer can really be used to its fullest potential.

Farmer 10 has forward contracted his grain, but he has never hedged or used options. Farm family 10 has had Dataline for two months and farmer 10 says he wants to start hedging and maybe speculating someday soon. They also have a VCR, satellite dish, microwave, Teleconnect, Autodial telephones.

Farmer 10 doesn't think a computer breakdown would be a very big problem until tax time came around. If the computer would break, they would call spouse 10's brother to come look at it and if he couldn't fix it, then they would take it to a store to be repaired.

In five years farm family 10 wants to have a 3 1/2 inch drive, hard drive, 712 K. Farmer 10 does most of the wishing. He wants to put the trucking runs, diesel, mileage, employee wages, etc. on the computer. He would also like to be able to run V-P Planner, but that would take upgrading his system first. Farmer 10 laughs that in five years he might as well throw this system out and go buy a larger unit. More seriously he says he wants to figure out more things. He wants to do payroll, loads, expenses, travel log, etc. for the trucking. For the farming operation, he wants to keep track of the grain production on each farm, keeping track of total farm costs and profit and loss. He

wants to see which farms are making money.

The reason 85 percent of the farmers don't have computers is because they are too small. If they have a couple of hundred head of cattle, they don't need a computer. The paper ledger works just fine. You need 1000 acres to make a computer valuable, he thinks. It cuts the pencil pushing. The smaller farmers have no need for a computer. Also the older farmers are the ones who are resisting change and that is why there isn't more using computers. Farmer 10 thinks you need a computer to do more detail. Everybody is looking more closely at your records, IRS and the bank, so need more details.

The most serious problem Spouse 10 has had was when the Finance Manager disk was full. She called Radio Shack and they told her to call the toll free number. They wouldn't help her unless she paid for the service so she called the store back. The store finally helped her some, but it was so little that she finally just figured it out by herself.

Case 11 -- Apple IIe, school influence, purchased to help spouse in graduate school, Appleworks for farming and antique hobby

Farm family 11 operates a corporate farm with farmer 11's father. His father is semi-retired, but still owns shares in the corporation. They farm 750 acres, 450 in corn, 150 in soybeans with the remainder set-aside acres. They have 30,000 laying hens on an 18 month rotation and farrow to finish 2500 hogs per year. Farmer 11 grinds and mixes his

own feed. He has on farm storage and even has to purchase some corn for his livestock. He doesn't market any of his corn. He does both high temperature drying down to 20 percent and then uses forced air fans to dry down farther. He does a little crop scouting, but he never has hired it done. He listens to WOI for their reports. They have one fulltime hog hired man and one part-time man for the laying hens. He doesn't no-till or ridge-till because he has 1 million gallons of slurry to get rid of each year and it's too hard to knife slurry into ridges.

Farm family 11 purchased a used Apple IIe about 1 1/2 to 2 years ago. They saw an ad in the Des Moines Register and called the guy and went down to pick it up. They got two floppy drives, dot matrix printer and two monitors, color and monochrome. The only hardware they have purchased after the original computer purchase has been a joystick.

Farm family 11 decided to get an Apple because the school has about 50 Apple computers. The high school has a computer lab and computers in the business classroom. Each elementary class has a computer also. They decided they would get an Apple because if they wanted to borrow the software from the school, they could. Spouse 11 began graduate school about the same time they got the computer. She uses the word processing for her papers for class. If the school wouldn't have had Apples, farmer 11 thinks they would have got an IBM. But since no one in the area had IBMs, farmer 11 was leery of getting one. He knows quite a few people around his area have Apples because of the school.

They have called the computer science teacher at the high school a couple of times for help, but that was when they were new.

When they purchased their computer, they got software back-ups with it. The previous owner kept the originals, but gave them the back-ups. Unfortunately they didn't have a manual so that's when the called the high school teacher. They went within a week to a bookstore in Ames and bought a book about Appleworks. Farmer 11 thinks it would have been easier for them to get started if they would have had a book.

The software they got with the computer was Appleworks and several educational games. Since then, they have purchased 3-4 more educational games for their kids. This has been in the last year.

The number one purpose for buying the computer was for spouse 11 to do word processing for graduate school. She does her word processing and lets farmer 11 do all the farm computing.

Farmer 11 says he really didn't care one way or the other about whether he got a computer or not. Spouse 11 was the one who wanted it for word processing.

Farm family 11's computer is set up in an office area that has a roll-top desk to the left and the washer and dryer to the right. All of his farm accounting information is on the desk and he has a printout of the chicken spreadsheet laying out on the desk. The color monitor is not hooked up, but sits above the monochrome monitor on a computer desk. The manual was sitting out as was one of the kids' games.

Farmer 11 is using the computer to keep swine and chicken records on the spreadsheet of Appleworks. He made up the formulas and developed the layout. He is also using the database for the antique toys which he collects and trades.

The computer is being used to keep track of pigs/sow/litter,

litters/sow/year and feed efficiency. These kinds of records farmer 11 kept prior to the purchase of his computer. But his chicken records were started with the purchase of the computer. He keeps track of the prices for large, medium and small, how many he sells of each, what percent of eggs are large. He basically keeps a running count of what his chickens are producing. He says by hand it was just too much of a job because he would let it fall behind for a month or two and then it was too large to catch up. (He operates on a 4-week period so it is easy to fall behind by two months if he misses two entries.) Now he can catch up in one or two hours.

Their children, 7 and 10, play games with the computer. They probably average more time per week than anyone else. Farm family 11 move the two monitors back and forth for the kids to use color with their games and monochrome for the adults to do word processing or data entry. Farmer 11 thinks they could get a cord to hook up both monitors so they would only turn on the one they wanted to use, but it really doesn't bother them too much that they have to change the monitors.

They have taken adult edcuation classes on the computer prior to purchasing their own. Farmer 11 took one class on Apple computers and both of them took a class on Lotus 123. Farmer 11 said the Apple class wasn't that good and he really didn't think he learned much. Maybe it was because he didn't have a computer to work on, but he thought it helped decide he could at least operate one.

Sometimes farmer 11 says he has been off the computer too long and he forgets how to operate it. He says it's not so much data entry, but

setting up the spreadsheets that he forgets. To get back into the program he just bangs on buttons or reads the book until he figures out what is wrong.

Farmer 11 says since the very beginning, they haven't talked to anyone about their computer problems. Mainly they just figure it out by themselves.

Farm family 11 say they know about 5 farmers who own Apples, 1 who owns an IBM and 1 who owns something that cost $16,000. Two of these farmers are taking night classes about computers.

Farmer 11 has gone to his cousin's house to see how his computer works, but he hasn't demonstrated his computer to anyone other than his father. His father isn't interested in operating the computer, but he is interested in the output generated by the computer.

Spouse 11 doesn't have an off-the-farm job currently. She will once she gets her master's degree.

Farm family 11 sometimes go to a computer store to browse for games for the kids, but they don't look at new farm software.

In the past, farm family 11 kept their records on computer through an Iowa farm business association. Farmer 11 thought the association was good for comparing your operation to other farmers. Currently they have a private accountant who puts together their financial statement. Farmer 11 doesn't think it would be hard to switch to keeping accounting records on the computer, but he would keep two sets of records for 1-2 years because his cousin lost two years worth of records on his computer. They don't do their accounting on the computer. It is enterprise accounting which spouse 11 does by hand.

Farmer 11 uses the computer about 2 hours per week and spouse 11 uses it about the same amount of time, more if she has a paper due.

Farmer 11 thinks the computer has saved him time now that he got the spreadsheet set-up. He went back and entered five years of farrowing records for comparison.

Farmer 11 thinks the computer has paid for itself. $1600 is a drop in the bucket for a farm the size of his ($1 million income). The records show him if the livestock is eating too much feed, etc. He doesn't use his computer for crop decision aid programs because he can get the same information from farm magazines.

They have never hedged or placed options. He has forward contracted hogs. Farmer 11 thinks he's better off being an efficient producer than trying to manipulate numbers and outguess the market.

Other innovations include microwave, answering machine, VCR, camcorder, calculators, 2-way radios.

If the computer broke, it wouldn't be too important to farmer 11, but to spouse 11 it would be a disaster. She goes to Ames 3-4 times per week so they would probably take it in as soon as she was going to Ames.

In five years, farmer 11 thinks he will put his accounting on the computer. By this time spouse 11 will have finished her graduate school program and will take a job off the farm. Then farmer 11 will have to keep the records and he will computerize them. He also thinks he may buy a program for the chickens but he may send the records off the farm so they can be compared to other farmers.

A total of 85 percent of Iowa farmers don't have computers because

they don't need them, he says. They are too small. Economically his farm can afford one, but it is not a necessity. He also doesn't think grain farmers could utilize one as well as livestock farmers.

He had a serious problem with his sow records. He culls sows after so many parities so he deletes them from his file. The first time he did that he deleted the top line and the whole thing came up error messages so he just took out the disk and put in the back-up and ran from it. He messed around trying to figure out what was wrong and finally it dawned on him that he couldn't ever delete the top row or the formulas would be divided by 0 which is an undefined number and gives you error messages. He said he was just lucky in figuring out what was wrong.

Case 12 -- Radio Shack Model 4, used mainly for off-farm soil testing business, writes own programs, will upgrade.

Farm family 12 operates 220 acres of corn and soybeans. They used to farrow-to-finish hogs, but two years ago they got out of that business and are now into custom feeding hogs. Farmer 12 has one hired man who takes care of the hogs since he has gone to custom feeding. He has about 800 head on feed at a time. He said his farrow-to-finish buildings got to the point that he needed to spend a lot more money to update them and he decided it was cheaper to update to a finishing operation than to buy new farrowing crates and nursery equipment.

They have a batch dryer which uses heat drying and also have on-

farm storage. Farmer 12 doesn't do any no-till farming or any crop scouting.

Farmer 12 bought a Radio Shack Model 4 which has 64K, printer, two floppy drives and a monochrome monitor over four years ago.

Prior to purchasing the computer, farmer 12 took two classes at a junior college on programming. He was involved in soil consulting at the time and thought the recommendations he needed to make for farmers would be easier if he had a computer program so he wouldn't have to keep writing the same things out. He designed his computer program in Basic for these classes. While he was at the college he used Radio Shacks, IBMs and Apples. He didn't like the Apples and the IBMs were too expensive, so he bought a Radio Shack. Actually, he sold his soil testing program to ProAg for $5000 and with this money bought his own computer and set up a soil testing lab in his home. He sold rights to it, but he could keep using it.

When farmer 12 purchased his computer he got Visicalc and within the first year he purchased PFS File (a database) and PFS Write (a word processing package). He still uses PFS File for mailing lists for his soil testing business, but he doesn't use PFS Write or Visicalc much. He occasionally uses Visicalc to develop a spreadsheet to show farmers what kind of yield this high protein corn would produce with certain inputs. He also bought one game for his kids, but it wore out shortly after purchase and he never bought another game.

The main intent of buying the computer was to conduct soil testing. It was definitely a business purpose, not related to farming. Farmer 12 says he uses a new method of soil testing. He doesn't recommend

anhydrous ammonia or any other toxic soil applications. He uses the word natural fertilizers and then qualifies it by adding non-toxic chemicals. Since this method was new, he had no program so he knew he would have to write his own. He couldn't just give farmers amounts, he wanted to tell them more information about their soil test, so he thought a computer would help him. There was so much information he wanted to get to the farmers that he had to hand write so he decided the computer would be the easiest way to get the information out.

The computer was always in farmer 12's lab. The family had very little contact with it. The kids played with it a little, but not a lot. Farmer 12 was the primary user. That was one of the reasons he didn't replace the game when it wore out. Spouse 12 never used the computer. The computer is now completely out of the house. It is in the office in a nearby town. Farmer 12 moved it about six months ago because he used it more when it was at the lab than when it was home.

Farmer 12 says his kids all use computers in school. They are Apples. He says it's funny that all the schools have Apples, yet they are nonexistent in industry.

The classes he took at the community college were Basic I and II. Farmer 12 has had no additional training on the computer besides the two programming classes he has taken.

In a couple of years he will be revising the program because there have been new developments. He may do it sooner, he's not sure. He knows that he will have to dig out his books and study them again before he starts programming again because he has forgotten some of the basic

commands. But he says to operate the soil testing program isn't that hard and he never has any problem reentering that program. Farmer 12 said if he ever wanted to reenter PFS write, he would have to get out the manual because he hasn't used it in such a long period of time.

When asked how many other farmers he knows own computers, he said three or four years ago when he bought his, he only knew two who owned computers, but this year he knows of at least five farmers who have purchased computers. He doesn't know, but he suspects they have gotten cheap enough that farmers can afford to buy them.

Farmer 12 says a lot of people have asked him which computer is the best, but since he isn't using it for the farm it is hard for him to say. He tells them what he likes and then tells them to look for themselves.

Farmer 12 says he never went to any other farms to look at computers. He has demonstrated the soil test program to other farmers, but they haven't been locals. He says they were really interested in the program and traveled quite some distance. He says he got a lot of calls when he was doing soil testing for information which the computer generated.

Farmer 12 is a salesman for computers. He has been selling for about 1 1/2 years. (Two years in June.) He said he had a second job in another state two days a week but needed something else to keep his family going. So he worked for an office supply store because he had two years of work as an electronic technician and had done some service work. Then when the office supply store closed he went to work for another business supply store in town and quit the job in the other

state. He said at first he just serviced the office equipment in town, but then he moved into sales and training. He said mostly what he sells is Panasonic word processors. This changing jobs came about at the same time he was changing his hog operation from farrow-to-finish to custom finishing. He indicated he needed the other job to keep his family going.

Farmer 12 is also working for a seed corn company that is looking at producing high protein, high yield seed corn. He set up his lab at this seed corn company and while his testing is very limited now, he expects business to pick up soon. He says his work is very limited right now, but the owner of the seed corn company (it wasn't clear whether farmer 12 was a partner or an employee in this operation) wanted to expand his computer use in the company.

Farmer 12 says he's thinking of getting a new computer. He said his was big when he got it, but it isn't very big now. He thinks he could sell this one to someone who wants to get started on computers pretty cheap. He wants to buy at least 640K, IBM compatible with a hard drive. He says it would be used a lot for the seed corn company. He would be the one who would be in charge of figuring out what kind of inventory software to buy for the company. Farmer 12 is the only one who operates a computer at his office.

Farmer 12's number one source of information is the publication PC World. He learns just as much from the magazine though as selling and training people on computers. He really hasn't been seeking new information about computers right now. He will have to start looking

harder when he has to set up the inventory program for the seed corn company. He thinks he will look at what other seed corn companies are doing for inventory programs before he buys one.

Farmer 12 never goes to other computer stores to browse because he works at a computer store and can do what browsing he needs to do at work.

Farmer 12 does all the record keeping for his farm. He keeps general ledgers and does as little as has to. Farmer 12 says he does his farming on the weekend mainly.

When asked how many hours per week he uses the computer, farmer 12 says it is more like hours per month. He does mailing lists with it, but right now he is only doing four or five soil test per month.

Farmer 12 said while they were raising hogs farrow-to-finish, he sent his hog records off the farm to for professional record-keeping. They kept track of litters/sow/year and pigs/sow/year. He had that service after he had the computer for about 1 or two years.

When asked if the computer paid for itself, farmer 12 laughed because if he wouldn't have written the computer program and sold it he might not have had the computer. He said after getting it, he thinks it paid for itself again because he was using it in his soil consulting business.

Farmer 12 has never traded options or hedged. He has done some forward contracting through the hog buyer.

Farm family 12 doesn't have a television so they have no need for VCR or satelite dish. They have calculators and a microwave oven.

Farmer 12 said if his computer broke today, he wouldn't get it

repaired. He said if it was just for his farm, it has no purpose for the farm and he would just let it set. If his job at the seed corn company ended, he again wouldn't need the computer so it could set. But if the computer went down at the office, he would go buy a new one. This one is too old to get fixed. Farmer 12 says he would go buy a new one within one month. He doesn't use it every day, so it could wait that long.

In the next five years farmer 12 forsees doing a lot more work with a computer. He took his computer over to the office to show the higher ups just what a computer could do for their business. They are now talking about getting a bigger one, but no one has given farmer 12 the ok to buy. He is not thinking of buying one for his farm however. He would only use it at his job at the seed corn company.

The reason 85 percent of Iowa farmers don't have computers is because they aren't good at keeping records. If someone isn't good at keeping records, the computer isn't going to save them a lot. Also most farmers are fairly small and they don't really have the need for one. He thinks though we will see a lot more getting them in the near future. The first year farmers really enjoy the computer and can't get away from them, but in 2 years, the novelty will be gone and they won't use them unless they are good at keeping records.

Farmer 12 says he is having a problem with the computer now that happened on and off when it was at the house, but he hasn't ever done anything about it. He thinks it's a power surge because he screen goes black and then he has to shut it off and boot it up again. He says he

thought it would quit when he moved it to the seed corn company office because he thought it was his rural electric cooperative's problem, but now he's not sure what it is. He said it wasn't a big enough problem to go get it looked at. He never loses anything with the soil test program. He has lost information when he was using the word processing program, but since he doesn't use that much any more it isn't too big a deal. He usually stores on the disk every so often when he's using the word processing or database system just in case the computer decides to act up.

Case 13 -- Older adopter, Macintosh, son influenced, adoption characterized by trial and error approach.

Farmer 13 is a grain farmer. He tills 320 acres of corn and soybeans. He used to raise hogs, but quit about three years ago. About 10-15 years ago he fed cattle.

He has one 10,000 bushel grain bin with a forced air dryer. He does no conservation tillage or no-till. When he raised seed corn, the company sent out people to crop scout and do somethings like that, but since he quit raising seed corn he doesn't hire anyone to check the problems. He does most of that himself.

Farmer 13 farms by himself. He has no hired labor and his son doesn't farm.

Farmer 13's son got a computer about five years ago and then two years ago when he moved out of the house, farmer 13 bought a computer.

Both of the computers were Macintosh. Farmer 13's computer is a Macintosh Plus which has a double disk drive, printer and mouse.

When his son bought the computer, farmer 13 really didn't have any interest in a computer, but when he saw what a computer would do, he decided he and his son would go out looking for a spreadsheet for the farm records. They bought Multiplan and used it for several years. Within the last year his son sent him Excel spreadsheet package and farmer 13 had spent all winter developing an enterprise accounting spreadsheet, but he lost it and it wasn't backed up so he hasn't had time to rework it yet. So for this year he is using a program called Dollars and Cents. It is just an expense and income accounting system which will do until farmer 13 has time to redevelop his Excel spreadsheet.

Farmer 13 also uses MacPaint and MacDraw. He has started to put his field maps on the computer this spring, but hasn't had time to do all of them. He wasn't sure when his kids sent him these two programs.

Farmer 13 says his son and daughters keep sending him all kinds of software, but he really doesn't look at it. He just files it until the kids come home and then they usually use it. He has one son and three daughters. Farmer 13 knows his daughters keep their resumes on his computer and come home to update them. Only one lives close enough to use it frequently. The other two use it on their visits home.

His original intent in buying the Multiplan spreadsheet was to keep farm records. Farmer 13 has also used his spreadsheet to develop decision aid programs to project yields and incomes on certain fields

and also on the government programs. His son bought his computer because he was a computer science major and wanted his own computer.

The computer was set up in the living room on a desk. No other office equipment was around. Farmer 13 said when his son's computer was at home, it was in a back bedroom. When he bought his he put it in the living room. It was about two steps from the lineoluem so he could come to it easily in the winter.

Farmer 13 is the primary operator of the computer. Spouse 13 doesn't want anything to do with the computer.

Farmer 13 has never had any computer training. His son was his teacher. The son was also the one who used to help farmer 13 when he had trouble with the computer, but now the son lives far away and it is a little hard to get help from him.

Farmer 13 only knew one other farmer who owned a computer and he was recently killed in an auto accident. Now he doesn't know of anyone who owns a computer.

Farmer 13 has demonstrated his computer to one friend, but this friend really wasn't that interested in owning a computer. He just wanted to see farmer 13's new toy. He has never helped anyone go buy a computer. Prior to his son getting a computer, farmer 13 never looked at computers anywhere.

Farmer 13 doesn't ever send any information off the farm to be computerized. He said he used to participate in the county crop evaluations where everyone sent their paper records in to be evaluated, but he hasn't done that in years. He knows of a young neighbor who is farming and sends his hog records into the county extension office to be

kept on their computer. He also thinks this neighbor uses some decision making programs at the extension office.

Spouse 13 works as a nurses aide in a local nursing home, but she doesn't have any computer contact.

Farmer 13 says he likes to play with the computer and see what he can develop for a spreadsheet. He spends a lot of his time in the winter developing new spreadsheets. He estimates that he uses the computer a couple of hours per day in the winter time, but when summer time rolls around he loses interest because there is so much to do outside. He says he doesn't have any problems reentrying any programs after he's been off the computer all summer.

Farmer 13 says a valuable source of information is the magazine MacWorld. He goes through it every month to see what new software is available and reads any other article of interest to him. He has found trouble shooting information and other new information there. He doesn't need to go to computer stores to browse.

The few problems farmer 13 has had he has been able to work out on his own. He says sometimes he has found the answers in MacWorld. Farmer 13 also says he wouldn't hesitate to call the dealer from whom he bought the system, but he hasn't been back or called that store since he purchased the computer.

Farmer 13 set up enterprise accounting one year on his son's computer, but he ran out of memory, and had so many problems he quit. On this computer he wants to try enterprise accounting again. He has enough memory, but he hasn't had time to set the accounts up. That was

the spreadsheet he was working with and lost this last winter. If he wouldn't have lost it, he would have been doing enterprise accounting this year. Farmer 13 didn't keep enterprise records on paper, but he wants to with his computer. He wants to see how the enterprises were working out for him. He has always done the record keeping.

Once he got his computer set up, it saved him time. But the initial set-up of the spreadsheet takes a lot of time. He also says it takes time to enter the information, but at the end of the year it is so fast to total everything and do taxes.

It hasn't saved him any money. Farmer 13 doesn't think his computer is economically viable, but it keeps him busy in the winter. He thinks if a farmer had livestock, it would be more valuable to him to calculate the break-even points and feed efficiency.

Farmer 13 has forward contracted, but never hedged. He hasn't used the computer to market any grain, but he hopes to use it that way in the future. He has been thinking about buying a modem to access information services. In five years, farmer 13 is going to retire, so he has no plans for his computer after that.

Other innovations in farm family 13's home include VCR, microwave oven, calculators (son has programmable and farmer 13 has one, but doesn't know how to program it), autodial phones. Farmer 13 has considered CBs but decided against getting them. He recently has been thinking about buying a satellite dish.

If his computer broke, farmer 13 didn't think it would be too serious a problem. His records could wait until he got it fixed. He would take it to the dealer when he had the time. It wouldn't be a real

big rush unless it was the end of the year.

Farmer 13 really doesn't think he'll be doing anything with his computer in five years. He is planning on retiring and the computer doesn't figure well into retirement.

A high number of Iowa farmers are non-adopters because they are afraid to get into them. Farmers aren't generally interested in electronic gadgets; farmer 13 is. He attended Iowa State for three years in engineering.

The most serious problem farmer 13 has encountered was when a disk was damaged and he needed to copy it. He and his son found the option key in MacWorld telling how to do this. He also says his manual is always handy to figure things out. He also says trial and error works well.

Farmer 13 isn't interested in writing any programs. His son developed a couple when he lived at home, but farmer 13 doesn't want to do that.

Case 14 -- Apple IIe, 4 years as owner, school connection, farmer does not use, wife uses minimally for records

Farm family 14 operate 320 acres of corn, soybeans and oats. They farrow-to-finish 450 pigs per year. They have 3 bins, one of which is a heat drying bin. They don't do any fall plowing any more, they do chisel plowing, but that's all the conservation tillage they do. Basically farmer 14 does his own crop scouting, but occasionally the

farm supply guy or the co-operative extension person will come out if they are having a severe problem. They do their own chemical application.

There are two boys in farm family 14. One is a freshman in college and the other is a sophomore at high school. The oldest was the one most instrumental in the acquisition of a computer. Farm family 14 bought an Apple IIe about four years ago. They got a monochrome monitor, two disk drives and a printer. Shortly after purchase, they bought a joystick for the boys to play games and about 2 1/2 years after purchase, they bought a color monitor again because the boys wanted it.

The reason farm family 14 purchased an Apple was because the school had Apple IIes and there is a dealer in another part of the state who is big and gives very good service.

The farm accounting program which spouse 14 uses was written by the oldest son. He wrote the basic program about one year after the computer was purchased.

The boys have purchased a lot of games. They also purchased Bankstreet Write for writing term papers about one year after buying the computer. About three years after buying the computer, the boys updated to Bankstreet Writer Plus.

The parents in farm family 14 didn't really have any idea what other software the boys had. They took me upstairs to one of the boy's bedrooms to rummage through the files to see what else the boys had.

The computer was set up on a desk beside another desk which the youngest boy used to study on. The other software the boys had was Printshop, Graphics, Copy.

The initial reason for purchasing a computer was for the boys to use at school. The computer was paid for out of household expenses and the only thing the farm bought was one ag software package, Ag Plus, which farmer 13 has never used.

The boys are the primary operators. Spouse 14 sometimes uses the word processing package to write letters, but mainly the sons are the ones who use it. Farmer 14 doesn't operate the computer at all. He looks at the farm accounting outputs, but he doesn't ever sit down at the computer.

Farmer 14 hasn't had any computer training, but the oldest boy had three semesters in high school and the younger son has had two semesters and plans to take two more. Spouse 14 had one class at the high school but it was about computer programming. At this point she doesn't write any programs. She uses what is set up or a purchased program. She took the class after they bought their computer.

They do know one farmer in the area who owns a computer and really gets into it. He teaches computers at the high school and keeps his cow/calf records on it.

Farm family 14 has never demonstrated their computer to anyone or gone anywhere to see a computer demonstrated. The boys have had friends over to use the computer, but they have never had neighbors.

Spouse 14 is employed on the farm.

Spouse 14 says she doesn't use the manuals because the accounting program has all the directions on the screen. The boys use the manuals in figuring out what else they can do with their computer. If spouse 14

gets stuck she gets her sons to help her. The oldest son came home over Christmas break and updated the farm accounting program, but spouse 14 couldn't get it to work properly. When the youngest son got home from high school, she got him to fix it for her. She doesn't know how to copy the accounting program to a new disk for a new year so she usually gets one of the boys to do it for her. She laughed that she would have to learn that before both of the boys left home.

The boys go to computer stores a lot to browse. The parents never do. The boys get Nibble, Computist and A+. Neither of the parents read these magazines. The kids usually read, but don't really talk to Mom and Dad about what they found out.

Spouse 14 keeps a notebook of all the expenses and all the incomes and once every three months sits down and enters the figures into the computer. The program is a general ledger sheet. She thinks it has paid off at income tax time even though it takes time to enter the information in the computer. The notebook is the same system she used to keep before they got the computer so now she has two sets of records. The good thing about the computer is she can have the running totals at the end of the quarter. Before they would total about half way through the year. Now they do it every quarter. The computer hasn't saved her any time, but it makes neater records to take to the CPA. Spouse 14 estimates she works on the computer about three hours per quarter.

Farm family 14 doesn't believe the computer has saved them any money. The way it has paid for itself is in the boys' education. It definitely saved time and improved quality for the boys because they could rewrite their paper and use the spell check.

Spouse 14 estimates each boy used the computer about an hour each night. Since the oldest son has gone to college his use is a lot less, but prior to leaving home, he used it that much.

Farmer 14 has forward contracted cattle and hogs once. He thinks a computer could be useful in calculating break-even points.

Farm family 14 has a VCR, microwave oven and calculators.

Farm family 14 doesn't think the computer breaking down would be a very big problem. They would just contact the computer dealer to get it fixed. They can farm without it. It isn't used that much for their farming operation.

In five years, farm family 14 doesn't know what they will be doing. Spouse 14 says basically they will be doing what they are doing now. Farmer 14 says maybe they will do hog feed efficiency records. He says, "Basically I'm not whole hog wild about computers."

He believes 85 percent of Iowa farmers don't have computers because they cost too much. Farmers don't need a computer to farm. It isn't like a tractor.

The only problem they have had was when the disk drive needed to be cleaned. The boys noticed it was getting noisy and sticking and they got their parents to take it back to the dealer to get it cleaned.

Farm family 14 has never sent any records off the farm to be computerized.

Case 15 -- Apple II+, 9 years, equipment limits expansion to new programs and possibilities, spouse uses for off-farm job records.

Farm family 15 tills 570 acres of corn and soybeans. This year they let 200 acres go that they had farmed last year so the family could have a little more time to do other things. The only livestock they have is two horses.

Farmer 15 doesn't have a partnership with his little brother, but they exchange labor. Farmer 15 owns the planter and combine while his brother owns some other implements. He doesn't have any hired help.

Farmer 15 does minimum till with chisel plowing the corn ground and once over the bean ground. He does his own insect scouting, but a chemical firm provides a man who comes out to scout the soybeans for weeds.

Farm family 15 bought an Apple II+ in 1979. They got a monochrome screen and 1 floppy drive. They purchased a printer one year later.

Farmer 15 used to work with three men who owned Apples. They were all satisfied with what the Apple was doing for them. Farmer 15 also figured it would help if he knew someone who owned a computer when he was trying to get his running.

When they bought the computer they also got Apple Writer and Spreadsheet (which is based on Visicalc, but doesn't require Visicalc to run). They have never purchased any other software programs.

The computer is on a desk in the corner of the living room. It is close to the telephone and kitchen table. It has piles of books around it, but not any of the manuals. No other office equipment is around.

Farmer 15 is the primary user when it comes to farm record keeping. The kids use Apple Writer for homework. The two kids at home use the computer about 5-6 hours per week during the school year. The oldest daughter was the one who figured out how to operate the word processing package and she wrote a little cheat sheet that is still hanging on the computer today. The high school has Apple IIes. The oldest daughter had wanted to buy a word processor/computer when she went to college, but she decided to settle for a typewriter because it cost less.

Spouse 15 keeps her beauty shop quarterly records on the computer, "but other than that she stays away from it."

Farmer 15 hasn't had any training on his computer. The store in which he purchased the computer offered a class, but it was offered only at night and he couldn't take it because of his other job. His kids on the other hand have had computer programming classes, one is a sophomore in college, one a graduating high school senior and one a high school junior. They were too young when he bought the computer to be any help so farmer 15 relied on one of the men he worked with to help him. Farmer 15 figured he talked him into buying it; he could help him trouble shooting.

Farmer 15 knows two farmers who own computers, his brother and another man on the east edge of town. Farmer 15 talks a lot to his brother about computers, but not to the other man. He thinks his brother's IBM that has a hard drive operates a lot easier than the Apple that he owns. Farmer 15 has never gone anywhere to see a computer demonstrated nor has he ever demonstrated his computer for anyone else.

Spouse 15 helps with the farm work sometimes, but she also operates a business out of their home. Farmer 15 works second shift using a computer to program NC tape. He says he uses a computer to do work; he doesn't program the computer.

Farmer 15 says his heaviest time of use for the computer is in the Spring and Fall. That is when they receive the most money.

He says he never has any problems starting to work with the computer again because he does such simple commands.

Farmer 15 doesn't receive any computer magazines and has never attended any seminars on computers.

Farmer 15 said he used to go and browse in the computer stores for the first three years that he owned his computer, but he thought the Apple accounting packages were too expensive. He has been thinking about buying an IBM with a hard drive and changing software all at once.

Farmer 15 keeps a general ledger set of records. He keeps the exact same headings as the book he originally started keeping records on, except he didn't enter the ones that he never used. Farmer 15 estimates he uses the computer about 2-3 hours per week.

Farmer 15 says the computer has made his record keeping easier because it is easier to punch in the numbers than to have to write everything out in longhand. He says this saves him time. The computer has not saved him any money or paid for itself.

Farmer 15 does some forward contracting. He figures he should use hedging, but he's not knowledgeable enough about trading at this time.

Farm family 15 has a microwave, VCR (and access to grandmother's camcorder), programmable calculators, portable telephone, bank cards and

digital tractor readout. He used to have CBs, but they got too noisy so he took them out and hopes to replace them with high band FM radios. He doesn't have Agriview or Dataline.

Farmer 15 says if something happened to his computer today, he would take it into the store in the next couple of days. If the problem was very serious, he would junk this computer and buy an IBM.

That wasn't too surprising because Farmer 15 said almost in his first breath that his little brother just got a computer 8 months ago. It's an IBM with a hard drive and he does a lot more than farmer 15 does. Throughout the interview farmer 15 talks about how terrific this IBM is and how he wants to get one. His five year goal is not out of line with that piece of information. He hopes to buy 512K IBM. He is looking at AutoCad to design his fields. He wants a hard drive and 5 1/4 inch disk drive. Farmer 15 wants to separate the fields and also put a machinery depreciation schedule on the computer so he can decide whether to buy new or repair the old equipment.

The cost is the major factor that less than 85% of Iowa farmers own computers. That coupled with a lot who don't know how to use them.

Farmer 15's biggest problem with the computer was one day he wanted to boot up one year's records and it wouldn't boot up. Then he inserted the main disk and it wouldn't boot either. He then called the store where he purchased the computer and discovered that his disk drive had gone bad. He lost one complete year's records. He had a hard copy so he has never bothered to re-key that information onto disk. He said he took the computer in immediately to get it fixed. He deals with all

broken equipment the same way. If it's broken it should be repaired in a timely fashion.

Case 16 — IBM, 3 years, much trial and error at first, got help from Pioneer, bank recommended personal computer, support was a problem the first year, serious farm user.

Farm family 16 run a 400-acre row crop operation of corn and soybeans by themselves. They farm another 400 acres with a neighbor on an informal partnership. They also share work with his brother who farms nearby. Farm family 16 has 10 sows. They used to raise more hogs, and are starting to build the herd back up again.

They do minimum till with a mulch tiller. Farmer 16 hasn't used a moldboard plow in over 10 years. He does a little crop scouting, but he doesn't watch all that closely. The company from which he buys his chemicals does most of his scouting for him. If they see an problem, then he does what they suggest. Farm family 16 has no hired labor.

Farm family 16 bought an IBM PC in 1985. The computer has 2 floppy drives, a monochrome screen and an Epson printer.

They chose IBM mainly because they knew that company would always be in business. Also the bank recommended the IBM. The bank lined up the salesman to talk to farmer 16 and promised they would set up a users group for the farmers who bought IBMs to attend.

At the time they purchased the computer, they also bought Accounting, Profit Projector (both from Harris Ag Disk) and Lotus. In

1986 farmer 16 purchased Pioneer Decision Aids. It has 7 schedules, ammortization, storage cost, cash flow, etc. He also calls every year to Pioneer to get the government farm program disk which is free. He says he really likes that program. It helps him a lot. In 1987 he purchased the ISU extension hog program, but that was about the time he started cutting back on hogs, so he hasn't used that program. Farmer 16 also received a program from a seed corn company that allows a farmer to put in his own soil tests and different levels of fertilizer to project the yields he'd receive. He also copied a Pik and Roll and Charting program from AgPac this past winter. The guy he farms with purchased these programs, so farmer 16 copied them. He hasn't used them either. He wonders if his computer will have enough memory to work them, but he just hasn't tried them yet.

The major reason for purchasing the computer was for accounting purposes, although it is used a lot more for planning than for accounting. Ever since farmer 16 started farming, he has kept his records on PCA's Agrifacts. But their prices to keep the records kept going up every year and pretty soon the amount of money they were paying they could buy a computer with in a couple of years. So they bought a computer. The bank was really high on anyone buying a computer. They would push anyone who was thinking about buying a computer to go ahead and buy it.

The computer is set up in an office just off the front door of the house. Farmer 16 says he does all of his farm bookwork here. He has his Dataline set up right beside the computer and has a printer hooked up to it. Farmer 16 wished the computer room was somewhere else in the

house away from the kids' playroom and the living room.

Farmer 16 is the primary operator. Spouse 16 has too much help when she tries to use the computer (their daughters are 4 and 2) so she just doesn't use it. She laughs that she may use it when the kids get into school because they will be able to teach her how.

Farmer 16 said he wasn't sure how the Pioneer people came to visit him at his farm, whether he sent in a card or if they called him first, but when they came out to demonstrate their software, they also helped him understand his computer a little better. He then purchased the decision aid package. He was really happy with the Pioneer people because they actually sat down and took time to go over stuff with him.

The company that farm family 16 bought the computer from had promised to stop by every 2 weeks during the winter of 1986 to see how they were doing, but he basically sold the thing and left. Farmer 16 called him once, but he walked in the door ten minutes, kept his coat on and didn't want to mess with the problem himself. This was the biggest problem farmer 16 has ever had with his computer. He says because he was green and because the bank had promised a users' group and never delivered, he said he spent most of that winter with trial and error learning. His manuals were a good reference and the only place he really learned about his computer.

Although farmer 16 has never had any training on his computer, he took a class prior to buying his computer for 1 afternoon at the high school. It was on Apples. He learned that having a computer would help. He also said the men who came out to demonstrate software for

Pioneer were very helpful in showing him how his computer worked. (This is one year after he's had the thing and has had time to play around with it.)

Farmer 16 says his major source of information about new computer products was a seminar put on by Pioneer at the local library. Also he looks at the Swine Expo in Vets Auditorium in Des Moines each year. He thinks he would like to take a Lotus class some day because if he understood Lotus better he can use other programs which run off Lotus and they are a lot cheaper than stand-alone programs. He has done some spreadsheet work. He has developed a check book account a little different from the bank because he wants it that way, but they want it the way the accounting package generates the numbers.

Farmer 16 said the first year when he had been off the computer a lot and then tried to restart the program he had a lot of difficulty. He had to sit down and relearn everything, but now it is more of a second nature like riding a bike, you don't forget.

Farmer 16 said he knew about 10 farmers who used computers and that he talked frequently with them about computers, especially the man who he farms with. They talk about computers a lot. Although farmer 16 had not gone to another farm to look at a computer working and had not demonstrated his own, farmer 16 has gone to another farmer's house to help him set up his IBM this past Christmas 1987.

Farm family 16 used to get Ag Computing magazine, but farmer 16 says it really didn't help him, so he let it go. They never go browse in a computer store. Spouse 16 says it's because they rarely go shopping. Farmer 16 adds that people like Pioneer deal only with farm

software and when you go to a computer store the people don't know what you want for a farm. He laughed and said he usually didn't know what he wanted either.

Farmer 16 says Agrifacts is a pretty elaborate accounting system with enterprise accounting. His accounting package is pretty similar to Agrifacts, but it isn't as important now to use the enterprise accounting since he has a small hog size. He still uses the enterprise system and it will be more valuable when he gets going full force again in the hog business.

Farmer 16 said it takes as much, if not more, time to enter the accounting records, but he has more information at the end. He definitely thinks it has saved him money by preventing him from making mistakes. He cited the example of buying feeder pigs. He thought the price was pretty low so he ran the numbers through the computer and found out that with the price of inputs he would lose money even though the purchase price seemed low enough. It has definitely paid for itself.

He only enters information once a month in the summertime. In the winter time he uses the computer quite a bit. He estimates he averages throughout the year about 3-4 hours per week.

He has forward contracted and bought options. He may start using the charting program to perform these two marketing techniques, but he hasn't had time yet to see if this will work.

Innovations in farm family 16's house include VCR, microwave, calculators, Dataline and digital readout in a tractor. He had C.B.s

but took them out.

If his computer broke today, farmer 16 says it's not a threatening situation, but he would get it fixed right away. He would call Nebraska and if he had to would ship it there. He says he really doesn't know where to take it near his farm. During this time of year, especially, a breakdown isn't that big of a deal.

In five years, farmer 16 really isn't sure what he wants to do. He would like to get a modem to dial up EXNET. He says it seems the more you know, the more you need to know. He says he will keep doing what he is doing, but he really hadn't thought about other things. He thinks he probably needs more computer memory.

He believes 85 percent of Iowa farmers don't have a computer due to lack of computer knowledge and they probably can't justify the expense. Most of the older ones have done it so long one way that they will stay with that system and won't change.

In addition to not having the start-up help he was promised, farmer 16's other big problem was when a chip went bad about 1 1/2 years after purchase. He turned on the computer and a code number was on the screen so he called the bank for the telephone number of the computer store. Then he called the computer repair place and he talked to a guy who asked if he wanted to ship the computer to him or if farmer 16 wanted to install it himself. Farmer 16 chose to install it himself. So he had the computer man talk him through the procedure and then send him the chip. He said he didn't have any problem installing the thing. He had the chip in two days and installed it as soon as he got it in the mail.

<u>Case 17</u> -- Tandy TX1000, uses Deskmate II and Quartet, both spouses use, bought in 1987 and still new to them.

Farm family 17 till 600 acres of corn and soybeans. They have no livestock. They do very little no-till. They tried it for 3-4 years, but he didn't have good results and he felt it was just additional input costs. This year farmer 17 has tried something new. He skip planted soybeans and corn. Six rows of corn alternated with six rows of beans. He stripped the corn for conservation practices. He was trying to increase the yield, but he isn't sure it was such a good year to try a test field with the terribly high heat we've been having this summer.

Farmer 17 says his extension agent is real active. They do a lot of things with or because of extension. He talks very frequently to the agent.

Farm family 17 has on-farm drying and grain storage. The dryer is a batch dryer. Farmer 17 also does his own crop scouting. He took the co-op's crop scouting service the first year he came back to farming (around 1973) because the farm was so run-down and he was a little rusty on farming practices. Now he does his own. He said he got back to speed on farming through reading and the county extension service. They have no hired labor.

Farm family 17 purchased their Tandy TX1000 in November of 1987. They said they had wanted one for a long time. They originally had looked at a TRS80, but they cost too much so they waited. Farmer 17 likened it to owning a calculator; if you wait long enough, the price will come down.

The computer has two 3 1/2-inch drives, a monochrome screen and a printer. Farm family 17 is already saying they want a 40 meg hard drive because they anticipate buying bigger programs which require a hard drive.

Farm family 17 say there were no influences in buying a Tandy. They looked for 6-7 years. Then one day they saw a price they just couldn't believe so they decided they couldn't go wrong by buying at that price. They chose a Tandy because they believe it is the most versatile computer on the market. They will always be around and they have a location nearby. Farmer 17 felt the Tandy would be a long-term investment.

When they purchased their computer, they bought a program called Deskmate II. It has a worksheet, tax program, calendar, word processing, paint and more. It is supposed to be just for computer beginners because it really doesn't have the capability of holding very much information in any one area.

They purchased a flight simulator game at Christmas time, buy they can't really make it work. It took a long time to get it to even come onto the screen and do anything. It is just really hard to operate. Farmer 17 says computers are funny because what starts out to be fun can be so frustrating.

In February the accounting package Quartet went on sale. Since farm family 17 had been looking at that program for their accounting, they purchased it.

The purpose for buying the computer was not only for their farm,

but spouse 17 is the accountant for the local golf course so she would keep her course records on the computer.

Farm family 17 hasn't started to use their computer for accounting though. Their bank went under about 2 weeks after they purchased Quartet, so they really couldn't do any planning until they got square with the federal agency who covered the loans. And they are still dickering over what operating costs and such are. They had really intended to have all of their farm records set up on the computer by this time. The bank has been the major set-back.

Farmer 17 says he is looking at Farm Smart because it is a complete farm system which is integrated, but it needs a hard drive. He says that will be a winter project. And hopefully the bank situation will be straightened out. Once he gets Farm Smart, he wants to put 10 years of previous records on the computer so he can do some comparisons.

With Farm Smart, farmer 17 wants to break everything down by fields; every cost, every yield. He thinks it will be interesting to see which fields are profitable and which ones aren't. He says he would never do this long hand because it is too time consuming.

The computer is in the toy room/sewing room/office. Farmer 17 dreams of the day he can move the toys and the sewing machine out and just keep desks in one room. Farmer 17 has the Dataline setup on his desk as well as his computer which leaves him very little work space. He wants to build a set of shelves for the desk so he can clear the printer and screen and Dataline off the top of the desk.

The responsibilities of who does what will continue to be the same. Spouse 17 will continue to keep the accounting books while farmer 17

will do the crop analysis and the what ifs.

The children in farm family 17 use computers at school. The oldest boy who is 11 was furious with his parents because they didn't buy an Apple because that's what's at school. The children don't use their computer much because the parents don't feel secure enough in what it can and can't do. The 11-year-old can use the computer occasionally if spouse 17 is around. The kids have a Nintendo which keeps them away from the computer.

The adults in farm family 17 took one class which was a training session through the Extension Service. This was while they were looking at computers. The man through extension was trying to sell software, but they just took the orientation to see if they could use a computer. It was basically Apple oriented and spouse 17 doesn't like the Apple computer. This class basically showed that they could use a computer to run debits, credits, quarterlies and p/ls and that they needed a computer. Spouse 17 took a class on Apples and how they worked, but they were so slow, she knew she didn't want an Apple.

Farmer 17 knows one farmer who early-on owned a TRS80. He was wild about it when he first got the computer. He also knows a teacher at the high school who writes computer programs. He estimates he knows another 5-6 farmers who own computers, but he has never demonstrated his for other farmers. He has gone over to one neighbor's place to mess around with the computer a little.

Farmer 17 wants to get a users' group started, but the farmers he knows don't all have the same equipment so it wouldn't be very

beneficial for them.

Spouse 17 took on another job just this past winter. She does bookkeeping and income tax for a firm in a nearby town. She only works the spring months. She doesn't use a computer.

He sees the winter time (Jan., Feb. and Mar.) being the heaviest period of use to plan for the next crop. Farmer 17 thinks if you were a livestock person, using the computer would be a daily affair.

Farm family 17 picked up a couple of computer magazines prior to purchasing their own computer. They used the magazines to compare one computer to another. They also did some looking in the newspaper when they were comparing computers for articles as well as price information.

Farmer 17 thinks the manuals are worthless. But he concedes he may be trying to run before he can walk. He always uses back-ups of the program because he is very afraid he will lose the program. In thinks within 5 minutes he could have it totally screwed up. They bought a book about how to run the Tandy TX1000 and they swear it's a better book than the manual.

They never go to a computer store to browse.

Farm family 17 will continue to keep double entry general ledgers. This is the system they have now and they are satisfied with them.

Farmer 17 says it took him lots of hours at first working on the computer. He estimates that he spends 30-40 minutes per day looking at Dataline. So he thinks he will be using the computer to calculate the what if I get what they're offering now, will I make money. He also thinks he will use his computer to cash flow a new piece of equipment purchased. He really can't estimate how long he spends because they

really aren't actively using it right now.

Farmer 17 says the computer has saved him time and money. He has instant access to money figures and can make decisions based on those figures. He thinks he will be making even more money once he begins using decision aid programs.

Farmer 17 forward contracts grain. He was starting to get into options when the bank closed so they can't really do too much right now. Most brokers won't take you without a bank. They definitely will use the options in the future. Farmer 17 charts the markets every day, but has never considered using his computer to chart. He is currently forward contracting against his sealed corn for the high prices we are experiencing.

Innovations that farm family 17 have include Dataline, F.M. radios, micro-wave, VCR and Nintendo. They want a satellite dish and are looking into buying one.

If the computer broke down today, it wouldn't be a serious problem for farm family 17. But it still frightens spouse 17. She swears she will always print every few pages of her document. Farmer 17 on the other hand says she could just back it up on another disk and be safer. They argued a little about what would be best and they haven't even really begun to use the computer.

In 5 years, farm family 17 want a hard drive. Actually they want to buy the hard drive by this coming winter. Farmer 17 also wants to buy a program for the crop audit (Farm Smart) so he can do what he's been doing by long hand on the computer. They also project that in 5

years, they will have bought an inexpensive computer for their three sons to use since having a working knowledge of computers is important.

They believe 85% of Iowa farmers don't own a computer because the majority of Iowa farmers are over 50. Younger farmers are more willing to change. They have education and accept new technology. The older farmers are too close to retirement age to learn to operate something new. Also older farmers aren't aggressive about farming.

If anything goes wrong with the computer, farmer 17 calls the computer store. Although he couldn't tell me a specific incident, the times farmer 17 has called the store, they have always returned his call. If the computer store can't correct the problem, they call Texas where the company is located and they return farmer 17's call.

Case 18 -- Apple IIe, purchased 1985, programmer, uses mainly for taxes, both spouses use.

Farm family 18 operates 500 acres of corn and soybeans and farrow-to-finishes 1200 hogs per year. They do mostly minimum till with chisel plowing corn ground and some no-till when he is putting corn into bean ground.

Farmer 18 does his own crop scouting, but he mostly just looks for corn borers. He took a course in crop scouting with the local co-op, but he says he didn't stick around for the hot months at the end of July and all of August.

He doesn't have any hired labor full-time. In the Spring and Fall

his retired uncle helps. He also utilizes a nephew when it is the really busy season.

Farmer 18 has an on-farm batch dryer. He also has two forced air dryers in the bins.

Farm family 18 bought an Apple IIe in the Winter of 1985. They got a monochrome screen, printer and 2 floppy drives.

Early in the interview farmer 18 said nothing influenced him to purchase an Apple, but later as the interview progressed he decided the reason he purchased an Apple was because it was what his daughter used at high school.

Farmer 18 writes his own software. He has a master of science degree in mechanical engineering. He writes programs in machine language.

In addition to the farm record keeping program, farmer 18 has also written a word processing program and a football game. He says he just keeps improving them and really doesn't know when they were first written and usable. He enjoyed writing the programs much more the first couple of years. He has been thinking about writing a livestock feed estimation program, but he hasn't gotten around to it.

They have also purchased a few games for their son.

The main reason he purchased his computer was for tax purposes. He does more record keeping with the computer. He enters the check numbers, amount and it puts it in the correct categories and totals it for the year.

Farm family 18's computer is in the master bedroom. It used to be

in the living room until the oldest daughter moved out. When she left, the parents took over the larger upstairs bedroom and spouse 18 moved the computer out of the living room and back into the bedroom. She wanted to have a pretty living room again.

Farmer 18 uses the computer for farm entry. His wife uses the word processing and the son is learning the typewriter keyboard by using the word processing package. His oldest daughter took computer programming in high school.

His daughter taught him about PASCAL and graphics commands while he helped her with programming problems.

The 8-year-old son has one computer in the school which classes may share. His class doesn't use it very often, but he may as he gets older.

Farmer 18 took a review course in basic at the adult education center when he got his computer. He had computer instruction when he was in college.

Farmer 18 really doesn't know any other farmers who own computers. He assumes the guy down the road owns one because he's a Pioneer seed salesman, but farmer 18 never talks to him about computers. He has never gone to another farm to see a computer nor has he demonstrated his computer to anyone else.

Spouse 18 is employed on the farm.

Farmer 18 uses his computer the most in the winter time. He says he never has problems going back to computing after the summer. He does get behind on entering farm records.

At Christmas time is when farm family 18 may browse a computer

store. Farmer 18 used to take Apple magazine, but discontinued the subscription. He likes books on programming.

Farmer 18 keeps general ledger farm accounting. He estimates he uses the computer about 10 hours per week in the winter time and 0 hours per week in the summer time. Farmer 18 says it varies because if he is really interested in the program he will work endlessly on it.

Farmer 18 thinks the computer saved him time when it came to entering tax information. He said it made it easier. He has used the computer for some simple decision aid programs, but they weren't really that important. The main advantage of having a computer is being able to do some tax planning before the end of the financial year so things can be purchased to decrease the amount of taxes that must be paid.

Farmer 18 doesn't know whether the computer has saved him very much money or not. He concedes that one of the reasons he purchased the computer was as a hobby and that although it has been useful, it has probably not paid for itself.

Occasionally farmer 18 forward contracts grain and livestock. He's not done much forward contracting with the livestock in the last few years because you could make more money by not contracting.

Farm family 18 has a VCR, microwave, F.M. radios and solar heating for the house.

The computer breaking down wouldn't be a real problem, but farmer 18 would want to get it fixed before tax time. Farmer 18 says he'd probably get it fixed within one month of when it broke.

In 5 years farmer 18 really didn't know what he would be doing. He

doubted if he would be doing too much differently. He might like to have instantaneous market prices. Mabye if something really good came along he'd do it.

He thinks 85 percent of Iowa farmers don't own a computer because they have not been around computers and don't know what a computer can do. The first time you use a computer it is kind of mysterious, especially if something goes wrong. Also the store where farmer 18 bought his computer couldn't explain to him how a software package worked so he could see how other farmers who knew nothing about computers would have a hard time grasping the concept.

Farmer 18 put a comma in the wrong place in writing the word processing package. The computer was misreading a comma in the text as a command comma and messing the machine up. The problem would only occur when the wife was operating the word processing package because she used commas and farmer 18 didn't. It took him a long time to trouble shoot that problem because it wouldn't happen to him and he thought she was crazy. He finally just was looking at the program one day and it dawned on him.

Case **19** -- Commodore 8032, older farm couple, she is primary users to keep records for son's business, problems with training and support.

Farm couple 19 is in their 60s and semi-retired. They have farmed over 1000 acres when they were partners with a member of a seed company. They still operate 160 acres and have 130 head of commercial cows. They

have a son who is a farmer and rents their other two farms. Their

second son runs an off-farm equipment business. He has 13 full-time

people working for him. This is where the computer fits in.

Although their questionnaire response said they owned a computer,

their second son is the person who owns the computer. He purchased a

Commodore 8032 in 1980 to keep his business records. It has 2 floppy

drives, monochrome monitor and printer.

He purchased a Commodore because the salesman was good and he

believed the Commodore could do what he wanted it to do.

The intial computer purchase included Word Pro 4, general

accounting and an inventory package. The son also purchased games for

the computer, but not recently.

The computer is located in the main office of the off-farm

business.

Originally the son had hired a community college woman to keep his

books on the computer. When she was about ready to graduate, she said

she would teach spouse 19 how to operate the computer. Then the girl

got a job and never did give spouse 19 any lessons on the computer.

Spouse 19 had to just sit down and read a book. She had the people

where the computer was purchased come out and give her a demonstration,

but they talked over her level of understanding. Spouse 19 wishes she

could have had down-to-earth people who came out to train her instead of

the technical types that she had training her. She also was disgusted

with the cost of training.

The wife of the oldest son purchased the same computer shortly

after the second son bought his and she was very good at operating the

computer. Spouse 19 used to call her for help in figuring out how to operate the computer. But now the oldest son and this woman are divorced. She took the computer and all of her knowledge and left the area.

Spouse 19 can do the general ledgers for the off-farm business, but she never did figure out how to run the inventory that the son wanted her to run. Neither spouse 19 or her son want to do the billing for the equipment business on computer because they go to a lot of livestock shows and it would be too hard to do computerized billing there. The son does want to put the inventory on the computer, but his farmer 19 (his father) is against it and spouse 19 (his mother) can't figure out the program so he probably won't be doing that until he buys another computer. The smallbusiness man from the state visited the operation a couple of months ago and promised to send information about an easier inventory program, but he hasn't yet. The son thinks it's because the computer is too old and this man can't find anything to run on it.

Spouse 19 said if she had somebody to talk to she could do a better job of operating the computer. She says she always has to fight with it and works hard to make it do what she wants it to do. It was easier when the oldest son was still married. His wife was very helpful. Spouse 19 thinks if she were completely retired she'd like to mess with the computer to see what it can do. She really likes it more than any crafts or sewing she has ever done. But because she is keeping her son's records and the livestock and truck business is going so well, she is really busy just doing what she knows how to do.

If spouse 19 has any problems with the computer, she basically figures them out herself. She could call the company where the computer was purchased, but they give her a number and say they will call her back in two days. The business can't wait that long so she keeps trying until she gets it right.

Spouse 19 knows people in town that have computers because she belongs to the local professional women's association. They talk about who's getting a computer, but they don't talk about how to use a computer. Farmer 19 says he knows a couple of farmers have a computer, but he can't name names. They both name the feed store and farm implement dealer as having computers.

Spouse 19 says she has got some computer magazines, but never has time to read them so they really aren't much help.

Farm couple 19 have never been to a computer store to browse. The son hasn't recently browsed. He says he's too busy and computers are too expensive.

Once spouse 19 began using the computer for the livestock equipment business, she decided it would give her better records for the farm so she decided to put the farm's records on it.

Spouse 19 estimates she uses the computer 3-4 times per month and 10 hours per day on those 3-4 days.

Spouse 19 always goes over the printouts every month with a calculator to make sure the computer doesn't make any mistakes. She also says she'd never hook up to any other computers over the telephone lines because she wouldn't want somebody else finding out how much money they made last year.

Spouse 19 says putting the farm records on computer didn't save her time, but it gave her better records when she was done. She keeps a general ledger. She thinks she's too old-fashioned because it would take her less time to enter the information by hand than with computer. She has always kept the farm books and the livestock registration papers. After spouse 19 is done entering the monthly data, the son will sit down and look at the information. So he thinks it saved him money by knowing where the money goes. Farmer 19 never looks at the farm numbers so he doesn't think the computer saves him money.

Farm couple 19 do not use any futures for hedging or forward contracting.

The second son has a photocopier, VCR and a cellular telephone in his pickup. Farm couple 19 don't have any of the electronic innovations.

If the computer broke, spouse 19 says she would put the records on paper and go on because the operation is so big she has to keep the records up-to-date. Spouse 19 would take the computer to town and if it cost too much to fix, she would buy a new computer, but it would be the exact same machine. The son on the other hand would buy a new set-up with more capabilities.

In 5 years spouse 19 wants to teach the salesperson on the computer so she can retire from the job, but she's not sure if she will convince her son to add that responsibility to the salesperson's job because he thinks she should be busy selling.

The son says in 5 years he's going to have a new computer that

will be capable of taking care of small business operations as well as designing blueprints for equipment. He says his business will demand it. He may even want to operate it if he can draw the blueprints. The Commodore they have is getting old. The keys are loose and sometimes give triple digits when touched once.

The reason 85 percent of Iowa farmers don't have computers is because they won't take the time to set up computers. It is easier to them have it done on paper. If the wife does the record keeping, then a computer will be used. Otherwise it will be done on paper.

They have a major problem with operating a computer in their end of the county. They are one of the last hook-ups on the REC line and they have a lot of low power times. This causes the computer to glitch and most of the time eat whatever data spouse 19 was entering. Then she has to start all over. The day of the interview, spouse 19 had started to run the monthly checks through. When she got about half way done, she realized she was posting the May instead of the June checks. Luckily she had a back-up disk, so she just used it and started all over. It took a couple of hours to come up with that solution, however. She said she sat and worried and stewed about how she was going to void those debits and it finally came to her to use the back-up.

Case 20 -- TRS80 Model 3, 1978, cassette model so no software or printer, no real farm use, kids use it for games.

Farm family 20 operates a 600 acre grain farm. Farmer 20 had been in a partnership with his uncle, but this year his uncle retired and

farmer 20 farms by himself. He still hires his uncle and his cousin to work for him in the busy season.

Farmer 20 does his own crop scouting, but had been contacted this year by ISU to be part of a study on rootworm. He doesn't do any no-till or minimum-till. He does have a two bin drying system to handle all the corn on his farm.

Farmer 20 bought a Tandy TRS80 Model 3 in 1978. It is cassette. He never purchased any software or printer. It has a monochrome screen.

Farmer 20 says there really wasn't an influence in why he purchased a Tandy. He said at the time it was a strong model with good working ability and cheap. He purchased the computer from a company in Texas through the Wall Street Journal. Farmer 20 gets the Journal delivered at home.

He never purchased any software, although now he has contacted some companies to see if he can buy any software for his kids to use. He says some are still available in cassette. At first he bought books which had game programs already written and all he had to do was type the lines into the computer. That didn't last too long.

Farmer 20 did purchased a set of cassettes on how to program in Basic, but he says he never really used them much. Anything he purchased was basically in the first years he owned the computer, before he was married.

Farmer 20's original intent was to use in keeping farm records and charting the markets, but he really never utilized it to its full potential. The first two years of farming, he balanced his check book as a general ledger with it, but then he quit. It was more of a hassle

than a help. He says he got married and really just lost interest in the computer. He really never got it going for the farm.

The computer is in the basement sitting on farmer 20's desk beside the Dataline. The office area is also the girls' playroom so they have access to the computer readily.

Farmer 20 says the primary users of the computer are his daughters. He has four daughters ranging in age from 6 weeks to 10 years old. The oldest three use the computer just for messing around. They type on it. They don't or can't operate the games. Farmer 20 said he was looking into cassettes for them, but hasn't purchased anything yet.

The oldest daughter uses Apple computers at school, mainly doing math and spelling skills. Farmer 20 had inquired about spending an hour after school with his daughter on the school's computers, but the school district turned him down. He says there is a computer in the public library, but it is hard to get time on it.

Spouse 20 never really got into computing. She never looked at the computer.

When farmer 20 was in high school he took a class in computer programming and got really interested. In junior college, he took several programming languages: Fortran, Cobol, RPG. He says he never learned Basic.

Farmer 20 says just last winter he went to the county extension's 6-week record keeping course and one night of that training was dealing with computers. He thought it was interesting, but not for him.

Farmer 20 estimates he knows 3 people who own computers, but they

never talk about them. He has never went to another farm for a demonstration, nor has he demonstrated his computer to other farmers.

Farmer 20 has an off-farm job. Spouse 20 is a housewife, but when farmer 20 becomes full-time off the farm, she will need to work at the farm.

Farmer 20 still goes into a computer store to browse. His main interest currently is programs for his kids. He is definitely not looking for a new computer for himself. Farmers can still keep records on paper and not have any problems. Farmer 20 has looked at a programmable calculator because they are cheap and he can throw it in the pickup and take it with him to the farm. Farm family 20 lives in town.

Farmer 20 does some hedging and forward contracting. He has looked at options, but their base is too expensive right now.

Farm family 20 owns a VCR, microwave, electronic card for buying gas, Dataline and cable t.v. They want a camcorder, Farmer 20 considered Agriview before he got Dataline, but he thought the investment in the receiver was too much. It was cheaper to rent Dataline's equipment. Farmer 20's uncle has a satellite dish.

If the computer broke, it wouldn't be a serious problem. "It isn't worth enough to put money into it."

When asked what he will be doing with a computer in 5 years, farmer 20 says he won't be doing anything, but he might buy a computer for the kids when they get older.

Eighty-five percent of Iowa farmers don't own a computer because they are older, he believes. The farmers who own computers are 25-35.

Farmer 20 couldn't think of a problem because he didn't use the computer like he should have. "Now that I look back, I wish I would have bought disk drives. No software is available on cassette."

REFERENCES

Biehl, Nancy J.
1984   "Perceptions of Selected Attributes of Personal Computers by
            Nebraska Farmers." Presented to The Application of Computer
            Technology to Communication Processes - NCR-90 Research
            Conference.

Case, Donald, Milton Chen, Hugh Daley, Joung-Im Kim, Nalini Mishra,
            William Paisley, Ronald E. Rice, and Everett M. Rogers
1981   Stanford Evaluation of the Green Thumb Box. Stanford, CA:
            Institute for Communication Research, Stanford University.

Clearfield, Frank and Paul D. Warner
1984   "An Agricultural Videotext System: The Green Thumb Pilot
            Study." Rural Sociology, 49(2):284-297.

Dickerson, Mary Dee and James W. Gentry
1983   "Characteristics of Adopters and Non-Adopters of Home
            Computers." Journal of Consumer Research
            10(2):225-235.

Dillman, Don A.
1985   "The Social Impacts of Information Technologies in Rural
            North America." Rural Sociology, 50(1):1-26.

Dutton, William, Peter Kovaric, and Charles Steinfield
1985   "Computing in the Home: A Research Paradigm." Computers
            and the Social Sciences, 1(1):5-18.

Dutton, William H., Everett M. Rogers, and Suk-Ho Jun
1987   "Diffusion and Social Impacts of Personal Computers."
            Communication Research, 14(2):219-250.

Ettema, James S.
1984   "Three Phases in the Creation of Information Inequities:
            An Empirical Assessment of a Prototype Videotex System."
            Journal of Broadcasting, 28(4):383-395.

Harris, Linda and Ronald E. Anderson
1984   Computer Learning and the Public Need: MCSR Technical Report
            84-3. Minnesota Center for Social Research, University
            of Minnesota.

Louis Harris and Associates
1983   "The Impact of Technology on Society." Presented to The
            Eighth International Smithsonian Symposium,
            Washington, D.C.

Hooks, Gregory M., Ted L. Napier, and Michael V. Carter
1983   "Correlates of Adoption Behaviors: The Case of Farm
          Technologies." Rural Sociology, 48(2):308-323.

Jorgensen, Jerry D.
1984   "An Evaluation of the Use of Computers within the South
          Dakota Extension Service." Presented to The Application
          of Computer Technology to Communication Processes - NCR-90
          Research Conference, Minneapolis, MN.

Jose, H. Doug
1984   "Microcomputers: Early Adopters and Extension." Journal
          of Extension, 22(July/August):4-9.

Mason, Robert G.
1963   "The Use of Information Sources by Influentials in the
          Adoption Process." Public Opinion Quarterly,
          27(3):455-457.

Orr, James R.
1986   "The Innovation Adoption Process: A Panel Study of
          Microcomputer Adoption Among Iowa Farmers." Master's Thesis,
          Iowa State University.

Paisley, William
1983   "Computerizing Information: Lessons of a Vidoetext
          Trial." Journal of Communication 33(1):153-161.

Rice, Ronald E. and William Paisley
1982   "The Green Thumb Videotex Experiment." Telecommunications
          Policy, 6(3):223-235.

Rogers, Everett M.
1985   "The Diffusion of Home Computers Among Households in
          Silicon Valley." Marriage and Family Review,
          8(1&2):89-100.

1983   Diffusion of Innovations. New York, NY: The Free
          Press, 453.

Rogers, Everett M., Hugh M. Daley, and Thomas D. Wu
1982   The Diffusion of Home Computers: An Exploratory Study.
          Institute for Communication Research, Stanford University,
          Stanford, CA. (microfische)

Scherer, Clifford and J. Paul Yarbrough
1984   "An Examination of the Adoption of Microcomputers by
          Farmers in Iowa and New York." Presented to The
          Application of Computer Technology to Communication
          Processes -- NCR-90 Research Conference, Minneapolis, MN.

Venkatesh, Alladi and Nicholas Vitalari
1986   "Computing Technology for the Home: Product Strategies
          for the Next Generation." Journal of Product Innovation
          Management 3:171-186.

1983   An Empirical Investigation of Home Computer Adoption and
          Usage. Graduate School of Management and Public Policy
          Research Organization, University of California, Irvine, CA.

Yarbrough, Paul and Clifford Scherer
1984   "A Longitudinal Study of Farmer Adoption of Computers:
          An Interim Report." Presented to Rural Sociology
          Annual Meeting, College Station, TX.

Yin, Robert K.
1984   Case Study Research Design and Methods. Beverly Hills:
          Sage Publications, Inc.

196

ACKNOWLEDGEMENTS

APPENDIX A: LINES OF QUESTIONING

1. Farm Background Information

I'd like to know a little bit about your farm before we talk about your computer.

What kind of crops and how many acres do you grow?

Do you raise livestock? If so, what kind and how many head?

Do you practice any conservation tillage? No-till? Minimum till?

Do you do crop scouting or do you hire it done?

Do you apply pesticides and herbicides prior to a problem occurring or do you wait for a problem to occur and then apply the correct chemical to take care of that problem?

Do you have any hired labor?

2. Hardware

When did you purchase a computer?

Have you owned a computer prior to this one or have you thought about purchasing a second one?

What peripheral equipment are you using?

When did you purchase each piece of equipment?

How did you decide to buy your particular type of computer and the other equipment you own?

3. Software

What programs are you using?

What do you do with each program?

When did you purchase each piece of software?

What was your original purpose in purchasing the computer?

Can you do all the things you purchased the computer to do?

Since purchasing your software, have you found software which you believe may better serve your needs?

Where do you learn about new software (or hardware) coming into the market?

May I see your computer set-up? (Write down where it is located and if it an office area or family center)

4. Family/Corporation/Partnership Communication

Who is the primary operator of the computer?

Do other members of the family use the computer? If so, who are they and what do they use it for?

Did your children use a computer in school?

Do different members of the family use different computer programs?

Who uses what program?

Do your children ever help you solve a computer problem?

5. Training

Have you had any training on your computer?

Did you take any classes before you purchased one?

Do you want or are you able to get additional training on your computer?

To get this training where would you go or who would you contact?

What kind of problems have you had with your computer?

What do you do when you encounter a problem?

6. Societal Influences

How many farmers do you know who are using computers?

Are there neighbors who you share computer knowledge with?

To whom do you talk about computers?

Did you ever go to another location to watch what a computer could do?

Do you or your spouse work off the farm and do either of you use a computer at work?

Have you demonstrated your computer to any neighbors?

Do you use your computer more during certain seasons of the year?

7. Computer Information Sources

What is the most valuable source of information about your computer?

Do you read computer magazines, books, etc.?

Do you subscribe to any computer trouble-shooting service (such as Pioneer provides)? And how often do you use this service?

Have you talked to an extension agent or attended an extension computer seminar?

When you encounter a problem with your computer, who do you turn to for help?

Do you ever stop by a computer store just to browse through the latest software or hardware?

8. Record Keeping

Do you keep records of your farming transactions? Are they computerized or are they done by hand?

What kind of accounting did you keep before you purchased your computer and who did the record keeping? Who does the record keeping now?

How many hours per week do you use your computer?

Do you believe your computer has saved you time in your farming practices?

Has the computer paid for itself? (and how)

9. Management Skills

Do you forward contract or hedge grain or livestock?

Do you regularly follow the futures markets?

Have you ever purchased a put or call option?

Do you get higher prices for your production by using your computer?

Does your computer keep you better informed about the agricultural industry?

10. Adoption of Other Innovations

satellite disk?
cable tv?
computer prepared income tax statements?
automatic bill paying?
automatic deposits?
use automated teller machine?
microwave oven?
pocket calculator?
alternative long-distance phone service?
automatic garage door opener?
digital watch or clock?
programmable pocket calculator?
video tv games?
digital computer panel in car?
credit cards?
video recorder?
videotext?
Dataline or Agriview?
C.B. radio?
2-way radio?
solar collectors or water heaters?

11. Hypothetical Questions

If your computer broke down today, how serious of a problem would that be for your farming operation?

What do you expect to be doing with your computer five years from now?

Many farmers in Iowa (85%) do not have a computer at the present. Why do you think that is the case?

Pick a specific time when you could not make your computer do something. What specifically did you do and did it solve your problem?

APPENDIX B: MATRIX OF RESPONSES

Case Number	1	2	3	4	5	6	7	8	9
Acres	1200	1300	1500	800	680	570	750	600	250
Livestock	cow/calf	1100 hogs, 1200 feeder cattle	hogs, 70 cow/calf	65 cow/calf	50 cow/calf	hogs	2000 hogs, boars for Farmers' Hybrid	none	70 sows, farrow-to-finish pigs
Hired Labor	part-time students	1 full-time man	several full-time men	not currently, had when fed 5000 feeder calves	none	part-time students	no, hired man just quit, farmer and spouse taking over	none	none
Operation Type	partnership	individual	partnership	partnership	partnership	partnership	individual	individual	individual
Computer Brand	IBM XT clone	Apple IIe	Apple IIe	Apple IIc	IBM	IBM	Apple IIe	Apple IIe	Apple IIc
Hardware	20 meg hard drive, 1 floppy	2 floppies	2 floppies	2 floppies	2 floppies	2 floppies	2 floppies	2 floppies	1 floppy color monitor
Additional Hardware	modem, not using	none	none	modem, sends registration papers to association	modem, not using	memory at 2 years, graphics card at 2 1/2 years, new keyboard at 3 years 10 months	nothing	modem, not using, joysticks at 2 months	color printer at 2 weeks, mouse and joysticks at several months, external drive, added memory at 2 years
Influences	no influence	schools had Apples	no influence	brother owns Apple, school had Apples, neighbor bought IBM, but couldn't find any local to help him	didn't like Ag Disk and was told IBM better	6 sharp farmers who were using IBMs	school had Apples	friend as well as school had Apples	school had Apples, all classes on Apples
Length of Ownership	1 year	4 years	7 years	1 year	5 years	4 years	4-5 years	5-6 years	2 years
Intended Use	cattle records, farm records	cattle and hog rations	hog records	cattle records, replace programmable calculator	word processing and record keeping	school work, hog program and farm accounting	kids and farm record keeping	kids and farm record keeping	farm records
Software	WordPerfect at purchase, accounting at 11 months, purebred records at 13 months, Lotus 123 (looking for) at 14 months	land purchase Appleworks, Ag Disk at purchase, ISU beef cow analysis at 1 year, feedlot budgeting at 3 years	farrowing, operation and feeder pig costs program written at purchase, word processing at 1 year, cattle break even at 6 years, inventory at 7 years	Appleworks, Printshop, Newswriter at purchase, Ag Disk at 2-3 weeks, feed rations and calendar (looking for) at 1 year	WordStar, Visicalc, games at purchase, accounting at 1 year, looking for spell check and thesaurus (looking for) at 5 years	WordStar, Lotus 123, ISU sow records at purchase, Javelin at 2 1/2 years	6 educational games at purchase, word processing at 2 months	Visicalc at purchase, Appleworks almost immediately, accounting at 1 year	Appleworks, Printshop, games shortly after purchase, ISU swine templates at 1 year, Color Me, Type, Where in the World, other educational games at 2 years, Widespread at 1 year 10 months, Copy II+ at 2 years

10	11	12	13	14	15	16	17	18	19	20
1500	750	220	320	320	570	800	600	500	160	600
none	30,000 laying hens, farrow-to-finish 2500 hogs	800 custom feed hogs	none	450 farrow-to-finish pigs	none	10 sows	none	1200 farrow-to-finish pigs finish	130 cow/calf	none
several full-time truckers and farm labor	1 full-time 1 part-time	1 full-time	none	none	none	none	none	part-time relatives	13 full-time truck/livestock equipment business	part-time relatives
individual	corporation	individual	individual	individual	individual	individual and partnership	individual	individual	partnership	individual
Tandy 1000	Apple IIe	Radio Shack model 4	Macintosh	Apple IIe	Apple II+	IBM PC	Tandy TX1000	Apple IIe	Commodore 8032	Tandy TRS80 model 3
1 floppy color monitor	2 floppies color and monochrome monitor	2 floppies	2 3 1/2 in. drives mouse	2 floppies	1 floppy	2 floppies	2 3 1/2 in. drives	2 floppies	2 floppies	cassette
modem at 3 years, not using	joysticks shortly after purchase	none	none	joysticks shortly after purchase, color monitor at 2 1/2 years	none	none	none	none	none	none
none, bought first TRS80 as novelty and for records	school had Apples, no other IBMers in the area	college where took classes had Apple, IBM and Radio Shack, Radio Shack cheapest so bought	son bought Mac so farmer bought Mac when son left	school had Apples and Apple dealer gives good service	3 co-workers had Apples, figured they could help farmer trouble shoot	bank recommended, plus IBM will always be in business	none, Tandy will be around a while	school had Apples	salesman told son computer would do what he needed it to do	no influence, saw ad in Wall Street Journal
5 years	1 1/2-2 years	4 years	2 years	4 years	9 years	3 years	6 months	2 1/2 years	8 years	10 years
farm records	word processing	set-up soil testing lab	farm records	kids	record keeping	farm records	record keeping	record keeping	livestock equipment business records	farm records and charting markets
Finance Manager at purchase, V-P Planner and ISU templates at 4 years, Deskmate at 2-4 years	Appleworks, educational games at purchase	Soil testing program before purchase, Visicalc at purchase, File, PFS Write at 1 year	Multiplan when son purchased Mac 3 years prior to farmer buying Mac, Excel at 1 year, Dollars and MacPaint, MacDraw not sure when acquired	games at purchase, Bankstreet Writer at 1 year, Farm Accounting at 1 year, Bankstreet Writer Plus at 3 years, Printshop, Graphics, Copy traded for at school in the last 3 years	Apple Writer and Spreadsheet at purchase	accounting, Profit Projector, Lotus 123 at purchase, decision aid at 1 year, ISU swine templates at 2 years, soil test, Pik and Roll at 3 years	Deskmate II at purchase, Flight Simulator at 1 month, Quartet at 3 months, Farm Smart (looking for) at 6 months	accounting program written at purchase, can't remember when word processing and football programs written, games purchased for son	Word Pro 4, accounting, inventory at purchase, Games in first years	accounting program written at purchase, Basic tapes near purchase, educational tapes (looking for) at 10 years

Category									
Approach to Software	get demo and play with it at home	doesn't want to write, not a hobby	someone write specialized farm operation	writes own specialized spreadsheets	develops specialized spreadsheets	program in basic or use Lotus for specialized spreadsheet	does not apply	develops specialized spreadsheets	doesn't write own programs, but types them in from magazine
Considering	bigger hard drive, second printer	nothing	more memory and hard drive	nothing	more memory	hard drive, but leery	buying an IBM	nothing	3 1/2 in. drive
Computer Location	office	dining room/office setup	office	recreation room/office setup	sewing room/office	office	play room/office	recreation room/office	sewing room/office
Computer Training	2 day seminar, no other class, use manuals	none, son went to summer school, farmer got info from him	none, trial and error, use manuals	taking class, daughter's boyfriend helped, son took class, use manuals	took class, but quit because was programming, use manuals	farmer took 3 classes, programming, spreadsheet and Lotus classes, use books and manuals, use Lotus magazine	spouse took 2 classes, but neither on Apples, wants service and training when buy IBM	spouse took programming class, kids took classes in high school	spouse took 3 classes, basic, database, word processing, also 2 day seminar
Like Computer Training	didn't like seminar	doesn't apply	doesn't apply	happy with class	not happy with class	happy with classes	not happy with classes	spouse not happy with class	happy with instruction
Operators	Farmer for records, spouse for letters, spouse will return to records this year	farmer for feed analysis, boys for homework and fun	farmer for records, kids for word processing	farmer for records, son high school class, daughter plays games	farmer for records, spouse for word processing, daughter for typing, son-in-law for records	farmer for records, spouse for word processing	kids played games	farmer for records, daughter for homework	spouse for records, household expenses, telephone database, kids play games
Other Family Members	Farmer's father asks for info from computer, kids may have own in future	spouse afraid, not interested in computer	spouse prefers computer at work because it is faster	spouse not interested, prefers typewriter	daughter married to partner is afraid of computer	Farmer's father won't have anything to do with it	no adult used	spouse won't use computer, brother gets info, but doesn't operate	farmer can get phone numbers from database, not other functions
Known Computer Users	3-4 farmers, not a topic of discussion, farmer's been asked to go with friends to purchase a computer	5-6 individuals local feed dealer used farmer's ration program until got his own, farmer helped feed dealer and auction setup computers	8 individuals, 1 friend talks about computers, others 2 times per week, neighbor asked farmer to run decision aid program once, never saw demonstration	brother owns same, farm wives in class, neighbor asked for help in purchasing computer, saw demonstration, never demonstrated	2 farmers for 5 years and 5 more in last 6 months, knew an Apple owner 5 years, but never talked to each other about computers, demonstrated, never saw demonstration	6 farmers gave idea of buying computer, these men are not neighbors, never saw demonstration, never demonstrated	2 farmers, neighbor and brother-in-law, never saw demonstration, never demonstrated	2 individuals, 1 is a close friend who demonstrated his computer for farmer, farmer has demonstrated to others	2 family members, never saw demonstration, has demonstrated, accompanied sister on computer search

wants specialized programs, not want to write	does specialized spreadsheets	wrote 1 program will update it soon	wants specialized spreadsheets	boys wrote farm accounting, Mom and Dad have no approach	uses what he has, Apple software too expensive, wants IBM	wants farm specialized software, pleased with Pioneer	wants specialized spreadsheets	liked writing more in first years	use what has and not explore farther	not interested unless for daughters to use
3 1/2 in. drive hard drive, more memory	nothing	buying new computer	modem	nothing	buying IBM	nothing	40 meg hard drive	nothing	buying a new computer	nothing
living room/ office	utility room/ office	off-farm office	living room/ office	son's bedroom	living room/ office	play room/ office	toy room/sewing room/office	master bedroom/ living room	main office of livestock equipment business	play room/ office
spouse worked with computers on previous job, no classes	farmer took 2 classes, spouse took 1 class, spouse access at university	farmer took 2 classes	farmer no classes, son had classes	spouse took 1 class, sons took several classes	kids took classes in high school and college, none for adults	farmer attended seminar to see attributes of computer ownership	couple took 1 extension class, spouse took 1 additional class	farmer took classes as college student and in adult education, daughter took class at high school	spouse had 1 session with computer store	farmer took high school and college classes
happy, although no formal training	not happy with class	happy with classes	does not apply	not happy with instruction	does not apply	happy with instruction	not happy with instruction	happy with instruction	not happy with instruction	happy with instruction
spouse for records, farmer for decision aid, kids use word processing	farmer for records, spouse for word processing, kids play games	farmer for soil testing, kids had 1 game	farmer for records, decision aids, son used own when living at home, daughters come home and use	spouse for records, boys for papers and fun	farmer for farm records, spouse for shop records, kids word processing	farmer for records	spouse for records, farmer for decision aid	farmer for records, spouse for word processing, son for games and word processing	spouse for records	farmer for records at first, kids for messing around
no other members	farmer's father interested in results not computer operation	spouse doesn't use computer	spouse doesn't use computer	farmer doesn't use computers	spouse only at quarters when she's forced to operate the computer	spouse doesn't use computer	oldest child can use	daughter no longer at home	farmer not interested in computer, son wants more records, but doesn't operate computer	spouse never interested
1 neighbor, never talks to him, never saw demonstration, never demonstrated to others	7 farmers, saw demonstration never demonstrated	5 farmers, been asked for help in buying computers, never saw demonstration, has demonstrated	none, never looked at computers until son bought 1, never saw demonstration, has demonstrated	1 farmer, never saw demonstration, has never demonstrated	2 farmers, 1 is brother, talks to brother a lot, never saw demonstration, has never demonstrated	10 farmers, talks to partner about computers never saw demonstration, never demonstrated	6-7 farmers, saw neighbor demonstration, has never demonstrated	doesn't know any computer owners, never saw demonstration, never demonstrated	2-3 individuals, don't talk to them, never saw demonstration, never demonstrated	3 individuals, never talk to them, never saw demonstration, has never demonstrated

Spouse Works	on farm	on farm	real estate agent	dental hygenist getting computer in dentist's office	registered nurse at nursing home	on farm	on farm	on farm	on farm
Browse	browsed just last week	no, if was a hobby, then would browse	confused by looking at all different programs, so stopped being interested	any time in town just to see what's new, didn't browse until he understood his computer, sometimes reads magazines	browsing for specific software	reads long copy ads in Lotus, then if really interested go to store to see	never browses for anything	browsed, but programs cost too much, reads mail on computers	some store browsing, most in computer magazines
Accounting	change to enterprise	not using computer, enterprise on paper	change to enterprise	changed to enterprise	changed to enterprise	enterprise prior to computer, but now more detail	enterprise with association computerizing papers sent to them	enterprise prior to computer, spouse doesn't keep any more	general ledger, bank kept on computer 1 year before purchase, trying to get more detail every year
Estimated Use	5 times per week	1 hour per week, kids 2 hours per week	2 hours per week	7 times per week	1 time every 2 weeks	little use now, once graduate use during time used to study now	since it was not used, no estimate	Winter 4-5 hours per day, daughter 5 hours per week	1 hour per week on accounting, can't estimate other
Save Time	doesn't save time, but get more accurate records, taxes easier	same amount of time, salesman used to figure rations, now computer does	saved time knowing where operation was monthly, got more detailed records	less time to do longhand calculations, quicker to sort cattle	less time inputting, but more time playing with the numbers, never did longhand calculations, get more info	save time on individual records, but keeping more records overall so spend more time, end of the year is easier	didn't use computer so can't say	takes time to enter, but more info overall, runs decision aids more efficiently than longhand calculations	takes time to enter info, but saves time at tax time, able to see profit
Paid for Itself	hasn't in dollars, but in sanity	saved money, but hasn't paid for itself	has by spending less money in hog operation, also in billing save in dollars and peace of	has by aiding in remembering small details about cattle buyers, brings in more money	has, but would be easier with computer prices falling	has in hog operation, not yet in crops	not used	has because can't make mistakes like could in 70s	in educational value alone
Marketing	has forward contracted	computer calculates break evens, speculates and hedges, computer not important in crop operation	didn't want to discuss	used to hedge and speculate when farm was larger	doesn't hedge or forward contract	speculates and hedges, not using the computer	hedged in past, not in last 2 years	hedged, options, not currently, government program is so big	doesn't hedge, sell most grain at harvest at market price, no forward contracting

on farm	graduate student	on farm	nurses aid at nursing home	on farm	beauty salon on farm	on farm	book keeping/ tax job during winter	on farm	on farm and equipment business	on farm
some store browsing, most in computer magazines	browse for kids games	reads computer magazine for information, as well as training people on computers	reads computer magazine to browse	Sons browse and read computer magazines, parents don't	browsed for first years, but Apple software too expensive	never browse	never browse	browse during Christmas for games	parents never browsed, son did when first purchased computer	browsing for cassettes for daughters
general ledger, similar to paper	not using computer, enterprise on paper, prior kept on computer by private company	general ledger, prior to computer had Moormans computerize swine records	general ledger, tried to develop enterprise, but lost spreadsheet through electrical glip	general ledger, use a notebook for actual transactions, computer is glorified calculator	general ledger, exactly same as paper	enterprise, used PCA's Agrifacts prior to computer	general ledger, same as paper	general ledger, same as paper	general ledger, same as paper	general ledger, on computer then returned to paper
trucking 1 hour per week, farming 1 hour per month	farmer 2 hours per week, spouse 2 hours per week unless a paper is due, kids more than adults	4-5 soil tests per month	2 hours per day in winter	spouse 3 hours per quarter, sons 1 hour each per day	farmer 2-3 hours per week, kids 5-6 hours per week, spouse quarterly	3-4 hours per week	projects 30-40 minutes per day	10 hours per week in winter, 0 hours per week in summer	3-4 times per month, 10 hours per day on the days used	none
saved time in record keeping	saved time once spreadsheet set-up, didn't keep hen records prior to computer, entered 5 years info to compare	saved time writing down soil test instructions	takes time to enter, but end of the year easier	takes time to enter, but pays off at tax time, able to keep a running total that wasn't kept before	saved time because it is simplier to key in numbers than write out in longhand	takes as much if not more time to enter, but more info when done	should save time, have instant access to numbers	takes time to enter, but save time at tax time	no, takes less time to keep by hand, but get better record with computer	no, too much work entering info
no	has because cost is a drop in the bucket, shows if livestock are eating too much	has because a vital part of soil testing business	no	has in educational value	no	has because helps figure break even points on feeder pigs, shows when buying is unprofitable	will by providing instant access to figures, make more money by using decision aid programs	no, has been useful, but not saved money or paid for itself	has by having accurate records of where money is going	no, not being used
has forward contracted, wants to hedge	never hedged or used options, has forward contracted	never hedged or used options, has forward contracted	never hedged, has forward contracted	has forward contracted, computer could be useful in calculating break even points	has forward contracted, should hedge	has forward contracted, has bought options, wants to use computer in charting	has forward contracted, charts, wants to trade options	has forward contracted, not recently	never hedged, forward contracted	has hedged and forward contracted

Innovations	VCR
	microwave
	speaker phone
	autodial phone
	2-way radios
	Dataline
	calculators
		VCR
		microwave
		autodial phone
		private band
		  radios
		Dataline
		Agriview
		camcorders
		calculators
		phone patch
			VCR
			microwave
			house security
			phone answering
			  machine
			Dataline
			t.v. rotor
			solar heating
			programmable
			  calculators
			C.B.s
			2-way radios
				VCR
				microwave
				autodial phone
				rent camcorders
					VCR
					microwave
					C.B.s
						microwave
						photocopier
						C.B.s
						Dataline
							VCR
							microwave
							solar fencers
							neighbor has
							  F.M. service
							  to which
							  farmer has
							  access
							wants 2-way
							  radios
								VCR
								microwave
								C.B.s
								wants F.M.
								  radios,
								  camcorder,
								  satellite dish
									VCRs (2)
									microwave
									programmable
									  calculators
									electronic
									  grain scales
									Dataline at
									  coop

If your
  computer
  broke today,
  how serious
  would that be
  to your farm?
	not a big
	problem because
	most info
	backed up, once
	cattle on
	computer can't
	live without
		not too big a
		problem now
		because happy
		with rations
			not a real
			catastrophe,
			could get it
			fixed easily,
			don't depend on
			it every day
				big problem
				because sale
				is coming up
				hate to be
				without for
				more than 1
				week, would go
				to brother's
				until his fixed
					not a problem,
					get along with-
					out it for 1
					month, problem
					is where to
					take to be
					repaired
						depends on day,
						would get a
						replacement
						until repaired
							not a problem
							until tax time,
							brother
							repair possibly
								not a problem,
								broken for 2
								months, each
								drive gone out
								3 times, lead
								to frustration
								and leaving it
								broken
									not a problem
									would fix it
									because trust
									and rely on
									it for figures

In 5 years	purchase additional computer for cattle barn, purchase one for kids	start book keeping	cow and field histories recorded, find hog feed efficiency program, looking for way to integrate all	field histories recorded, son take over farm farmer work on computer full- time	marketing, receive advisory service with modem, chemical application	out of hogs and into computerized farm accounting, write 25-30 more Lotus templates	3 1/2 in. drive hard drive, more memory, maybe buy new computer	purchase IBM to write checks, keep records, calculate livestock inputs	doing the same thing

Why 85% of Iowa
  farmers don't
  own computers
	no money, if
	farm economy
	rises, more
	computers will
	increase
		scared of them,
		can't see
		return on
		investment
			not exposed to
			potential uses,
			through
			extension can
			use computer
			without
			investment
				don't know
				what a computer
				will do for
				them, aren't
				good at record
				keeping
					money
					constraints
						average age of
						farmer is old,
						don't want to
						learn new
							farms too small,
							older farmers
							resist change
								average age is
								old, don't want
								to try new
								ways
									not willing to
									spend money,
									too old to
									learn to use

Tramatic Problems	hard drive formating, called computer store for help	no problems	error in program that caused lock up, called high school teacher	sending ASCII files to association, called daughter's boyfriend	error in print program, just shuts it off and prints a second time	couldn't run swine program, called computer store, now just read manuals	never used, broken a large share of the time owned	damaged accounting program by punching buttons, got another copy of program	initially called computer store, but now if she gets software from local dealer will take software to dealer and have them go over it with her

VCR microwave autodial phone Dataline satellite dish	VCR microwave answering machine camcorder 2-way radios calculators	microwave calculators	VCR microwave programmable calculator autodial phones wants C.B.s, satellite dish	VCR microwave calculators	VCR microwave portable phone programmable calculators digital tractor readout wants F.M. radios	VCR microwave calculators Dataline C.B.s digital tractor readout	VCR microwave Dataline F.M. radios Nintendo wants satellite dish	VCR microwave F.M. radios solar heating in house	parents nothing son VCR photocopier cellular phone	VCR microwave Dataline considered Agriview prior to subscribing to Dataline cable t.v. wants camcorder
would take it to be fixed next day, get a loaner	not a problem for the farm, spouse may be critical, take it to be fixed as soon as possible	not a problem for the farm, wouldn't get it repaired, buy a new computer	not a serious problem, would fix it, but no rush unless end of the year	not a problem because it isn't used that much in farming operation, would get it repaired	not a problem would take it to be repaired, if too bad would buy an IBM	not a problem, but would get it repaired right away	not a problem, spouse worried about losing large amounts of information	not a problem, would fix before tax time, probably within 1 month	not a problem, put it on paper and continue, if too bad, buy a new computer	not a problem because is not being used
3 1/2 in. drive enterprise accounting, field maps	accounting on computer, hen records	buy IBM clone to be used at seed company, not for farm	no plans because retiring, may buy a modem to access market info	don't know, hog feed efficiency records, maybe	buy IBM, separate fields, machinery depreciation schedule	not sure, modem to access EXNET, probably add memory	hard drive, Farm Smart software, inexpensive computer for sons	don't know, modem access to markets maybe	spouse wants to retire and quit using the computer, son wants new computer capable of business and designing blueprints	wants to buy a programmable calculator, not buy a new computer
don't know what computers can do, not willing to learn	farms are small and don't need	small farmers don't need computers, aren't good at keeping records	don't know how to use	computers cost too much	cost too much, farmers don't know how to use computers	lack computer knowledge, can't justify the expense, older one don't want to learn	older farmers aren't willing to learn,	don't know what computers can do	won't take the time to setup accounts	farmers are older, the ones who own computers are 25-35
Finance Manager disk full, called store, not much help so figured out themselves	erased sow formulas with error message finally figured it out himself	screen fades in and out, loses word processing info, not a problem in soil test program, so never solved problem	disk damaged and needed to copy it, found answer in computer magazine, lost spreadsheet due to static electricity	son updated accounting program and spouse couldn't get it to work so she waited for the younger son to come home and help her, needs to learn to copy a disk before both sons leave home	tried to boot the system and couldn't so called store, discovered drive had gone bad so lost 1 year's records	promised support when computer purchased and didn't deliver, also microchip went bad so farmer called company had part shipped to him and he repaired it on farm	can't recall specific problem, but always calls store for help	farmer put comma in wrong place and spouse kept locking up word processing program, farmer finally figured the problem out	low power voltage so frequently lose records, not much can be done, has posted wrong month's bills to current statement, so just got backup and started the month over again	none