AMERICAN FARMLAND TRUST

Evaluation of AFT's Sustainable Agriculture Program

FINAL REPORT

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EXECUTIVE SUMMARY

In 1991, with the support of the W. K. Kellogg Foundation, the American Farmland Trust (AFT) undertook an evaluation of its work in sustainable agriculture. For the most part, this evaluation focused on AFT's on-farm demonstration program -- accomplishments, strengths and weaknesses, and changes that should be made to program structure and operations.

The evaluation effort included a survey of 53 farmers in four states who have participated in AFT's sustainable agriculture on-farm demonstration project and three day-long meetings of an evaluation advisory panel.

Survey of farmers

The American Farmland Trust, contracting with the Center for Governmental Studies at Northern Illinois University (NIU), surveyed farmers who implemented nitrogen reduction, pesticide reduction, or other practices associated with sustainable agriculture. These farmers had participated in AFT projects in one or more of the years 1989, 1990, and 1991; the states in which they farmed were Illinois, Indiana, Michigan, and Missouri. Some of the significant findings are detailed below:

- More than half of the participants would highly recommend participation in AFT on-farm demonstration projects to other farmers.
- AFT has conducted "farmer friendly" projects which have generally been helpful to participants in planning and managing their farm operations.
- Most participants felt that the technical assistance provided by AFT was helpful, but suggested that the timing and quality of written materials provided by AFT needed improvement.
- The stipend provided to farmers by AFT was generally considered to be adequate to cover any extra costs, risk or inconvenience associated with the on-farm demonstrations.

Changing Agricultural Practices

The NIU survey was principally designed to direct feedback on the operational aspects of AFT's on-farm demonstration projects, as indicated above. However, the survey results do shed some light on the continuing effect of the projects on agricultural practices. The survey work undertaken by NIU provides indications that this effect is consistently positive.

The survey also indicated that on average, about eleven farmers visited each demonstration project while in progress. Also, participating farmers reported discussing their projects with, on average, another 17 farmers. (In 30 percent of the demonstrations, farmers reported 40 or more such conversations with other farmers).

For example, for 70 percent of the demonstration projects, farmers indicated a willingness to continue using the demonstration practice in subsequent years. When participating farmers were asked if they had continued using the indicated practice in subsequent years, most farmers reported that they had done so. Among 1989 on-farm participants, 100 percent reported that they continued the practice in 1990 and 1991.

Advisory panel findings

The evaluation advisory panel convened to critique AFT's sustainable agriculture program consisted of:

George Bird, Deputy Administrator, CSRS, Department of Agriculture;
Garth Youngberg, Executive Director, Institute for Alternative Agriculture;
Dave Swaim, President, Swaim and Associates;
John Gerber, Assistant Director, Agricultural Experiment Station, University of Illinois;
Ken Rineer, Director, Rodale National Network for On-Farm Research and Demonstration;
Michael Heller, Manager, Claggett Farm, Chesapeake Bay Foundation; and
John Harlin, Chairman, Geography Department, Northern Illinois University.

Not surprisingly, examination of a complex subject by a group such as this led to a multitude of findings. Some were common sense; some were fascinating and enlightening; some

were difficult to accept. Key findings can be grouped into the following categories:

1. AFT has special strengths that will provide a firm basis for continued and expanded work in the future.

2. AFT should improve and expand the single variable on-farm demonstration model currently being used.

3. AFT should extend the scope of its sustainable agriculture projects to include water quality issues more directly, in both demonstration work and in policy development.

4. AFT on-farm projects should be expanded to include whole-farms.

5. AFT projects should reflect the diversity of American agriculture by including more diversity in demonstration projects -- particularly including livestock and a variety of fruit and vegetable operations.

6. AFT must place greater emphasis on policy and education work.

7. On-farm demonstrations should be more closely coordinated with the university research community.

8. AFT should become a stronger national leader in sustainable agriculture.

9. AFT should not dilute the conceptual basis of sustainable agriculture in an attempt to encompass a larger group of farmers.

New Program Directions

This program evaluation process has led to the development of specific new directions to be taken in AFT's on-farm demonstration and research projects beginning in 1992. These include:

1. Whole-farms. In each target state, AFT will identify a small number of farmers interested in integrating a wide range of practices into their operations, leading over time to "whole-farm" sustainability.

2. Water quality. Discussions are under way with faculty at universities in several target states regarding design of water quality demonstration projects in watersheds where baseline information already exists.

3. Livestock and orchards. AFT expects to develop a number of on-farm demonstrations involving dairy and cattle operations, as well as a greater number of fruit orchards than in past years.

4. Land grant and other universities. Discussions are under way with several universities regarding their involvement in leadership development, design of demonstration and research projects, water quality monitoring, and assistance in nurturing the development of statewide sustainable agriculture organizations.

5. Technical assistance publications. AFT intends to upgrade the quality and improve the timely delivery of technical assistance publications. This will include a major redesign of the annual reports on the results of on-farm demonstrations.

6. Rural economic revitalization. AFT is eager to work with other organizations to demonstrate that a comprehensive adoption of sustainable and alternative farming systems has the potential to bring economic and cultural stability and revitalization to rural America.

AFT anticipates incorporating on-going program evaluation into the design of its sustainable agriculture programs in the future. AFT will continue a peer review process and will adopt the groups's recommendations as necessary to ensure program flexibility and applicability to farmers.

AFT expects to work with other organizations to identify appropriate measures in such areas as soil health, water quality, and economic feasibility. Also, AFT intends to build into the design of on-farm projects an effort to help farmers create their own visions and benchmarks for the increasingly sustainable futures of their farm operations. These comprehensive evaluations will be made available to other non-profit groups that are interested in designing or evaluating their own sustainable agriculture programs.

I. INTRODUCTION

This report examines many facets of sustainable agriculture as the concept is understood and promoted by the American Farmland Trust. Necessarily, the report contains many observations about the larger sphere of sustainable agriculture as well as AFT activities designed to support and foster it. To provide a context for AFT's work and to help illustrate the background for later recommendations, this report deals with such questions as: why the concept of sustainable agriculture has emerged in the last quarter of the century; what economic, social, and ecological forces have influenced its development; and, importantly for AFT, how nongovernmental organizations can influence and improve upon existing educational activities that encourage farmers to adopt the concept.

Why AFT undertook the evaluation

The American Farmland Trust has operated on-farm sustainable agriculture demonstrations since 1987 in order to facilitate the experimentation by farmers with agricultural systems highlighting reduced use of purchased inputs.[1] To evaluate the effectiveness of the program and to chart a course for organizational expansion, AFT undertook an in-depth program evaluation. The

[1] See Table I for a chronology of AFT's Sustainable Agriculture Program.

evaluation was designed to help AFT managers determine the effectiveness of its sustainable agriculture program relative to other alternative approaches, and to establish a context in which AFT efforts, as well as the total efforts of many groups, can be measured meaningfully.

The measurement task is made difficult because it attempts to evaluate a system, and not simply the component parts of that system. One of the advisory panel members warned that appropriate system measures may not be easy to find.

An evaluation of this scope would not have been possible without generous financial assistance from the W. K. Kellogg Foundation. It is anticipated that AFT's sustainable agriculture program will improve as one consequence of this effort. In a broader context, this work may demonstrate a path leading to a stronger and healthier rural America.

Scope of "sustainable agriculture"

"Sustainable agriculture" is a concept. The concept covers a host of complex interactions between agricultural production and a larger milieu of economic, environmental, and social systems. The practice or actualization of this concept is thought to be a realistic response to a pattern of interrelated phenomena that may undermine long term ecological stability.

TABLE I

Chronology of AFT's Sustainable Agriculture Program

1988	Kleiss farm demonstrations
1989	Formation of the Illinois Sustainable Agriculture Society and 1989 Illinois on-farm demonstration project
	First meetings with leaders of the Indiana Sustainable Agriculture Society
	Kleiss farm demonstrations
1990	Formation of the Missouri Sustainable Agriculture Society and 1990 Missouri on-farm demonstration project
	1990 Indiana on-farm demonstration project
	1990 IDENR and Illinois on-farm research and demonstration project
1991	Formation of the Michigan Agricultural Stewardship Association and 1991 Michigan on-farm demonstration and research project
	1991 Indiana on-farm demonstration and research project
	1991 Missouri on-farm research and demonstration project
	1991 Illinois participatory research and demonstration project
1992 Proposed	1992 Michigan on-farm demonstration and research project
	1992 Indiana on-farm research and demonstration project
	Formation of the Pennsylvania Sustainable Agriculture Association and 1992 Pennsylvania on-farm research and demonstration project
	Whole-farm and educational activities in Illinois and Missouri
	New program development efforts in other states

In particular, adoption of sustainable agriculture is considered by some to be necessary to balance or weigh against existing land use practices that are unwise. They are unwise in the sense that they are exhaustive of the natural capacity of resources; these practices provide for current needs at the expense of the natural resource base needed to provide sustenance for future generations. Examples of unsustainable land use practices range from urbanization of farmland and deforestation, to erosive cultivation and extensive dependence on excessive nutrients and chemical production inputs.

Sustainable agriculture is a concept larger than the sum of the alternative farming practices used by selected farmers. It is a concept that indicates a changing or a changed attitude held by a farmer; that emerging attitude is one of stewardship for the farm's physical and natural resources. In one view sustainable agriculture is a process, the beginning of which signals that a farmer has adopted a new set of goals, or rediscovered an old ethic.

The economic and environmental forces that led to a need for sustainable agriculture to counterbalance attitudes of "more, more, whatever the ultimate cost" will be present for some time to come. The need to promote widespread use of sustainable agricultural systems will increase, not decrease. Burgeoning human population growth will place more pressure on the

productive capacity of the resource base, while still longer term needs will demand that the resource base be conserved.

Sustainable agriculture and AFT's mission

In a real sense, sustainability defines the mission of AFT. The formal statement of the organization's mission is "to stop the loss of productive farmland and to promote farming practices that lead to a healthy environment." Both components of the statement, direct land protection and indirect land protection through better management practices, are aspects of sustaining a resource base for the future, and, indeed, for all time.

Evaluation as a part of program operations

AFT staff members have been increasingly curious about the effectiveness of its on-farm demonstration projects and, more broadly, the effectiveness of the organization's overall program of work in sustainable agriculture. In particular, staff members have speculated and asked questions informally about the relative effectiveness of demonstration work compared to alternative approaches, such as broader environmental or agronomic educational efforts or reliance on research led by universities.

Indeed, AFT has begun to grapple with substantive questions about the nature and purpose of its on-farm activities, and how

best to chart a course for future work. This raises questions that are important for future evaluations: if AFT is in the business of changing farmer behavior, how can, or should, effectiveness in this context be measured? In the last section of this report potential future evaluation efforts at AFT in the area of sustainable agriculture are described.

The following sections take a critical look at AFT's on-going program of sustainable agriculture demonstration projects -- the effectiveness of the that program and its supporting efforts. A part of that discussion is a review and assessment of the importance of sustainable agriculture in a broader context of resource protection and efforts to engender a strong sense of stewardship among farmers.

II. EVALUATION METHODOLOGY

To evaluate AFT's work in the area of sustainable agriculture, a three-part examination of its programs was undertaken. First, questions were asked about how AFT could improve the management of its on-going work. Second, an effort was made to develop a commonly shared, realistic view of the scope of sustainable agriculture in the national future. Third, an attempt was made to position and redirect AFT's activities within that scope so as to maximize the effect and efficiency of AFT's efforts.

Survey of farmers who participated in on-farm demonstration projects

To examine the management of its ongoing program, the American Farmland Trust undertook a survey of 53 farmers in four states who had participated over the past three years in AFT's Sustainable Agriculture On-farm Demonstration Project. AFT contracted with the Center for Governmental Studies at Northern Illinois University to administer the survey and analyze the results. The farmers had implemented nitrogen reduction, pesticide reduction, or other practices associated with sustainable agriculture as part of their demonstrations. These farmers had participated in AFT projects in one or more of the years 1989, 1990, and 1991; the states in which they farmed were Illinois, Indiana, Michigan, and Missouri.

Evaluation advisory panel

To help AFT examine the future of sustainable agriculture, an evaluation advisory panel with considerable knowledge, practical background, and professional standing was assembled. The panel's deliberations were focused on where trends in sustainable agriculture may lead and on providing valuable insights into AFT's positioning and program management.

By convening an expert panel to assist in a critique of AFT's sustainable agriculture program, it was expected that individuals from outside the organization would add depth to the

discussion and evaluation, as well as give a fresh, candid view of the organization's efforts. Participants were selected to represent academia, public agencies, and agriculture, as well as private research, conservation, and environmental groups. The evaluation panel consisted of:

George Bird, Deputy Administrator, CSRS, Department of Agriculture
Garth Youngberg, Executive Director, Institute for Alternative Agriculture
Dave Swaim, President, Swaim and Associates
John Gerber, Assistant Director, Agricultural Experiment Station, University of Illinois
Ken Rineer, Director, Rodale National Network for On-Farm Research and Demonstration
Michael Heller, Manager, Claggett Farm, Chesapeake Bay Foundation
John Harlin, Chairman, Geography Department, Northern Illinois University

The panel met on three separate occasions for full-day meetings in the fall of 1991. During these meetings, the group developed a recommended protocol for advancing work in sustainable agriculture and offered their views as to an appropriate role for AFT in that protocol. They also were asked to react to and comment on AFT proposals for evaluating broader sustainable agriculture efforts.

In addition, the advisory panel pointed to ways that AFT can expand and improve its overall program of work in sustainable agriculture, including its policy and advocacy work. AFT staff provided the advisory group members with all program information available.

III. SURVEY FINDINGS

Farmer reactions to the AFT program

J. Dixon Esseks and Paul J. Culhane of Northern Illinois University's Center for Governmental Statistics completed a report based on the survey of farmers who participated in AFT's on-farm demonstration program from 1989 to 1991. Their complete report is attached as Appendix A.

The survey was designed primarily to elicit feedback on AFT's design and operation of the on-farm demonstration projects. Principal findings can be summarized as follows:

1. AFT has conducted the projects in a "farmer friendly" fashion -- the projects are not too costly, not too time consuming, and, generally, they have been helpful to participants for planning or managing farm operations.

2. Most of the participants believe that AFT-provided technical assistance for planning or conducting the demonstration was helpful, although improvements can be made.

3. The great majority of participants rate the stipend of $500 per farmer to be large enough to compensate for any extra costs, risk, or inconvenience in conducting the on-farm demonstration.

4. Half of the respondents were not sure about whether AFT had provided a soil test or they did not receive soil tests; therefore, AFT must improve its interaction and communication with participants.

5. The type and quality of manuals or other written materials from AFT should be improved.

6. More than half of the participants would highly recommend that other farmers conduct a similar demonstration project.

Changing agriculture practices

The NIU survey work was not configured to exhaustively study the impact of AFT's on-farm demonstration projects on on-going agricultural practices at participating farms and, more broadly, on other farming operations in the communities where demonstrations took place. The primary limitation was an inability to conduct a broader survey of agricultural practices to compare to AFT's sustainable on-farm demonstrations.

Nevertheless, the survey did include questions that allowed the NIU researchers to draw some conclusions about the impact of AFT's program on agricultural practices beyond the confines of the individual demonstrations projects.

The NIU farmer survey indicates that on average, about eleven farmers visited each demonstration project while in progress. (In 20 percent of the cases, farmer participants reported 40 or more farmer visitors). Also, participating farmers reported discussing their projects with, on average, another 17 farmers. (In 30 percent of the demonstrations, farmers reported 40 or more such conversations with other farmers.) The scope of the NIU survey was not broad enough to address the question of secondary effects of the outreach effort on production practices used by other farmers. Estimating such

effects will be an important topic to build into the evaluation design of future programs.

For 70 percent of the demonstration projects, farmers indicated a willingness to continue using the demonstration practice in subsequent years. When participating farmers were asked if they had continued using the indicated practice in subsequent years, most farmers reported that they had done so. Among 1989 on-farm participants, 100 percent reported that they continued the practice in 1990 and 1991. Among 1990 participants, 78 percent reported continuing the practice in 1991. Cost effectiveness was cited most frequently as the reason for continuing the practice.

IV. ADVISORY PANEL FINDINGS AND DISCUSSION

Not surprisingly, examination of a complex subject such as sustainable agriculture by a diverse and inquisitive group of experts led to a multitude of findings. Some were common sense; some were fascinating and enlightening; some were difficult to accept.

Key Findings

Key findings can be grouped into the following categories:

1. AFT has special strengths that will provide a firm basis for continued and expanded work in the future.

2. AFT should make improvements to the single variable demonstration model currently used.

3. AFT should extend the scope of it efforts to include water quality issues more directly, in both demonstration work and in policy development.

4. AFT on-farm projects should be expanded to include whole-farm demonstrations.

5. AFT projects should reflect the diversity of American agriculture by including more diversity in demonstration projects -- specifically including livestock, fruit, and vegetable operations.

6. AFT must place greater emphasis on policy and education work.

7. Projects should be more closely coordinated with the university research community.

8. AFT should become a stronger national leader in sustainable agriculture.

9. AFT should not dilute the conceptual basis of sustainable agriculture in an attempt to encompass a larger group of farmers.

Detailed Comments From the Advisory Panel

Over the course of the three meetings of the evaluation advisory panel, there was extensive discussion about a wide range of issues. Much of this discussion is summarized below. These comments illustrate both desirable aspects of sustainable agriculture or AFT's program, and illuminate areas of either poor performance by AFT or unfortunate on-going trends in sustainable agriculture education, demonstration, training or promotion.

1. AFT has special strengths that will provide a firm basis for continued and expanded work in the future.

The American Farmland Trust is well positioned to work in the area of sustainable agriculture because of the organization's work in other areas of land protection. AFT is also seen by many farmers and government officials as an organization that has been able to work locally, from modest projects, and has allowed local organizations to grow without interference. Undoubtedly, much of this perception has been formed from observing AFT's work in Illinois. Work undertaken in Illinois, notably the founding of the Illinois Sustainable Agriculture Society, is frequently cited as an exceptional achievement. Credibility and willingness to defer to local, farmer-driven priorities are the cornerstones of AFT's sustainable agriculture work to date, and will likely be two essential ingredients for further successful work. The third ingredient is an easily-accessed project design.

AFT enjoys credibility with farmers, farmer groups, and government agencies -- a fact that is in large part based on a perception of AFT as an organization that "protects land." This perception is apparently based on AFT's history of accomplishments in land conservation through establishing easements on farmland.

Curiously, AFT's land projects have been most successful in states other than the Midwest where AFT has worked to promote sustainable agriculture through on-farm demonstration projects

and formation of local groups. Also, AFT is sometimes perceived as an organization that stands ready to financially intervene when necessary to "save a farm," in the sense of protecting a farmer from financial catastrophe, a description that does not accurately reflect the vast majority of AFT's land project work. State governments tend to view AFT as a partner able to undertake work that, for whatever reason, the state government has been unable or unwilling to conduct.

This credibility, however derived, is an asset of the organization and, as such, should be wisely used. Activities in the area of sustainable agriculture that might threaten the ability of AFT to expand land project work should be undertaken with great care. Conversely, land protection projects should be considered as a way to approach farmers, over time, about changes in land management practices. Land protection work is seen by most of AFT's potential collaborators as distinctly different in substance and style from sustainable agriculture work. This distinction should be reflected in different approaches to landowners that AFT may want to engage in one or another activity. It is very important not to "blur" or gloss over the sustainable agriculture objectives to include landowners as "sustainable" farmers. This issue is discussed below.

These positive perceptions of AFT are not held by all potential collaborators. Some farmers remain suspicious of AFT's

programs and are vocal about their skepticism. In general, the suspicion derives mostly from AFT's land protection program. Little could likely be gained in the area of sustainable agriculture by de-emphasizing or downplaying AFT's land protection work, however, because farmers who are suspicious of, or even hostile toward, this work are unlikely to be adopters of sustainable agricultural systems.

Within the sustainable agriculture program work, another strength AFT can build upon is the accessibility of its project format to motivated farmers. (This project format is what AFT staff have termed the "single variable approach.") This accessibility allows AFT to begin a constructive dialogue with inquisitive farmers, introduce them to new concepts of agricultural production and stewardship, and create a sense of community among such farmers. AFT has used this approach to build statewide organizations which broaden the constituency for policy changes that support sustainable agriculture. This accessible project design is the third area of strength upon which AFT can expect to build a larger and broader-based program.

The advisory group felt that the establishment of farmer-driven statewide organizations was a key to the success of AFT's approval. However, the panel warned that AFT should be explicit and absolutely candid with such newly created sustainable agriculture groups about the eventual decoupling from AFT. While

some discussion about the timing of such decoupling is appropriate and some negotiation over the exact timetable would be healthy and expected, these groups must not become "arms" of AFT. As such, they would lose the essence of local context that makes them valuable for on-farm work and advocacy.

2. Improve the single variable on-farm demonstration model

AFT's *modus operandi* has been to facilitate the formation of statewide sustainable agriculture groups and to involve those groups in identifying farmers interested in establishing side-by-side demonstration plots on their farms. Farmers work with the AFT project manager to identify a specific change in a production practice or variable. The selection is made by the farmer as appropriate for the farming operation and the inclination of the farmer. In the majority of cases, the farmer has chosen to demonstrate a specific strategy for pesticide or commercial fertilizer reduction, compared to a control plot using their conventional practice for that input.

This demonstration plot procedure can be appropriately termed a "single variable" model. Its use is not strictly a demonstration of sustainable agriculture, which is a systems approach. The chief values of the single variable model are the creation of an organizational support system and the presentation

of an easily accessible, non-threatening way for a farmer to begin exploring alternative farming practices.

The advisory panel believes that AFT, through its single variable model, is experimenting with and may be unconsciously promoting best management practices (BMPs), not sustainable agriculture. BMPs are one among many sustainable processes; sustainable agriculture is not one of many BMPs. The panel's recommendation to become more closely and deeply involved in the experimentation with on-farm demonstrations is, in part, a reflection of their collective belief that AFT should move soon from the "try-anything-that-reduces-additives" model.

This recommendation is also strongly rooted in a belief that sustainable agriculture can be strongly encouraged through "participatory research," a strategy that closely links research, education, and action. In a participatory research process developed to address agricultural problems, farmers are encouraged to identify research and education objectives; researchers develop experimental designs that can result in useful and valid information. The process differs from traditional modes which presume a unidirectional flow of information from researchers to users. Moreover, the process

works to modify current social relationships among farmers, researchers, and their socioeconomic community.[2]

Several recommendations came out of the evaluation process regarding opportunities for improving the single variable demonstration model:

a. Screening. In order to achieve a higher "success" rate with program participants, a more formal screening process should be instituted to identify farmers that are appropriate for the project and interested in demonstrating the production variable that AFT and the statewide group wishes to highlight. Farmers should be selected on the basis of their credibility -- the likelihood that other farmers will see the participant as a credible source of information and competent advice.

b. University involvement in designing demonstrations. To assure that demonstrations meet research protocol and to maximize the opportunities for disseminating information about the results of the demonstrations,

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[2] For a concise discussion of agricultural participatory research and education, see John M. Gerber, "Participatory On-farm Research: A Facilitator's Expectations." Mr. Gerber served as a member of the advisory panel. See also M. Elden and M. Levin, Cogenerative Learning: Bringing Participation into Action Research 1991.

the sponsoring organization should work with land grant and other university personnel to develop the demonstrations, at least in the latter years of the on-farm demonstration program. (This point is reinforced below, in a discussion of the need for greater involvement with university research communities.)

c. Secure multi-year commitments from farmers. As part of the screening process, AFT and the statewide organization should choose farmers who will agree to multi-year demonstrations (at least 2 years). This will allow the farmer to begin with a relatively simple project and move toward a more complex undertaking with a prescribed research protocol.

d. Require information on economic consequences of demonstrations. In order to adequately assess the economic viability of an agricultural system or component of that system, better information must be supplied about not only the yield results, but the bottom line as well (i.e., to what extent was any decrease in yield offset by a decrease in costs?).

e. Farmer participation must remain a crucial element of demonstration project activity. Farmers must decide the questions for research and analysis. The challenge for AFT and statewide organizations is to determine a

pattern of overall, comprehensive work that affords the opportunity for individual farmers to investigate their individual concerns, while making progress in a national program of resource protection.

f. A working relationship must be established among farmers, AFT, statewide organizations and universities that enables a division and specialization of effort to occur. At the same time, the work undertaken should be closely linked and integrated.

3. Expand efforts to include environmental issues, especially water quality issues, more directly, in demonstration work and in policy development.

Environmental problems have emerged as a negative but preventable side effect of contemporary U.S. agriculture. Many of these problems are a result of past policies that placed greater emphasis on expanding the sheer volume of agricultural output than on protection of the natural resource base. (Thus, adoption of systems that define sustainable agriculture face a constraint imposed by society.) Other educational and market influences have also contributed to a mis-focus on short term gain. In any case, overuse of pesticides and nutrients, improper handling of animal wastes, and inadequate soil erosion control have led to

serious pollution of the nation's water systems. One source notes that:

> Intensive agriculture seeking high yields with fertilizers, pesticides, and irrigation water is designed to feed the nation at low cost. Until recently, the cost of water quality impairment ... has been missing from agricultural policy debates.
>
> Many farms are characterized by monoculture [that] requires greater use of chemical fertilizers and pesticides than those in diversified production. It also may cause more soil erosion. With few positive incentives but facing significant impediments to change, the farm sector has been slow to adopt changes that can be equally productive and minimize environmental impacts...[3]

Environmental concerns will pre-empt all other farming concerns in coming years. Voluntary changes today will be much cheaper and much easier for farmers to undertake than the enforcement alternatives in the future. In very specific terms, farming systems will voluntarily or through regulation be modified to reduce the adverse affects of agricultural production on water quality.

While sustainable agriculture is more comprehensive than just "environmentally sensitive farming," powerful incentives and disincentives stemming from environmental concerns of the general public will confront farmers in the near future. The likely

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[3] Water Quality 2000 Phase II Report: Problem Identification September 1990.

course of progress will parallel the expansion in the number of farmers following organic production methods after food safety concerns became public issues in the past two decades.

Current on-farm demonstrations sponsored by AFT can be logically argued to be environmental activities, but quantitative evidence can be shown to indicate the effects of any particular farming practice or system on water quality. This lack of quantifiable and scientific evidence is not unique to AFT's on-farm demonstrations. However, lack of such evidence will inhibit AFT's on-farm and policy development work in the future, as water quality becomes a more controversial and significant issue in conservation debates.

The consensus of the advisory panel was that, if AFT intends to be relevant and progressive in promoting sustainable agriculture's potential for improving water quality, AFT must get much better, and progress much faster, in demonstrating environmentally "correct" farming. The panel felt that conservation concerns generally should supercede a determination of the economic viability of any particular farming operation. As one participant observed, protecting life on earth is more important than one or another farm staying in business because the farmer cannot or will not change an existing production style. However, panel members also acknowledged that economic

feasibility is essential to the adoption of alternative approaches to farming.

AFT should develop collaborative efforts with government agencies and universities as a valid approach to measure the relationship between alternative agricultural systems and water quality. It should be possible to engage universities and organizations such as the U.S. Geological Survey, Environmental Protection Agency, state geological surveys, and the Soil Conservation Service in water quality monitoring activities coincident with comparisons of farming systems, i.e., sustainable agriculture versus conventional farming practices.

AFT should begin immediately to design projects where water quality improvement is integral to the "sustainability" of the system. Almost certainly, a wide range of profitable and environmentally sound production techniques can be combined to manage farming operations sustainably; identifying those techniques and the combinations of them that lead to quantifiable improvements in the ecosystem is a challenge for applied research. A whole-farm approach may be necessary for this work; indeed, a community focus, involving many farms and a nearby non-farm population may be necessary for truly conclusive work.

Necessarily, then, the undertaking will be large, lengthy (multi-year), and costly. However, the alternative of <u>not</u> working in this area will diminish the educational, social, and

political potency of AFT's work. Without this background information, there will be little likelihood that sustainable agriculture can be a credible alternative to increased regulation of farming activities.

AFT must continue to integrate its policy, land projects, and sustainable agriculture programs -- for example, to establish easements for riparian areas when working with livestock operations. One task will be to build a case for compatibility of agricultural production with its surrounding environment. A second task will be to link water quality goals to USDA programs, to overcome environmental problems that are typically linked to agriculture. At the same time, AFT may be able to explore issues and undertake programs of work that USDA cannot undertake. The challenge will be to build a case for compatibility of agricultural production with the surrounding environment.

4. Expand efforts to include whole-farm demonstrations

The single variable model that AFT has used in the Midwest is an appropriate strategy for establishing contact with new farmers and building constituencies. However, AFT must develop a broader spectrum of effort that includes "whole-farm" demonstrations. A whole-farm demonstration can provide an example of viable systems of environmentally sound agriculture. In addition, the interaction of single alternative practices can

be seen, described, and measured in a project that utilizes all the resources available on a farm.

To develop comprehensive whole-farm projects, AFT should identify and work with farmers who are willing to make a transition from their current farming practices to a whole-farm sustainable agriculture effort. The success of this approach will depend upon improving several facets of AFT's work, two of which are noted here. First, AFT should screen potential participants and evaluate current participants for their inclination to be innovators. From among the innovators, possible whole-farm participants can more likely be found.

Second, the whole-farm approach will be the most expedient project design in states where multiple product farms are more the norm. Projects that include both crops and livestock may, in fact, be the best way to address livestock issues directly.[4]

Some of the specific benefits derived from sponsoring and promoting whole-farm projects include a wider range of policy and university research opportunities. Such opportunities work to

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[4] One comment from a member of the advisory group, in response to the question "How should AFT address livestock issues?", was:

> Locate whole-farm cooperators. The sponsor [i.e., presumably AFT] could provide a transition subsidy or offer to pay the interest on loans necessary for capital expenditures but the farmer would need to absorb most of the costs into his present operation. If he can't afford the capital outlay, he is probably not the right farmer.

leverage better cooperation from skeptics and give sympathetic researchers greater choices for designing projects.

AFT must be careful about how farmers view a "whole-farm" demonstration project. Such farms are not that common and may be seen as research operations, not the product of an innovative farmer. Some of these farms should be transitional farming operations, somewhere between so-called conventional operations and "organic wholes." To some extent, the single variable demonstrations play this role; however, they are unlikely to persuade any farmer to make a massive shift to alternative farming methods.

In the design and implementation of whole-farm projects, AFT must define and regularly examine the practices that comprise the system. These individual practices or combinations will, in turn, be possible experimental undertakings for a larger group of farmers. The less than whole-farm options must be retained for that group of mainstream farmers who will be observing the whole-farm projects. Promoting self-directed experiments on the farms of these observers will be an important undertaking.

The recordkeeping and educational aspects of a whole-farm demonstration will be very demanding on the participating farmer. The research team assigned to the project will work with the farmer who manages the farm. A third party may be employed to

describe the whole-farm operation and otherwise speak on behalf of the participating farmer.

Finally, in this area, as with many other sustainable agriculture issues, there is an obvious need to collaborate with other organizations and universities already involved in whole-farm demonstrations. The efficiency from collaboration is obvious and failing to collaborate invites the danger of repeating the mistakes made by others.

5. Expand the scope of projects to include more diversity in agriculture -- especially livestock, fruit, and vegetable operations.

Closely related to the need to design, sponsor, and conduct sustainable agriculture whole-farm demonstration projects is a need to expand the scope of the demonstration work. The need to include livestock operations has already been cited, but project diversity should encompass fruit, vegetable, and forest product operations as well. A key management determination AFT will need to make is the rate of expansion into these (and, surely, other) more complex operations.

In some cases, it may prove expedient to work on these new types of farming operations by extensive and perhaps prolonged promotion of a few practices. This approach would be considered a special case of the single variable model: AFT would expand to

additional types of farming operations, as well as to additional farmers.

In other cases, a whole-farm approach may well be the only feasible initial approach. The advisory panel indicated that, especially for fruit and vegetable operations, the whole-farm approach may be the most appropriate. Moreover, many such operations have become organic or near-organic operations.

AFT's recruitment of farmers who are progressing toward the operation of organic farms may well prove to be a mistake and any forays toward establishing sustainable agriculture demonstration projects with organic operations should be carefully considered. The distinction between organic farms and whole-farm sustainable agriculture projects will be blurry at best. Using organic farms as program participants, AFT runs the risk of having its operational definitions and public image become confused. Moreover, to farmers, an organization that promotes organic farming may be a less trusted ally or possible partner.

A preferred approach may be a mix of single farm demonstrations (each farm using one practice) and multi-variable farm demonstrations (a sample farm using more than one of the practices highlighted by the single variable farms). This approach lends itself to development of case studies.

For large fruit or vegetable operations, AFT may want to think in terms of an educational effort for the near term. Case

studies and investigation of on-going work sponsored by another organization could be reviewed, highlighting the best that has been accomplished using one or more sustainable practices or organic methods. The work product (e.g., a report or published review) could be jointly sponsored by AFT and a university, establishing a credible approach for future on-farm work.

For livestock operations, AFT must develop usable and specific models for livestock agriculture demonstrations distinct from the current demonstration plot approach. Side-by-side comparisons will not suffice -- primarily because livestock operators are unlikely to segregate a small number of animals for different management.

Also, the use of the term "livestock operations" is currently almost synonymous with "cattle operations." Some thought must be given to how sustainable agriculture can be broadened to include hog, poultry, and dairy operations. Production of these commodities requires increased specialization and concentration. With producers of these commodities, AFT will confront a variety of issues regarding farm size and scale of operation.

Adapting sustainable agriculture to diverse operations, especially in the southeastern region of the U.S., will of necessity lead AFT to consider forest products as a component of

integrated farming systems. AFT may want to examine woodlots on farms as a management component of a complex farm.

Finally, but far from least important, the diversity of many farms will necessarily bring under scrutiny the profitability aspect of multiple product operations and the crucial aspect of profitability when promoting sustainability.

6. Place greater emphasis on policy and education work.

The individual efforts of many innovative farmers can be multiplied by engaging the substantial facilities and expertise of universities -- especially the land grant schools -- and by modifying an array of agricultural policies that could encourage adoption of sustainable systems. AFT can assist in these efforts by placing greater emphasis on its policy and educational activities.

A wide variety of educational efforts can be undertaken by AFT that are now not done or carried out with less than adequate resources. As a first step, AFT should improve the quality and format of its publications on sustainable agriculture and improve the rigor of both project monitoring and reporting of project results. Participating farmers should receive improved scientific and economic information; and, if other farmers are to benefit from the on-farm demonstration projects, significantly better documentation must be kept.

To engage the resources of the universities, advocates of *sustainable agriculture must first convince* the university system to acknowledge the legitimacy of sustainability as an important change to agricultural systems. Where necessary, AFT must be a critic of and constructive antagonist toward the land grant university system. (This specific point is discussed in the next section.) Some specific changes to the educational efforts are needed as well.

First, there does not exist a good basis for understanding the consequences of widespread adoption of sustainable agriculture. This lack of knowledge hinders the ability of AFT (and other groups) to inspire farmers with a vision of a productive and profitable future resulting from alternative farming practices. Most federal and state data collections and analyses are based on conventional agriculture. These data are not directly transferrable to sustainable agricultural systems. Data collection for sustainable agriculture is critically needed, although some progress is underway.[5]

In terms of broad public educational goals, AFT can play a role in improving the "agricultural literacy" of non-farmers and in improving the "environmental literacy" of farmers. Ignorance

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[5] The Cooperative State Research Service, in early 1991, asked for proposals on how to "develop the capacity to provide informed estimates of the national and regional economic, environment, and societal impacts of adoption of sustainable farming practices and systems."

is both a problem and an unrecognized protection for farmers. The non-farm public is largely ignorant of farming practices; this ignorance is thought to be a detriment to establishing farm policies that "work" for farmers. The ignorance, however, also shields farmers from possibly punitive policies aimed at stopping resource abuse, such as soil erosion or water contamination. Arguably, farmers are making progress in recognizing that improved environmental literacy is in their own self-interest.

Public funding of agricultural education should be re-directed and AFT should increase its efforts toward that goal. Currently, USDA provides major funding to inform the public about traditional agriculture models. A minuscule effort is devoted to questioning the validity of traditional systems, and even less effort or funds flow to sustainable agriculture systems.

Many advocates of sustainable agriculture argue that society must undergo a change in philosophy before agricultural production patterns will shift. The change must take place in many sources of education and experience -- at universities, in government, and in the minds of landowners. A change in philosophy requires a strong, renewed commitment to education, centered on innovative practices that conserve resources and promote farm and rural community structures. The advisory panel believes that AFT should promote curriculum development at universities to achieve many of these purposes.

Demonstration efforts (such as AFT's on-farm demonstration projects) are a component part of an educational effort that can indicate how agricultural resources and structures can be conserved. AFT has not fully exploited the educational possibilities of its demonstration work. AFT has not created a widespread awareness of sustainable agriculture work in the popular press. In fact, reporting of on-farm projects has appeared exclusively in the farm press.

Currently, research efforts undertaken by schools of agriculture measure complex components, at best, but do not measure complex systems. Much of the research and evaluation work that takes place under the aegis of research related to sustainable agriculture is measurement of "nitrogen in - corn out" and not a systematic examination of the emerging properties of ecosystems that are not stressed by external "loadings."

Educational efforts should not extend to "model" farms for urban residents who are not familiar with farming, or for educating urban youth. Such efforts are well beyond the scope of AFT's mission.

In large measure, some of the unmet policy needs are those of constituency building and mobilization. Some of AFT's most significant work has been the formation of local groups interested in furthering sustainable agriculture. AFT has not been as successful in mobilizing these same constituencies for

state by state policy work. AFT should also be working closely and collaboratively with other nongovernmental organizations that share a desire to broaden the use of sustainable agriculture practices.

In addition to stimulating innovation, AFT has and will continue to influence policies at the federal and state government levels. Policies targeted for change are those that inhibit innovative farming and those that promote change. AFT should work to eliminate the former and to promote the latter.

Some policy development needs are very closely tied to educational needs. For example, the advisory panel suggested that constituency building would be enhanced by getting more people to see the good examples of sustainable farming operations. The target groups for intensive exposure to the potential of sustainable agricultural systems include more than just farmers. These target groups include federal agency personnel, Congressional staff, state administrators or legislators, and local officials from rural areas. The distinction between constituency building -- an activity usually thought of as a policy undertaking -- and educational effort is not clearcut.

AFT might, for example, consider sponsoring alone or jointly, a week-long farm tour to several farms using sustainable agricultural systems. The tour would take place in 1993 at the

earliest; the audience for participation on such a tour would be the target groups mentioned above.

Another specific recommendation was that AFT conduct a conference among sustainable agriculture practitioners and program participants. A conference would serve a dual purpose of bringing together an array of interested persons to form a network and reaching some general consensus on future directions for policy work.

7. Work more closely with the university research community.

This comment has already been mentioned, but it deserves specific mention because of the degree and form of involvement suggested.

At a national level, there is a critical need to shift the research priorities at the U.S. Department of Agriculture. Massive funding efforts at USDA are directed at buttressing a traditional model of influencing farmer behavior -- through extension programs, agricultural research conducted at USDA or experiment stations, and a host of commodity subsidy programs. Indeed, the research and extension model in which information is produced by universities and disseminated by extension outlets is harshly criticized by many outside the academic community.

Farmers who consider themselves to be innovators may view universities skeptically and even negatively. For AFT to develop

or maintain credibility in some states it may be necessary to first work independently from the universities. Then after credibility has been established, AFT should attempt to directly involve the university with the on-farm projects through demonstration design and discussion of a university research agenda.

AFT may encounter situations, in some areas of the country, where initial cooperation with universities may be difficult or even counterproductive. In such cases, AFT's role will be to encourage the university program and faculty to begin such work. The advisory panel believed that an excellent way to move the universities into sustainable agriculture activities would be for AFT to continue operating its own demonstrations.

Farmers and scientists should become partners in developing sustainable agriculture systems. One of the challenges for AFT in the coming years will be the forging of such partnerships for on-farm demonstration work. Much of the existing information and knowledge concerning the management of farming systems cannot be found at universities. Notwithstanding that, a research-based, scientifically defensible process must be followed to facilitate the transfer of this knowledge to more "mainstream" farmers.

The advisory panel indicated that much of the participatory research activity underway at universities is instigated by farm extension personnel. When seeking like-minded partners from the

land grant universities, AFT should perhaps look first to extension programs to find commonality in applied research.

8. Become a stronger leader in national issues concerning sustainable agriculture.

Sustainable agriculture has emerged as a "counter culture" in contemporary U.S. production agriculture. Its advocates intend for sustainable agriculture to become the norm, not the exception. To accomplish that goal, the considerable energy shown by participants in, experimenters with, and advocates of sustainable agriculture must be clearly focused. One effective way to focus that energy and bring about the necessary changes in public policy and educational systems, discussed in this report, is through national leadership. Leadership in this sense does not and should not mean control or precedence; it does and should indicate guidance. The benefit to agriculture, conservation, and the entire society of a leadership presence may be self-apparent; if a transition will be made, from one production style to another, from one management approach to another, then a smooth and easy transition is always preferable to an uneven and costly transition.

The current void in national leadership presents both an opportunity and a difficulty for AFT as an organization. It is clearly an opportunity for AFT to take on an important and vital role in an area of national and probably worldwide significance.

It can be a difficulty because it requires the organization to make a firm commitment to grow rapidly in a mode that fits the challenge.

AFT's advisory panel pointed out that the same strengths that make the organization ideally suited to promote sustainable agriculture among farmers can influence national and state policy development. AFT's goal should be to work simultaneously with practitioners and with public policy to create conditions in which farmers are able to experiment with change, willing to conduct on-farm experiments, and financially able to broaden and deepen such experiments over time.

The panel suggested two areas in which AFT could have an immediate, positive effect as a national organization. First, AFT should take the lead in national debates defining sustainability in agriculture. This effort should go well beyond bringing clarity to the currently de rigueur explanation and definition of sustainable agriculture in each paper, conference, or project (including this evaluation). The effort should establish a model of applied research and practical use against which other efforts will be measured. Second, AFT must authoritatively differentiate between sustainable agriculture and organic agriculture. Frequently the two concepts are intertwined and confused.

The panel also warned AFT not to sacrifice intellectual clarity for popular support as a leadership role as the organization emerges. In particular, the group saw a danger in focusing on fairly simple practices, e.g., BMPs, that are merely practices and not systems. A narrow focus would define too many producers as "sustainable"; while politically palatable, this focus would defeat the standards and goals that AFT hopes more farmers will aspire to reach. This concern is addressed below.

9. Do not dilute the conceptual basis of sustainable agriculture in an attempt to encompass a larger group of farmers.

Sustainable agriculture is a systems approach that appeals to a certain group of farmers who are innovators. As such, it also provides a goal for a much larger group of farmers. Agronomic and environmental progress can be made by changes in farming practices used by this larger group; however, incremental changes must be considered progress toward and not achievement of the goal.

While this adherene to principle will perhaps frustrate attempts to "rack up big numbers" to illustrate a successful sustainable agriculture program, it will, in fact, be the only way to achieve meaningful and lasting results. Endorsing the status quo is a real danger when attempting to maintain a "farmer friendly" image and program.

The advisory panel's discussion of these points led to the development of a set of guiding principles (See Section V) that are intended to limit the dilution of AFT's sustainable agriculture program while expanding and strengthening it.

V. LESSONS APPLIED

AFT staff has attempted to digest the findings and discussion of the advisory panel and the report emerging from the NIU survey. The outcomes of this process are: a set of guiding principles to be followed by AFT in developing its future role in sustainable agriculture; specific new directions to be taken in on-farm demonstration and research projects beginning in 1992; and a commitment to incorporate on-going evaluation into the design of all of AFT's sustainable agriculture activities in the future.

Guiding principles for AFT's sustainable agriculture activities

As a start at defining AFT's role and mission objectives related to sustainable agriculture, AFT should consider following a set of guiding principles for sustainable agriculture. These principles are:

1. AFT must have and use a broad definition for sustainable agriculture. At the same time, the definition must not be so broad as to be all-encompassing and thereby sanction the status quo in agriculture today.

2. When applying the definition, AFT should always remember that agriculture is one part of a larger ecology and intrinsically linked to that ecology. Agricultural activity should be compatible with the long term carrying capacity of the resource base. Other similar links exist to economic and social systems, but the strengths of those links are less tangible over time.

3. AFT must work with farmers to promote sustainable agriculture as a goal to achieve. AFT's activities should enhance an ethical progression toward resource stewardship.

4. AFT must encourage and assist farmer learning experiences that reasonably promise to result in farmer adoption of a sustainable agriculture system. Best management practices may lead to good conservation activity but AFT will not promote BMPs as ends onto themselves -- single practices do not constitute sustainable farming systems. Through education and demonstration

activities, AFT will develop projects in which farmers can experiment and verify results from the practice of sustainable agriculture.

5. AFT should assist in farmer-to-farmer transmission of experiential knowledge.

6. Widespread adoption of sustainable agriculture systems may be a long term and difficult process. Generations of knowledge must be sorted -- some must be un-learned, some must be remembered.

7. The need for adoption of alternative practices is critical and urgent. Over-dependence on artificially introduced production agents -- whether they be chemicals or excess nutrients or water -- is creating a system that is more fragile than just "unsustainable" -- rather, agriculture is in jeopardy of becoming unstable.

New program directions

As a result of the recent program evaluation, AFT's sustainable agriculture programs will incorporate a number of changes in the future.

1. Whole farms. In each target state, AFT will identify a small number of farmers interested in integrating a wide range of practices into their operations, leading over time to whole-farm sustainability. In Michigan, Indiana and Pennsylvania AFT expects to conduct such whole-farm demonstrations in addition to single variable on-farm demonstration and research projects.

2. Water quality. Discussions are under way with faculty at Northern Illinois University and Pennsylvania State University regarding the design of demonstration projects in watersheds where baseline information regarding water quality already exists. The goal of these projects is to measure water quality impacts of different agricultural practices over time.

3. Livestock and orchards. AFT expects the Pennsylvania program to include a number of dairy and cattle operations. Michigan demonstration projects will include an even greater number of fruit orchards than in past years.

4. Land grant and other universities. Discussions are under way with Michigan State University, Pennsylvania State University, and Ohio State University regarding their

involvement in leadership development, design of demonstration and research projects, water quality monitoring, and assistance in nurturing the development of statewide sustainable agriculture organizations.

5. Technical assistance publications. Farmers have been dissatisfied with the quality and the timing of written materials provided by AFT. To respond to the need for better materials, AFT will, to the extent that resources allow, upgrade the quality and improve the timely delivery of technical assistance publications. Currently, the annual reports of the results of on-farm demonstrations are being reviewed for re-designing these publications to be more readable and to include more economic data.

6. Rural economic revitalization. AFT is eager to work with other organizations to demonstrate that a comprehensive adoption of sustainable and alternative farming systems has the potential to bring economic and cultural stability and revitalization to rural America. The character of these alternative systems is only fully revealed when examining the socioeconomic interactions within the farming community,

together with the interaction between that community and its ecological setting.

On-going program evaluation

AFT should continue to engage an advisory panel to help in the evaluation of its work in sustainable agriculture. This panel provided invaluable insights into AFT's efforts to date and, at every step, gave freely of advice on how to improve the program.

The nature of program evaluation, at AFT and elsewhere, must be relevant and creative. Indeed, a comprehensive review of the consequences -- actual and potential -- of using sustainable agriculture is crucial to ensuring that AFT's sustainable agriculture program continues to be relevant to national needs. AFT has seen the value of rigorous program evaluation in conducting this evaluation. The evaluation process should be ongoing for AFT programs and expanded to encompass the widest definition of program, including governmental activity.

Not enough has been done to construct the appropriate measures of success for sustainable agriculture. Much more work is needed to identify these measures, in areas such as ecological effects (i.e., soil health and water quality); minimal use of non-renewable resources; and economic feasibility. Each of these terms are value laden but their correct use, including an ability

to compare one project to another, will be critical for the early and widespread use of sustainable agriculture over the coming years.

As the level of individual on-farm demonstration and research projects increases, especially whole-farm demonstrations, farmers should be encouraged to articulate their own visions and benchmarks for the future of their farm operations. One panel member suggested that farmers develop "enterprise" statements in four categories:

(1) crop/livestock production choices

(2) economic choices

(3) environmental respect choices

(4) choices that lead to improvement in the quality of rural community life.

The American Farmland Trust intends to incorporate the formulation of such enterprise statements into its on-farm demonstration projects. Such statements will be essential for conducting whole-farm demonstrations.

Appendix A

AMERICAN FARMLAND TRUST

SURVEY OF PARTICIPANTS IN ON-FARM DEMONSTRATION PROJECTS

OCTOBER-NOVEMBER 1991

Draft Report

February 25, 1992

submitted by J. Dixon Esseks
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CHAPTER 1

INTRODUCTION

Background to the survey

In 1989 the American Farmland Trust (AFT) launched a program of on-farm demonstration projects to encourage farmers to use sustainable agricultural practices. "Sustainable" practices are designed to reduce the damage to health and the environment that agriculture can cause (such as through water pollution and soil erosion), to economize on non-renewable resources (phosphates, petroleum-based chemicals), and in other ways help to sustain farming as a safe, productive, and profitable sector of the economy over the long run (USDA 1990, Lockeretz 1988). Among the more widely employed sustainable practices have been the use of soil-building rotation crops, weed control through mechanical cultivation rather than herbicides, and experimentation with reduced levels of purchased nitrogen fertilizer.

Beginning in Illinois with eleven farmers in 1989, AFT's on-farm demonstration program was extended to Missouri and Indiana in 1990 and then to Michigan in 1991. By the time this survey of participants was conducted, the fall of 1991, a total of 53 farmers had agreed to take part in the program. Each farmer contracted with AFT to conduct a project for one crop year, with AFT agreeing to provide a $500 incentive payment and such further assistance as a free soil test, technical advice for applying practices, and written instructional materials. The typical project consisted of a comparison between farming two plots--with the demonstration plot receiving a reduced level of nitrogen or herbicide and the control plot receiving the usual level. The

cooperating farmers agreed to keep records of the chemical applications, tillage passes, and other operations conducted on the two plots, as well as to report the yields achieved.

AFT chose this on-farm demonstration approach because it believes that the most effective way to promote adoption of sustainable practices is through the combination of farmers directly experimenting with the practices and of their sharing the results of the experiments with other farmers, including through field days and publications. Following the 1989 demonstrations in Illinois, AFT published and disseminated the report, 1989 Illinois On-Farm Demonstration Project: Results (Chicago, Illinois, March 1990). A similarly titled reported was available for distribution in March 1991 on the results of the 1990 Indiana program (American Farmland Trust 1991). And the findings of the 1990 experiments in Missouri were disseminated in the spring of 1991 through a special newsletter of the Missouri Sustainable Agriculture Society's (1991). These reports provide detailed information on the nature and results of each experiment so as to help other farmers judge how applicable it might be to their own operations. Included in the report, by project and plot (demonstration and control), are the soil types, readings from soil tests, dates and kinds of cultivation, the times and levels of fertilizer and pesticide application, and yields.

AFT did not conduct its own program in Illinois after 1989, but instead has cooperated with the Illinois Department of Energy and Natural Resources, which began a sizable grant program for sustainable agriculture in 1990 (with over 100 separate projects that year). However, AFT's Missouri and Indiana programs that started in 1990 were extended into 1991, and a number of the farmer cooperators for those two programs in 1990 agreed to participate also in the second year.

Purpose of the survey

Desiring to gather qualitative information about the demonstration projects, AFT decided in the summer of 1991 to conduct a survey of all farmers who had participated since 1989. Through extended telephone interviews, AFT sought to learn (1) farmers' assessments of the program's various components (the technical assistance, incentive payments, soil tests, published informational materials); (2) their decisions about continuing to apply the sustainable practices that were the subjects of their demonstration projects; (3) the extent to which cooperators had discussed their projects with other farmers and would recommend participation to them; and (4) the cooperators' reported reasons for taking part in the program, as well as (5) inferences about the reasons for their participation that might be derived from the kinds of detailed personal background information obtainable from an extended survey.

In August 1991 AFT contracted with Northern Illinois University's Center for Governmental Studies to conduct such a survey. Between mid-October and the end of November, phone interviews averaging 37 minutes were conducted with 52 of the 53 cooperators. The fifty-third had left farming and did not answer the several messages left on his answering machine.

Plan of the report

The report's second chapter presents analyses of the farmer participants' assessments of the program's various components and of their demonstration projects' overall value to them. The third chapter discusses the post-project effects of the demonstrations in terms of both whether the cooperating farmers continued the practices with which they experimented and the extent to which other farmers may have learned about the demonstrations. The fourth chapter

focuses on the cooperators' reasons for participating in the project, both those reported in response to direct questions about motivation and those that are inferable from the background information gathered on each surveyed farmer.

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CHAPTER 2

FARMERS' ASSESSMENT OF THEIR DEMONSTRATION PROJECTS: BY COMPONENT AND OVERALL

Introduction

This chapter presents' the participating farmers' assessments of their experiences with AFT's on farm demonstration program--for each of its separate components and for their demonstration project as a whole. The four components are (1) a cash incentive of $500 paid in two equal installments, the first payment being made after the crops have been established on the plots being compared, usually in June or July, and the second made following the harvest and the farmer's submission of requested data on yields and management practices; (2) free technical advice for conducting the experiment from AFT staff or field coordinators hired by AFT; (3) a free soil tests worth about $50; and (4) and free handbooks and other informational publications about or related to sustainable agriculture, budgeted to average $50 per cooperator.

The responses are analyzed by type of demonstration project and by the state in which the projects were located. It was plausible that farmers' assessments of the incentive payments, technical advice, and other program components would vary by type of project. For example, the program staff or the available instructional manuals might be better at helping with one type versus others. Also, the perceived effectiveness of the program might vary by state, since there was some variation in the program personnel by state. AFT employed local persons in Indiana and Missouri to supplement the assistance provided by

the program's core staff officed in Illinois.

The most frequent type of demonstration project, comprising 38 (or 55%) of the total of 69 projects, were those designed to reduce the use of purchased nitrogen fertilizer (such as by applying fewer pounds per acre to the demonstration plot versus the comparison plot or by substituting the nitrogen produced by a legume cover crop for commercial fertilizer). The second-ranking type by frequency, comprising 21 (or 30%) of the total, were those intended to decrease the use of herbicides (such as by reducing the number of ounces applied per acre, by banding herbicide rather than broadcasting it, or foregoing it altogether on the demonstration plot). The projects in the "other category" totaled ten in number, of which seven were designed to reduce the use of insecticide (such as by scouting fields carefully to determine the need for treatment), two dealt with grazing, and one with tillage.

Cash incentive payment

The responding farmers were asked to assess the adequacy of the $500 incentive payment: "Do you think it was large enough to cover any extra costs, risk, or inconvenience you experienced in conducting the project? Was it not large enough? Was it too large?" Among the possible costs were the farmer's time devoted to setting up and conducting the project (e.g., meeting with AFT staff, keeping separate records by plot, and perhaps the sowing of a cover crop or scouting fields for pests) and the costs of other inputs besides labor (e.g., increased use of mechanical cultivation to compensate for reduced application of herbicide or the acquisition of a no-till planter). The main risks were that yields might fall, such as because of decreased applications of pesticides or purchased fertilizer. The responses to this question on the adequacy of the

incentive payments, as well as to the others dealing with individual demonstration projects, total to 69 rather than 52, because 17 respondents from Indiana and Missouri participated in two separate years and were asked to give separate assessments for each year.

Eighty-four percent of the total answers to this question fall in the response category, "Large enough." Only 12% are in the category, "Not large enough"; and just one percent, "Too large" (Table 2.1). There are no significant differences in the responses for nitrogen-reducing projects compared to those designed to decrease herbicide use (Table 2.1). For both types of projects, 86 or 87% of the assessments were in the "large enough" category. Although the percentage of "large enough" responses for "other" projects totaled considerably less than for the other two categories (70%), the small number of "other" cases--just ten--makes a difference of this magnitude too small to be important. If one response changed, such as from "too large" to "large enough," this difference would almost completely disappear.

There is relatively little variation also when the responses are broken down by state. For only one of the eleven Illinois projects, two of 24 in Indiana, and one of 16 in Michigan were the payments considered inadequate (Table 2.2). The number and corresponding percentage for the Missouri cases are somewhat higher--four out of 18 or 22%. Two of the four involved the same farmer. This farmer, the other two from Missouri, and the remaining four from other states were asked, "In what ways was it [the payment] not large enough?" In three of the eight responses, the farmers argued that the $500 did not cover the risks in reducing nitrogen applications. Three others dealt with costs---the farmers believed that the demonstration cost them more than $500. The two remaining responses came from the same farmer, who argued in both cases that,

Table 2.1. Participants' assessments of the adequacy of the $500 incentive payment for covering any extra costs, risk, or inconvenience in conducting the project, by type of project and total projects

Assessment	Type of Project			
	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Not large enough	13	9	10	12
Large enough	87	86	70	84
Too large	0	0	10	1
Not sure or did not answer	0	5	10	3
Number of cases	(38)	(21)	(10)	(69)

Table 2.2. Participants' assessments of the adequacy of the $500 incentives payment for covering any extra costs, risk, or inconvenience in conducting the project, by location of project

Assessment	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Not large enough	9	8	6	22
Large enough	91	88	82	78
Too large	0	0	6	0
Not sure or did not answer	0	4	6	0
Number of cases	(11)	(24)	(16)	(18)

although the $500 covered costs, he should have received something in addition, presumably to cover risks or inconvenience.

The large majority of farmer participants who found the $500 to be adequate were asked, "Why do you feel it was large enough?" Among the 58 responses to this question, nine attributed the adequacy to the relatively simple nature of their projects; little additional money or effort was required besides keeping records or making an extra trip to the elevator for weighing harvested grain. Another six responses stated that the farmer would have participated regardless of the incentive or if it were less; and three more implied the same explanation when they said that normally they are not paid when they take part in on-farm demonstration projects. However, most responses indicated that the payment was useful, if not necessary to their participation. For example, ten mentioned one or more specific cost burdens which the $500 covered, such as the time consumed in planning for the demonstration, keeping records, cultivating, or driving to elevators for weighing harvested grain; the cost of new equipment; and extra fuel used. In another five cases, the respondent stated that the incentive payment was adequate only because the project had been successful; there were no losses to cover.

Two fixed-choice questions focused directly on whether the $500 payment was enough to prevent farmers from losing money on their demonstration projects. For 40% of the total projects, the responding farmers said that the payment did serve this function (Table 2.3), while for 38% of the cases no losses were experienced (or expected on 1991 projects) and the absence of loss was not attributed to the $500. Only in 10% of the cases did the farmer report losing money despite the payment. The relative frequency of losses did not differ substantially across the three types of projects (Table 2.3). When the projects

Table 2.3. Participants' assessments of whether the $500 incentive payments helped to avoid losing money on their demonstration projects, by type of project and total projects

Assessment	Type of Project			
	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Yes, would have lost money without it.	50	29	30	40
No, did not lose money and the payments did not help to avoid a loss.	39	38	30	38
Lost money even with the payments.	8	14	10	10
Not sure or did not answer	3	19	30	12
Number of cases	(38)	(21)	(10)	(69)

Table 2.4. Participants' assessments of whether the $500 incentive payments helped to avoid losing money on their demonstration projects, by location of project

Assessment	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Yes, would have lost money without it.	36	63	19	33
No, did not lose money and the payments did not help to avoid a loss.	46	25	44	44
Lost money even with the payments.	18	4	12	11
Not sure or did not answer	0	8	25	11
Number of cases	(11)	(24)	(16)	(18)

are broken down by state, however, we find that the Indiana group of projects depended proportionally much more on the $500 payments to avoid losses--for 63% of them the payment had this function, compared to 19% to 33% in the other three locations (Table 2.4).

Technical advice

Technical advice was provided by AFT's two core staff members for the sustainable agriculture program (who worked out of AFT's Chicago office until the summer of 1991, when they switched to De Kalb) and by field coordinators employed by AFT. One coordinator assisted with the 1989 Illinois projects, one worked with the Indiana participants in both 1990 and 1991, and half the Missouri cooperators were served by a local coordinator. For the remaining Missouri participants and all the 1991 Michigan cooperators, the program's core staff provided the in-person and telephone contacts.

Farmers could receive technical assistance for conducting their projects at various points in time: (1) before the start of the growing season, usually in March, when a core staff person or a local field coordinator visited to learn if the farmer wished to conduct a sustainable agriculture project and, if so, to choose the plots to be compared and plan out other aspects of the project; (2) after planting, normally in May, when each participant was contacted to learn if the project was under way and to discuss any problems that might have been encountered; (3) later in the growing season when AFT staff or a coordinator called to check on the project's progress; (4) any time during the season if the farmer wished to spend the money to telephone the program's main office or a field coordinator; and (5) if AFT staff or a coordinator was able to visit during the season.

The surveyed farmers were asked whether they had received "any advice in person or over the telephone on how to carry out the project, from an AFT representative or someone provided by AFT" [i.e., a field coordinator hired by AFT]." For 50 of the 69 projects (72%), the respondents reported having received advice of this nature, while for 19 (28%) none had been received or, if it had, the farmer did not remember it (Table 2.5). Assistance was reported for proportionally more of the projects designed to reduce the use of purchased nitrogen (84%) than for herbicide-reduction projects (62%) or for the "other projects" category (50%).

We hypothesized that this difference might result from farmers' prior experience with the types of projects. All respondents were asked if they had previously participated in "formal" demonstration projects--sponsored by their state university, seed company, or other organization--that focused on fertilizer management or pesticide management practices. A related set of questions asked whether before the AFT project they had experimented with reducing the rates of nitrogen, herbicide, or insecticide to learn if yields or net income changed. It seemed plausible that farmers with either type of prior experience for the same kind of project they did with AFT (e.g., a university-sponsored fertilizer-management demonstration that preceded their nitrogen-reduction project with AFT) might not have bothered to ask for technical assistance. And, for relatively more of the AFT nitrogen projects compared to the herbicide and insecticide demonstrations, the farmers reported prior experiences of each type (demonstration projects and experiments with reducing rates). However, for this group of 69 projects, neither hypothesized relationship was supported. Previous experience with formal demonstration projects was associated with having received advice from AFT rather than the reverse, and the relationships between receiving

Table 2.5. Percent of projects receiving technical advice and participants' assessments of the helpfulness of the advice, by type of project and total projects

	Type of Project			
	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Received advice				
Yes	84	62	50	72
No	16	38	50	28
Number of cases	(38)	(21)	(10)	(69)
Assessment				
Highly helpful	44	31	0	36
Moderately helpful	44	46	80	48
A little helpful	6	15	20	10
Not helpful at all	3	0	0	2
Not sure or did not answer	3	8	0	4
Number of cases	(32)	(13)	(5)	(50)

assistance for a project and prior experiments with reducing the same type of input (e.g., purchased nitrogen) was inconsistent across the different types of projects.

Another possible explanation for the proportionally larger number of nitrogen-reduction projects reporting assistance was that relatively more of them were located in states where the delivery of assistance was better. Assistance was reported for 79% of the 24 projects in Indiana, compared to 75% for the Michigan projects, 64% in Illinois, and 61% in Missouri (Table 2.6). And Indiana was the location of half of the nitrogen projects. However, regardless of the state, high percentages of the nitrogen projects--71% to 100%--were reported to have received technical assistance.

There were three follow-up questions for participating farmers who reported they had obtained advice for conducting a project. The first of these was: "What kind of advice did you receive?" For 31 of the 50 projects with assistance, the respondents mentioned help with the technicalities of the experiment, such as in selecting appropriate plots for the comparison (e.g., ones with similar soils), in choosing plots of adequate size, and in understanding the kinds of data to be collected and the format for keeping records. For 20 cases, the reported assistance extended beyond such technicalities to help with choosing nitrogen or pesticide rates of application, the number of tillage trips per field, and the crops to be planted; with interpreting soils or plant tissue tests; and with evaluating crop growth. The number of cooperators receiving this second, more agronomic type of assistance, rather than only advice for setting up their experiments, may well have exceeded 20; many cooperators may have simply omitted to mention the second kind. However, given the program's limited resources of staff and money, an emphasis on the first type may have been

Table 2.6. Percentage of projects receiving technical advice and participants' assessments of the helpfulness of the advice, by location of project

	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Received advice				
Yes	64	79	75	61
No	36	21	25	39
Number of cases	(11)	(24)	(16)	(18)
Assessment of advice				
Highly helpful	0	68	8	36
Moderately helpful	100	16	75	46
A little helpful	0	16	8	9
Not helpful at all	0	0	8	0
Not sure or did not answer	0	0	0	0
Number of cases	(7)	(19)	(12)	(11)

unavoidable.

The second follow-up question was: "How helpful was that advice in planning or conducting the demonstration? Was it highly helpful, moderately helpful, a little helpful, not helpful at all?" Thirty-six percent of the responses to this question were in the "highly helpful" category; 48% were in the moderate category; 10%, "a little helpful"; and only 2% in the category "not helpful at all" (Table 2.5). Proportionately more of the cases of assistance for nitrogen-reduction projects were rated "highly helpful" compared to the herbicide-reduction projects and those in the "other" group (Table 2.5).

When we analyze these responses by location, the Indiana projects stand out for their large percentage of cases of highly rated advice--68%, compared to zero percent among the Illinois cases, 8% for Michigan, and 36% for Missouri (Table 2.6). Since seventeen of the 19 Indiana projects that received advice were nitrogen-reduction demonstrations, and since in 12 out of those 17 cases the advice was rated "highly helpful," perhaps there was something about that kind of project that tended to have assistance be greatly appreciated. However, in none of the other four locations was advice for nitrogen demonstrations so highly rated. These finding suggest that the providers of help in Indiana for that type of project were unusually effective. Since there are only two cases of other types of projects in Indiana that received technical assistance, we cannot extend this positive assessment beyond nitrogen-reduction projects.

The third follow-up question asked recipients of technical advice to elaborate on their evaluation of its helpfulness. If they had answered that it was highly or moderately helpful, the follow-up was, "It what way did you find the advice helpful?" The replies to this question tended to be repeats of their earlier answers about the nature of the advice extended (see the third paragraph

prior to this one). Exceptions to that pattern of responses were four farmers who said they highly valued the availability of knowledgeable advisors to answer their questions and guide them throughout the demonstration.

The six farmers who evaluated the advice as being only "a little helpful" or "not helpful at all," were asked, "How could that advice have been more helpful?" One of the six replied that the assistance was slight because he had encountered no major problem for which he needed help. A related response was that the farmer had little new to learn because of his prior experience with demonstration plots. Two farmers attributed their weak assessment of the advice to its limited nature; according to them, it focused just on how to set up the experiment. And one cooperator blamed himself in that he called for advice too late for it to have been helpful.

Soil tests

Cooperating farmers in all locations were offered a free soil test for phosphorous, potassium, acidity, and cation-exchange capacity (a measure of the soil's conductivity). A test of the soil's nitrogen level was offered in 1991 for some of the nitrogen-reduction projects. The tests at all sites were based on samples taken on average from every five acres, and the results were supposed to be available within two to three weeks. Ideally the testing was conducted earlier enough for the results to guide management decisions that crop year. The farmers for 25 (or 36%) of the 69 projects covered in this survey reported that they did not have tests conducted (Table 2.7). Just over half of them volunteered explanations: eight declined the AFT test because they already had in hand the findings from similar tests; one farmer said he had signed up too late to take advantage of the test offer, so he used the results from the past

Table 2.7. Percent of projects with AFT-provided soil tests and participants' assessments of the helpfulness of the tests, by type of project and total projects

	Type of Project			
	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Received test				
Yes	55	48	20	48
No	34	38	40	36
Not sure	3	0	10	3
Not asked	8	14	30	13
Number of cases	(38)	(21)	(10)	(69)
Assessment of test				
Highly helpful	48	10	50	36
Moderately helpful	19	60	0	30
A little helpful	14	10	0	12
Not helpful at all	9	0	0	6
Not sure or did not answer	9	20	50	15
Number of cases	(21)	(10)	(2)	(33)

year; and two implied that it was too inconvenient for them to draw the soil samples. Through a technical error, the farmers of nine projects were not asked the question about whether they had accepted the offer of a soil test. For two other projects, the interviewed farmer was unsure about the tests.

The cooperators for the remaining 33 projects were asked to evaluate the helpfulness of the soil tests. For 12 (or 36%) of those projects, the tests were rated as "highly helpful"; for 10 (30%), the assessment was "moderately helpful", and for six (18%), either "a little helpful" or "not helpful at all" (Table 2.7). When these assessments are broken down by type of project, the nitrogen-reduction demonstrations had a larger percentage of "highly helpful" ratings compared to herbicide projects--48% versus 10% (too few "other" projects had tests for a meaningful comparison--Table 2.7). And when the analysis is by location of projects, the tests for Indiana cooperators had more ratings in the "highly helpful" category compared to the Illinois and Missouri cases--58% versus 25% (the number of cases in Michigan was too small for useful comparisons--Table 2.8).

The 22 farmers who evaluated their AFT-provided soil tests as highly or moderately helpful were asked the follow-up question, "In what way did you find the test helpful?" Three said they regularly used soil tests and were glad to continue that practice. Eight gave general answers, such as "It's good to know your soils." But ten mentioned specific findings that were useful for management decisions about nutrients. For example, one farmer had not "done a test in years" and wanted to know whether he was applying unnecessary amounts of fertilizer. Another found from the test that additional phosphate and pot ash were not required.

The six cooperators who evaluated the soil tests as "a little helpful" or

Table 2.8. Percentage of projects with AFT-provided soil test aand participants' assessments of the helpfulness of the tests, by location of project

	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Received soil test				
Yes	36	50	31	67
No	46	29	44	33
Not sure	0	8	0	0
Not asked	18	13	25	0
Number of cases	(11)	(24)	(16)	(18)
Assessment of test				
Highly helpful	25	58	20	25
Moderately helpful	25	17	40	50
A little helpful	0	17	20	8
Not helpful at all	0	8	20	0
Not sure or did not answer	50	0	0	17
Number of cases	(11)	(12)	(5)	(12)

"not helpful at all" were asked, "How could the test have been more helpful?" One farmer said the particular kind of soil test AFT offered was not relevant to his project. Another indicated that the test results came back to him too late--after he had made the decisions with which the results could have helped. Two believed that their test results were invalid.

Handbooks and other informational publications

For its cooperating farmers, AFT budgeted an average of $50 worth of handbooks and other informational publications about sustainable agriculture and related topics. In August or September the farmers were sent a list of available materials and were invited to choose the titles of greatest interest to them. The selected items were then mailed to them. An exception is the Indiana program; publications were not provided there until 1991. Appendix A lists the materials made available by year.

According to our survey, most of the projects did not receive any of the publications; for only 45% (or 31) of the 69 cases were they reported (Table 2.9). The difference between the percentages for nitrogen-reducing projects and herbicide projects were insignificant (Table 2.9); as were the differences across the four states (Table 2.10). In five of the 31 cases where materials were received, the respondents volunteered that the publications mailed to them were not from a list of handbooks or manuals, but were AFT's reports from previous years' demonstration projects or, in one case, the AFT newsletter for its general membership.

Each recipient of publications was asked to evaluate their helpfulness. For only 16 projects were they rated "highly helpful"; for 42% they were considered "moderately helpful"; and for 29%, either "a little helpful" or "not

Table 2.9. Percent of projects with AFT-provided handbooks and other publications and participants' assessments of the helpfulness of the publications, by type of project and total projects

	Type of Project			
	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Received manuals				
Yes	47	43	30	45
No	53	48	60	51
Not sure	0	9	10	4
Number of cases	(38)	(21)	(10)	(69)
Assessment				
Highly helpful	16	11	33	16
Moderately helpful	47	33	33	42
A little helpful	5	55	0	19
Not helpful at all	11	0	33	10
No chance to read	16	0	0	10
Not sure or did not answer	5	0	0	3
Number of cases	(19)	(9)	(3)	(31)

Table 2.10. Percentage of projects with AFT-handbooks and other publications and participants' assessments of the helpfulness of the publications, by location of project

	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Received publications				
Yes	36	54	31	44
No	54	42	69	50
Not sure	9	4	0	6
Number of respondents	(11)	(24)	(16)	(18)
Assessment				
Highly helpful	40	15	20	0
Moderately helpful	20	38	20	75
A little helpful	20	15	20	25
Not helpful at all	20	0	40	0
No chance to read	0	23	0	0
Not sure or did not answer	0	8	0	0
Number of cases	(5)	(13)	(5)	(8)

helpful at all" (Table 2.9). These assessments varied little by type of project (Table 2.9). There are some substantial percentage-point differences in the analysis by location of projects (Table 2.10); but the numbers of cases involved are too small (5 to 13) for these differences to be considered important.

Four of the recipient farmers complained that the materials sent to them were not sufficiently related to their projects or their area of the country. Most of the publications' titles do not indicate if they are more appropriate for one or another type of project or geographic area (Appendix A). Perhaps, in future years, the list sent to farmers could categorize the publications by the type(s) of projects and production areas to which they are relevant.

Another deficiency with this component of the program that should be correctable was the complaint raised by four cooperators that the publications came too late in the year to be helpful with the current project. Perhaps, while visiting farmers in March to reach agreement on the demonstration projects to be conducted, AFT staff could carry with them relevant publications to distribute after agreement has been reached. An example is a piece on hairy vetch that a Michigan cooperator received and praised highly; he liked it because, "It was geared to hairy vetch in a cold climate like Michigan's."

Participating farmers' overall assessment of their projects

The farmers for the 69 separate demonstration projects were asked, "Overall, how helpful was the [1989, 1990, or 1991] project to you as a farmer? By helpful, we mean that conducting the project helped you in some way to plan, or manage, your farm operation." Was the project highly helpful, moderately helpful, a little helpful, or not helpful at all?" For 45% of the projects, the assessment was "highly helpful"; for 32%, "moderately helpful"; for 16%, "a

little helpful"; and for only 3% was the answer, "not helpful at all" (Table 2.11). In other words, nearly half of the projects earned the highest rating; and more than three-quarters were evaluated as at least moderately helpful.

The distribution of responses was virtually the same for nitrogen-reduction projects compared to herbicide demonstrations (Table 2.11). The category, "Other projects," had proportionally more "highly helpful" responses--70% compared to 42% for nitrogen projects and 38% for herbicide. Given that seven of those "other" projects were designed to reduce use of insecticide, we thought it worthwhile to analyze them separately to see if, perhaps, almost all of the insecticide projects were ranked highly. They were not; four of the seven (57%) were ranked highly; one was considered only "a little helpful"; one, "not helpful at all"; and regarding the seventh, the farmer was uncertain.

When analyzing these responses by location of the project, we found a sizable percentage point differences--24 to 42 points--only between the Missouri responses in the "highly helpful" category and the corresponding responses for the other three locations (Table 2.12). For example, only 22% of the Missouri projects were rated highly, compared to 56% of the Michigan cases. Intrigued by the relatively low percentage of highly ranked projects among the Missouri cases, we analyzed those responses by type of project, hypothesizing that the differences were due to one type of project not being highly ranked in Missouri while others were well rated. However, the pattern of responses across the different project types in that state was very similar. Although the Missouri projects may not have been as successful on this evaluative dimension as their counterparts in the other three locations, we must note that the numbers are too small for confident comparisons; moreover, across all four sites 72% to 81% of the projects were ranked either moderately or highly helpful.

Table 2.11. Participants' assessments of the project's helpfulness for planning or managing their farm operations, by type of project and total projects

	Type of Project			
	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Highly helpful	42	38	70	45
Moderately helpful	37	38	0	32
A little helpful	18	14	10	16
Not helpful at all	3	0	10	3
Not sure or did not answer	0	10	10	4
Number of cases	(38)	(21)	(10)	(69)

Table 2.12. Participants' assessments of the project's helpfulness for planning or managing their farm operations, by type location of project

Assessment	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Highly helpful	64	46	56	22
Moderately helpful	9	33	25	50
A little helpful	27	13	6	22
Not helpful at all	0	4	6	0
Not sure or did not answer	0	4	7	6
Number of cases	(11)	(24)	(16)	(18)

The surveyed farmers who rated projects highly or moderately helpful were asked the follow-up question, "In what ways was the project helpful to you as a farmer?" And those whose assessments were "a little helpful" or "not helpful at all," were asked, "How could the project have been more helpful to you as a farmer?"

An explanation offered for 14 of the highly and moderately helpful projects was that reduced rates of nitrogen or pesticide had proved successful. One example is the farmer who realized that for a "specific soil type on his farm I didn't have to use as much N as was recommended" (presumably by his fertilizer dealer). A second is the cooperator who reported the project had confirmed his conviction that less herbicide could be used. A related type of explanation for ten projects was that they had saved the farmer money. Eleven more projects were evaluated positively because they yielded various informational benefits, such as data on which to base future management decisions, confirmation of the effectiveness of practices begun some time in the past, and insights into the interaction between weather and nitrogen levels in the soil.

In three cases involving herbicide reduction and one for nitrogen, although the demonstrations were largely unsuccessful, the farmers were grateful for the information. An example is the cooperator who said, "I had quite a lot of weed pressure; this made me appreciate that herbicides were still handy." Another is the farmer who said, "The reduced rates were not the problem; the system for putting it on didn't work."

For four of the 11 projects judged to be only a little helpful, the complaint was that findings from just one year were not reliable; they needed to be replicated. For three more of these 11 and the one project judged to be of no value, the explanation was that uncooperative weather had caused the

demonstrations to fail. Two other farmers evaluated their projects to be of little help because they had been reducing the input in question for some time and, therefore, thought they had learned relatively little from the AFT-sponsored demonstration.

Since farmers could value a demonstration project highly and not be any more persuaded to use sustainable projects and vice-versa, we asked the following evaluative question: "As a result of conducting your project in [1989, 1990, or 1991], are you any more or less willing to reduce or keep reduced the rate of [nitrogen/herbicide/insecticide] used [or to continue some other sustainable practice]?" For 70% (or 48) of the projects, the farmer said that he/she was more willing to use the indicated practice; for 17%, the response was "no change"; and for only 3% was the cooperating farmer "less willing" (Table 2.13). There were no large differences either by type of project (Table 2.13) or by location of project (Table 2.14); regardless of type or state, the farmers for 60 to 81% of the demonstrations responded that conducting the project made them more willing to follow the sustainable practice.

In addition to these evaluations of the projects' overall effectiveness, the surveyed farmers were asked to assess the amount of time and money that the projects consumed. The purpose of these questions was to determine if the demonstrations tended to be perceived as too burdensome. If they were, the cooperators might refuse to replicate projects or try new demonstrations, as well as decide to discourage other farmers from cooperating. The given answers indicate no problems of this nature. For only 11% of the projects did the cooperator chose the response option, the project took "more time than you wanted to spend on it" to plan and carry out (Table 2.15). Eighty percent of the projects were assessed as taking "about the right amount of time," and only 6%

Table 2.13. Extent to which participants are willing to use the project's practice (e.g., reduce rate of nitrogen or herbicide) "as a result" of conducting the demonstration project, by type of project and total projects

Extent of willingness	Type of Project: Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
More willing to use it	76	62	60	70
No change in willingness	15	19	20	17
Less willing	3	5	0	3
Waiting for results	3	0	10	3
Not sure or did not answer	3	14	10	7
Number of cases	(38)	(21)	(10)	(69)

Table 2.14. Extent to which participants are willing to use the project's practice (e.g., reduce rate of nitrogen or herbicide) "as a result" of conducting the demonstration project, by location of project

Extent of Willingness to Use Project's Practice	Location of Project: Illinois	Indiana	Michigan	Missouri
	%			
More willing to use it	73	67	81	61
No change in willingness	18	25	13	11
Less willing	9	0	6	6
Not sure or did not answer	0	8	0	22
Number of cases	(11)	(24)	(16)	(18)

Table 2.15. Participants' assessments of the time spent in carrying out demonstration project, by type of project

	Type of Project			
	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Took more time than wanted to spend	11	9	20	11
About the right amount	84	81	60	80
Less time than could have spent	5	5	10	6
Not sure or did not answer	0	5	10	3
Number of cases	(38)	(21)	(10)	(69)

Table 2.16. Participants' assessments of the time consumed in carrying out demonstration project, by location of project

Assessment	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Took more time than wanted to spend	9	8	19	11
About the right amount	82	79	75	83
Less time than could have spent	9	8	6	0
Not sure or did not answer	0	4	0	6
Number of cases	(11)	(24)	(16)	(18)

were considered to have consumed "less time than you could have spent." The distribution of responses to the question about money is quite similar. Just 10% of the demonstrations were judged to have required "a greater outlay of money than you wanted to spend," 68% were evaluated as consuming "about the right amount of money," and 18%, "less money than you could have spent" (Table 2.17). When we broke these responses down by type of project and location of project (tables 2.15 through 2.18), we found that on the dimension of greatest interest--the percentage of responses in the "too much" category--the percentage point differences are small, ranging from one to 12 points.

Summary

To summarize this chapter of the report, we found that almost half of the demonstration projects were evaluated as "highly helpful" for planning or managing the cooperator's farm operation; that three-quarters were judged to be at least "moderately helpful"; that 70% were evaluated to have made the cooperator more willing to use the project's sustainable practice in the future; that very few--just 10 or 11%--were found to have been be excessively costly in time or money; that for 84% of the projects, the incentive payment of $500 was considered large enough; that for 72% of the projects some technical advice was received and that in 84% of those cases, the assistance was evaluated as being moderately or highly helpful; that only 48% of the projects were reported to have received free soil tests and that in 66% of those cases the tests were judged to be moderately or highly helpful; that for only 45% of the projects did the cooperating farmer receive free handbooks or other publications about sustainable agriculture and that in just 58% of those cases were the publications evaluated to be at least moderately helpful.

Table 2.17. Participants' assessments of the money spent in carrying out demonstration project, by type of project and total projects

	Type of Project			
	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Took more money than wanted to spend	11	9	10	10
About the right amount	79	57	50	68
Less money than could have spent	10	24	30	18
Not sure or did not answer	0	9	10	4
Number of cases	(38)	(21)	(10)	(69)

Table 2.18. Participants' assessments of the money spent in carrying out demonstration project, by location of project

Assessment	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Took more money than wanted to spend	18	8	13	6
About the right amount	55	88	50	67
Less money than could have spent	27	0	31	22
Not sure or did not answer	0	4	6	6
Number of cases	(11)	(24)	(16)	(18)

On balance, these farmer evaluations of the program's four components and of its overall value indicate success. The only evidence of needed improvement may be in the responses about the soil tests and publications components.

CHAPTER 3

POST-PROGRAM EFFECTS OF THE DEMONSTRATION PROJECTS

Introduction

Although the cooperating farmers' evaluations of their 1989, 1990, or 1991 demonstration projects were largely positive (see Chapter 2), those assessments might have little effect on the participants' behavior in subsequent years. And there might be little if any positive demonstration effect in the sense of other farmers being persuaded to try sustainable practices as the result of visiting the AFT-sponsored projects or discussing them with the cooperators. AFT hopes that effective sustainable practices will be spread and used for sustained periods of time through the successful experiences of cooperating farmers that persuade both the participants and the farmers who come into contact with them.

Therefore, in this chapter we examine the responses to three kinds of questions: (1) the extent to which cooperating farmers have continued and intend to continue to use sustainable practices after the initial demonstration year; (2) the extent to which other farmers visited demonstrations in progress and have discussed them with cooperators at other times; and (3) the extent to which the cooperators would recommend that other farmers conduct similar projects.

Extent to which projects' practices have been continued

The cooperating farmer for each project was asked if he/she had continued using the project's practice in the crop year(s) since the formal demonstration

year (e.g., 1990 following 1989, 1990 following 1991) and if the farmer intended to use it in 1992. All of the eleven 1989 cooperators (all from Illinois) reported continuing their demonstration practices in both 1990 and 1991, and 91% said they intended to use the practices also in 1992 (Table 3.1). Seventy-eight percent of the 1990 participants reported using their practices in 1991, and 74% intended to continue them also in 1992 (Table 3.1). Finally, 85% of the 1991 cooperators reported that they would continue their demonstration practices in 1992.

All the surveyed cooperators were asked to explain their responses about continuing to use the demonstration practices. In response to the "why" question about their intentions for 1992, the most frequent explanation--given for 24 projects whose practices were to be continued--was that the practices had proven their cost-effectiveness. For example, an Indiana cooperator said, "Reduced N rates have the same yield as the higher levels, contrary to what my fertilizer dealer said." In 12 cases the cooperator wanted to replicate the experiment to learn if the results would be as good or better. For example, a Michigan farmer planned another demonstration "to see if this year's difference was true or a fluke."

Extent of farmers visiting or discussing AFT-sponsored projects

The surveyed cooperators were asked to estimate the numbers of farmers (if any) who had visited during the demonstration year to inspect the plots being compared. For 39% of the projects, no visitors were reported (Table 3.2). Nineteen percent had only one to nine farmers visit, while 34% had as many as 10 and 18%, as many as 20. The frequencies of visits did not significantly vary by either location of type of project (tables 3.2 and 3.3).

Table 3.1. Extent to which cooperating farmers continued to use their demonstration projects' sustainable practices

% of 1989 cooperators (all from Illinois) who continued practice in 1990	100%
% of 1989 cooperators who continued practice in both 1990 and 1991	100%
% of 1989 cooperators who continued practice in both 1990 and 1991 and who intended to continue also in 1992	91%
% of 1990 cooperators (from Indiana and Missouri) who continued practice in 1991	78%
% of 1990 cooperators who continued practice in 1991 and who intended to continue also in 1992	74%
% of 1991 cooperators (from Indiana, Michigan, and Missouri) who intended to continue practice in 1992	85%

Table 3.2. Participants' reports of the numbers of farmers visiting demonstration project while in progress, by type of project

	Type of Project			
Reported Number of farmer visitors	Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Zero	37	38	50	39
One to four	3	14	10	7
Five to nine	13	10	10	12
Ten to 19	16	14	20	17
Twenty to 29	5	0	0	3
Thirty to 39	3	0	0	1
Forty or more	13	10	0	10
Not sure or did not answer	11	14	10	11
Number of cases	(38)	(21)	(10)	(69)

Table 3.3. Participants' reports of the numbers of farmers visiting demonstration project while in progress, by location of the project

Reported Numbers of Farmer Visitors	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Zero	36	33	44	50
One to four	9	8	13	0
Five to nine	0	17	13	11
Ten to 19	9	8	19	28
Twenty to 29	9	4	0	0
Thirty to 39	0	4	0	0
Forty or more	27	17	12	6
Not sure or did not	9	8	0	6
Number of cases	(11)	(24)	(16)	(18)

According to the interviewed cooperators, there were relatively few formal field days for their projects--for just over a third of the nitrogen-reduction demonstrations, a third of the herbicide projects, and just 10% of the "other" demonstrations. Not surprisingly, projects with field days tended to attract more visitors. For example, 92% of the 13 nitrogen projects with field days had at least ten visitors, compared to only 16% of the 25 nitrogen demonstrations without field days. The corresponding percentages for herbicide projects are 86% versus zero percent. These comparisons suggest that on-farm visits could become a more effective means for encouraging the adoption of sustainable practices if more field days were organized.

The surveyed cooperators were asked also to estimate the number of farmers with whom they discussed their demonstrations besides those who might have visited the projects while in progress. This kind of contact was reported much more frequently, compared to the on-farm visits. But it had the potential advantage of occurring over more years than just the demonstration year. Only 16% of the projects were reported to have had no such discussions; 54% were estimated to have had at least ten; and 32%, at least 20 discussions (Table 3.4). There were no sizable differences when these estimates are broken down by type of project (Table 3.4), but an expected difference emerged when the responses were analyzed by location of project (Table 3.5). Proportionally many more of the Illinois demonstrations had been discussed with at least ten farmers--81% versus 45% to 51% for the other states' projects. However, in the Illinois context there had been more time for farmer contacts with this purpose. All of the Illinois projects were conducted in 1989, while the other states' demonstrations date from 1990 or 1991.

Table 3.4. Participants' reports of the numbers of farmers with whom they discussed demonstration project, besides those who visited while it was in progress, by type of project and total projects

Reported Number of Farmers	Type of Project: Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Zero	13	19	20	16
One to four	0	10	0	3
Five to nine	26	33	10	25
Ten to 19	24	10	30	22
Twenty to 29	11	10	10	10
Thirty to 39	0	0	0	0
Forty or more	24	19	20	22
Not sure or did not answer	3	0	10	3
Number of cases	(38)	(21)	(10)	(69)

Table 3.5. Participants' reports of the numbers of farmers with whom they discussed demonstration project, besides those who visited while it was in progress, by location of project

Reported Numbers of Farmers	Location of Project			
	Illinois	Indiana	Michigan	Missouri
	%			
Zero	9	4	12	39
One to four	0	0	12	0
Five to nine	9	38	25	17
Ten to 19	18	33	25	6
Twenty to 29	36	0	13	6
Thirty to 39	0	0	0	0
Forty or more	27	17	13	33
Not sure or did not answer	0	8	0	0
Number of cases	(11)	(24)	(16)	(18)

Extent to which cooperators would recommend similar projects

The interviewed cooperators were asked, "If other farmers were to ask your opinion today of your [1989, 1990, 1991] project about . . . ., would you recommend that they conduct a similar project?" For 55% of the cases, the respondents selected the "recommend it highly" option; for 30% the choice was "recommend it moderately"; and for 10%, "recommend slightly" or "not at all" (Table 3.6). The responses varied little by type of project or location (tables 3.6 and 3.7). Regardless of state or project type, at least half of the cooperators would highly urge other farmers to participate.

Summary

This chapter's examination of the program's post-project effects found very impressive rates of participating farmers continuing and intending to continue using sustainable practices after the year of the demonstration. For example, ninety-one percent of the 1989 cooperators reported they used the practices in both 1990 and 1991 and planned to continue in 1992. Less impressive were the estimated numbers of other farmers visiting demonstration projects while in progress or discussing the projects with the cooperators at other times. For only 18% of the projects were as many as 20 visitors reported; and discussion contacts with as many as 20 were limited to 32%. However, if the cooperators were asked about recommending similar demonstrations, at least at the time of the interviews more than half would have given a high recommendation; and more than three-quarters, at least a moderate recommendation. This pattern of response varied little by type or location of the project.

These findings should encourage AFT to continue its program within the existing states and for the current types of projects. Moreover, with no

Table 3.6. Extent to which participants would recommend that other farmers conduct a similar demonstration project, by type of project and total projects

Extent of Recommending Similar Project	Type of Project: Reduced nitrogen	Reduced herbicide	Other projects	Total projects
	%			
Highly	55	52	60	55
Moderately	34	38	0	30
Slightly	5	10	20	9
Not at all	0	0	10	1
Not sure or did not answer	5	0	10	4
Number of cases	(38)	(21)	(10)	(69)

Table 3.7. Extent to which participants would recommend that other farmers conduct a similar demonstration project, by location of project

Extent of Recommending a Similar Project	Location of Project: Illinois	Indiana	Michigan	Missouri
	%			
Highly	64	54	56	50
Moderately	27	21	31	44
Slightly	9	17	0	0
Not at all	0	0	6	0
Not sure or did not answer	0	8	6	6
Number of cases	(11)	(24)	(16)	(18)

evidence of problems with the current, rather varied locations and kinds of projects, AFT would be entitled to consider expanding into other states and promoting other sustainable practices.

CHAPTER 4

DEMONSTRATION PROJECT COOPERATORS

Cooperators' Stated Reasons for Participating

As a part of our survey we asked cooperators in AFT's on-farm sustainable agriculture demonstration projects to explain, in their own words, why they decided to participate in the program. The specific question was broadly open-ended: "Thinking back to the time in [1989/1990/1991] when you decided to participate in this demonstration project with AFT, why did you decide to participate?" The cooperators' responses were content-analyzed by all three interviewers, plus the principal investigators. The responses could be grouped into 26 primary response patterns, that is, into groups of responses with essentially the same meanings. Our interview protocol allowed for multiple responses, although in practice no respondent gave more than four different reasons for participation. In Table 4.1 we list the patterns of first responses separately, since the initial response to this open-ended question may be regarded as the most important reason.

The most frequently mentioned response types reflect a personal interest of the cooperators in sustainable agriculture. (See the first set of four response patterns in Table 4.1.) The first pattern, which indicates a general belief or interest in sustainable (or reduced-input) agriculture (SA), accounts for a full fifth of all first responses and was mentioned in almost half of all cases. We regard the response, "I would do it [the demonstration practice]

Table 4.1 Response patterns to open-ended question, "Thinking back to the time in 19xx when you decided to participate in this demonstration project with AFT, why did you decide to participate?" Response patterns content analyzed from respondents' verbatim responses.

Response pattern	Number First Responses	Number Total Responses
Prior interest in S/A practices, general belief in S/A	14	20
Environmental concerns	0	2
"Would do [the S/A practice] anyway"	2	7
Likes to learn, participate in studies	8	18
Subtotals	24	47
Prior experience with similar experiments, input reduction, etc.	6	14
Wanted to continue in demonstration for a second year	5	7
Wanted to continue in demonstration, to verify findings over two years	3	4
Subtotals	14	25
Because of S/A group meeting or membership	11	16
Recruited, esp. by IN S/A group, because of specific farm operation, locale	0	1
To help/foster new group, i.e., AFT, getting involved in S/A	0	6
Subtotals	11	23
Study would produce evidence on farm to verify effectiveness of S/A	5	13
To share knowledge of S/A with other farmers	0	15
To make a point to land-grant, Ag. School researchers	2	3
Wants to stimulate/foster S/A research	1	1
Subtotals	8	32
$500 served as inducement, per se, to participate	1	7
$500 helped cover cost of participation	1	5
Interested in cost savings	1	7
"It wasn't the money."	0	1
Subtotals	3	20

Continued

Table 4.1 (continued). Response patterns to question, "Thinking back to the time in 19xx when you decided to participate in this demonstration project with AFT, why did you decide to participate?"

Response pattern	Number First Responses	Number Total Responses
Recruited by Brian, Bill, Dave Swain, other AFT representative; personal contact key	0	7
Recruited by consultant, pers. contact key	3	6
Recruited by friend, neighbor, etc, personal contact key	1	3
Subtotals	4	16
Liked aspects of AFT protocol, e.g., large plot sizes	3	6
Needed AFT's technical help or advice	0	5
Open-minded AFT approach to demonstration design	1	1
Liked publications provided by AFT	0	1
Subtotals	4	13
"Mutual benefits" (vague response)	1	1
"To be nice" (vague response)	0	1
Subtotals	1	2
Totals	69	178

anyway," as almost indistinguishable from the interest-in-SA response. The other two patterns in Table 4.1's first bloc of responses also deal with personal interests: (1) a general enjoyment of participation in research studies and (2) environmental concerns. As shown in Table 4.2, the interest-in-SA response was given relatively frequently by cooperators in Illinois, Michigan, and Missouri.

A related set of responses (the third bloc of responses in Table 4.1) focuses on SA group participation or identification with the SA movement. From a content-analysis standpoint these responses are distinguishable from the personal or individualistic responses in the first bloc, but we would certainly not argue that they are conceptually unrelated. Recruitment into the demonstration program through a state SA group was most often mentioned by Indiana cooperators and only slightly less often by Michigan cooperators.

Two sets of response patterns deal specifically with research aspects of the program. The second bloc of responses in Table 4.1 contains three response patterns involving the cooperators' desire for the continuation of SA experiments from prior demonstrations or studies. This set of reasons includes the desire to participate in a second year of AFT's program, a response given mostly by Indiana continuing cooperators. The third pattern in this second bloc is also similar to some responses in the fourth bloc of responses in Table 4.1. The responses in the fourth bloc generally reflect promotion or advocacy of SA practices, that is, an intention to prove the efficacy of SA to others. The lead response pattern in this set involves an intention to verify the efficacy of SA (which is very similar conceptually to the verify-findings-over-two-years response). These SA advocacy responses were most often given by Indiana cooperators.

A number of responses dealt with the financial inducement in the

Table 4.2. Response patterns, by respondent's state, to open-ended question, "Thinking back to the time in 19xx when you decided to participate in this demonstration project with AFT, why did you decide to participate?" Response patterns content analyzed from respondents' verbatim responses.

Response pattern	Total Responses IL	IN	MI	MO
Prior interest in S/A practices, general belief in S/A	5	1	6	8
Environmental concerns	1	1	0	0
"Would do [the S/A practice] anyway"	2	2	3	0
Likes to learn, participate in studies	3	6	4	5
Subtotals	11	10	13	13
Prior experience with similar experiments, input reduction, etc.	3	3	4	4
Wanted to continue in demonstration for a second year	0	6	0	1
Wanted to continue in demonstration, to verify findings over two years	0	2	0	2
Subtotals	3	11	4	7
Because of S/A group meeting or membership	2	8	6	0
Recruited, esp. by IN S/A group, because of specific farm operation, locale	0	1	0	0
To help/foster new group, i.e., AFT, getting involved in S/A	0	1	3	2
Subtotals	2	10	9	2
Study would produce evidence on farm to verify effectiveness of S/A	2	6	3	2
To share knowledge of S/A with other farmers	0	7	5	3
To make a point to land-grant, Ag. School researchers	0	3	0	0
Wants to stimulate/foster S/A research				
Subtotals	2	16	9	5
$500 served as inducement, per se, to participate	1	2	0	4
$500 helped cover cost of participation	2	0	1	2
Interested in cost savings	1	1	2	3
"It wasn't the money."	0	0	1	0
Subtotals	4	3	4	9

Continued

Table 4.2 (continued). Response patterns, by respondent's state, to question, "Thinking back to the time in 19xx when you decided to participate in this demonstration project with AFT, why did you decide to participate?"

Response pattern	Total Responses IL	IN	MI	MO
Recruited by Brian, Bill, Dave Swain, other AFT representative; personal contact key	2	1	1	3
Recruited by consultant, pers. contact key	2	4	0	0
Recruited by friend, neighbor, etc, personal contact key	1	0	1	1
Subtotals	5	5	2	4
Liked aspects of AFT protocol, e.g., large plot sizes	1	3	2	0
Needed AFT's technical help or advice	1	1	1	2
Open-minded AFT approach to demonstration design	0	0	1	0
Liked publications provided by AFT	0	1	0	0
Subtotals	2	5	4	2
"Mutual benefits" (vague response)	0	0	1	0
"To be nice" (vague response)	0	0	0	1
Subtotals	0	0	1	1
Totals	29	60	46	43

demonstration program (see the fifth bloc of responses in Table 4.1). A dozen cooperators indicated that the $500 payment was either a direct inducement or helped cover the extra costs of participating in the study, while a seven mentioned that the cost savings of reduced-input practices was a motivation for participating. These cost-related reasons were given more often by Missouri cooperators, whose farm revenues tend to be lower than those of cooperators in other states (see Table 4.3).

Two other blocs of response patterns, shown on the second page of Table 4.1, deal with the administration of the demonstrations. The first set, which might be labled, the personal recruitment bloc, indicates that personal contacts with AFT representatives or consultants or with friends or neighbors of the cooperator were key factors in the cooperators' decisions to participate. The consultant-recruitment response was given mostly in Indiana, where AFT used consultants as intermediaries with all cooperators; but overall the personal-recruitment responses are evenly distributed among the four states. Secondly, aspects of AFT's demonstration technique were mentioned by a dozen respondents as reasons for participating (see the second bloc of responses on Table 4.1's second page). The principal responses in this set involve approbation for AFT's protocol, especially the relatively large size of the demonstration plots, and the technical help provided to the cooperator.

In reviewing tables 4.1 and 4.2, one should note that these responses represent volunteered recall answers. On the one hand, these are responses the cooperator had to formulate in response to very general open-ended prompts. The response patterns do not necessarily mean that more cooperators would not share certain sentiments if asked directly. For example, more than 22% of the respondents might agree with a structured-choice question about the benefits of

Table 4.3. Selected traits of demonstration project cooperators compared to same traits for all farm operators in their respective states (as reported in 1987 Census of Agriculture)

Farmer or Farm Trait	Location of Project Ill.	Ind.	Mich.	Mo.	Totals
Farmers' average age					
AFT cooperators, 1991	37.5	42.5	46.1	44.9	43.1
Census farmers, 1987	50.4	50.5	50.9	52.9	n/a
Average gross farm revenues, in $1000s					
AFT cooperators	221.8	218.8	213.7	147.1	201.3
Census Farmers, 1987	82.8	64.8	54.8	37.6	n/a
Farmers' average days of off-farm work, %s					
AFT cooperators, 1991 (n=51)					
No off-farm work	36.4	69.2	60.0	58.3	(n=29)
"Part-time sporadically through year"	27.3	7.7	13.3	8.3	(n=7)
1 to 10 weeks	9.1	7.7	6.7	16.6	(n=4)
11 to 40 weeks	27.3	15.4	20.0	16.6	(n=7)
More than 40 weeks	9.1	0	13.3	8.3	(n=4)
Census farmer, 1987					
No off-farm work	43.4%	35.6%	37.9%	37.7%	n/a
1 to 49 days	8.6%	6.5%	5.3%	5.4%	n/a
50 - 199 days	11.3%	11.3%	11.0%%	11.1%	n/a
200 or more days	29.3%	39.9%	40.7%	38.6%	n/a
no answer	7.4%	6.7%	5.1%	7.2%	n/a

Continued

Table 4.3 (continued). Selected traits of demonstration project cooperators compared to same traits for all farm operators in their respective state

Farmer or Farm Trait	Location of Project Ill.	Ind.	Mich.	Mo.	Totals
Average total farm acres					
AFT cooperators, 1991	998.1	899.8	686.9	653.3	798.2
Census farmers, 1987	321	229	202	275	n/a
Average owned acres					
AFT cooperators, 1991	290.0	325.5	388.7	284.7	328.0
Census farmers, 1987	129.5	116.7	132.0	178.2	n/a
Average annual crop acres					
AFT cooperators, 1991	972.6	858.4	476.7	469.6	675.4
Census farmers, 1987	215.0	142.1	93.2	80.5	n/a
Average pasture acres					
AFT cooperators, 1991	10.0	18.5	28.8	112.3	41.5
Census farmers, 1987	19.6	16.8	14.5	86.0	n/a

sharing knowledge of SA with other farmers; and more than 7% would surely agree that AFT's $500 payment helped to cover the opportunity costs of participating in the study. These responses must be understood as respondent's recall, at the time of the phone interview, of reasons they had several months or up to two years previously for deciding to participate in the study. Therefore, the responses are useful as indicators of the types of reasons for participation, not for the relative importance of reasons.

Demographic Characteristics of Cooperators

At the end of the survey we asked cooperators a series of questions concerning the size of their farm operations, their organizational affiliations, selected attitudes on conservation issues, and other traits. Some of these items are comparable to those available in the Census of Agriculture (Bureau of the Census, 1987) and other sources, allowing some insight into the representativeness of the cooperators in the AFT demonstration program.

As shown in Table 4.3, AFT's cooperators are not representative of the average farm operator in the four states with the demonstration projects. AFT's cooperators are younger, by about seven years on average. AFT's cooperators tend to manage large farm operations, an average of 798.2 acres across the sample, and own on average 328 acres in their operation. The size of AFT's cooperators' farms are from two to three times larger than the averages for their states. AFT's cooperator's farm operations are also planted to notably higher proportions of annual crops than those of their counterparts. In Illinois and Indiana, an average of 97% and 95%, respectively, of the AFT cooperators' acreage were planted to annual crops, compared to 67% and 62% for the average operators in their states; in Michigan and Missouri, on average 69% and 72% of the AFT cooperators' acreage were planted to annual crops, compared with statewide

averages of 46% and 29%, respectively.

AFT's cooperators' revenues from farm operations, an average estimated at $201,300 across the sample, is also more than three times greater than the averages of all farm operators in the four states. The majority of farm revenue of the AFT cooperators 1991 farm revenue came from sales of annual crops, with livestock and dairy accounting for 21% and 11%, respectively (see Table 4.4). By comparison, annual crops account for significantly lower percentages for the average farm operator in the four states (53% in Illinois, 44% in Indiana, 34% in Missouri, and 22% in Michigan), and livestock and dairy account for high percentages (55% combined livestock and dairy in Missouri, 45% in Michigan, 42% in Indiana, and a low of 30%in Illinois).

AFT's cooperators spend more of their work year on their farming operations than the average farmer in their states. Only 7.8% of AFT's cooperators worked more than 40 weeks off-farm in 1991, compared to over a third of the farmers in the corresponding category of the 1987 farm census; and 56.8% of AFT's cooperators did no off-farm work in 1991, compared to less than two-fifths of all farm operators in the 1987 census (Table 4.3). The AFT cooperators reported that only 14% of their total income came from non-farm sources in 1990 (Table 4.4).

Finally, one of the two attitude questions we asked respondents had been asked in a prior survey of a larger sample of farm operators in six midwestern counties. This question asked whether the respondent was "worried that in ten years or less the water used in my house may be polluted with fertilizer or pesticide residue." As shown in Table 4.5, the cooperators in AFT's demonstration project gave responses that are distributed essentially like those in the broader sample of farm operators. While the responses to this item do not reflect a pronounced concern about agricultural chemical effects on groundwater,

Table 4.4. Demonstration project cooperators' farm income characteristics. N= 52.

1990 total revenues from farming [a]

$20,000 - $40,000	2	(3.8%)
$40,001 - $100,000	11	(21.2%)
$100,001 - $200,000	18	(34.6%)
$200,001 - $300,000	9	(17.3%)
Greater than $300,000	12	(23.1%)

Mean (est.) = $201,326 standard dev. = $139,415

Distribution of income

	Mean	Median	Std. dev.
Percent of farm revenue from annual crops like corn, soybeans, etc.	53.3%	55%	38.3%
Percent of farm revenue from sales of dairy products, calves, or culls	11.5%	0%	26.9%
Percent of farm revenue from non-dairy livestock	21.4%	5%	30.3%
Percent of farm revenue from other	10.4%	0%	24.8%
Percent of total (i.e., tax return) income of respondent and spouse from off-farm sources.	14.3%	5%	19.2%

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[a] Total revenue, per question phrasing, includes sales of crops and livestock, services to other farmers, plus government payments. Mean revenue estimate derived from totals volunteered by 19 respondents, plus the midpoints of the ranges of ordinal responses (with $400,000 used for the "greater than $300,000" category).

the responses to the other attitude question do indicate a strong concern among AFT cooperators about the effects of agricultural chemicals on the farm operator's family (see Table 4.5).

Several other characteristics of AFT cooperators, for which comparative data are not available, are presented in Table 4.6. The AFT cooperators appear to be relatively well educated, with 69% having at least some college education and a fifth some post-graduate education or a post-bachelors degree. Most of the college graduates' majors were in agriculture-related fields; respondents with post-graduate education included five in agriculture-related fields and, for whatever it signifies, two in theology.

AFT cooperators' affiliations also document a strong affinity for the sustainable agriculture movement. All but one respondent held subscriptions to sustainable-agriculture or related periodicals (Table 4.6). Most important, 70% of the cooperators belonged to the sustainable-agriculture organization in their state, a membership rate that substantially exceeded that in the traditional agriculture interest groups (Table 4.7). For example, only 33% belonged to a farm commodity organization. The cooperators reported a fairly high rate of membership in conservation groups, though a relatively low rate of membership (17%) in AFT itself.

Finally, AFT cooperators reported a high level of prior experience in demonstration or research projects (Table 4.8). Two-thirds had taken part in some demonstration project or study prior to volunteering for the AFT project, most commonly a comparison of seed yields, but with substantial prior experience in tillage and fertilizer- or pesticide-management studies.

Table 4.5. Demonstration project cooperators' responses to two attitude questions, compared with respondents to conservation compliance survey in six Iowa, Illinois, Indiana, Michigan, and Wisconsin counties.

Question	Strong Agree	Agree	Neutral	Disagree	Strong Disagree	Won't Ans., Don't Know
Health effects of agricultural chemicals, AFT cooperators [1]	20 (38%)	21 (40%)	0 (0%)	9 (17%)	1 (2%)	1 (2%)
Groundwater pollution concern about agriculture residues. AFT cooperators [2]	8 (15%)	16 (31%)	2 (4%)	21 (40%)	4 (8%)	1 (2%)
Groundwater pollution concern about agriculture residues, comparison group [3]	66 (9%)	248 (35%)	n/a	313 (44%)	63 (9%)	25 (3%)

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[1] Phrasing: "I am worried that my health or the health of members of my family may be harmed by handling agricultural chemicals or by breathing in fumes from agricultural chemicals like herbicides or insecticides." Note: the one respondent who would not answer within the agree-disagree range answered "not applicable," since he does not use agricultural chemicals. N=52.

[2] Phrasing: "I am worried that in ten years or less the water used in my house may be polluted with fertilizer or pesticide residue." N = 52.

[3] Phrasing: "I am worried that in ten years or less the water used in my house may be polluted with fertilizer or pesticide residue." Note: "neutral" responses not reported in this survey; N = 715. Source: Esseks, J.D., Kraft, S., and Paglia, M., 1990. Conservation Compliance Survey, 1990. DeKalb, Northern Illinois University, Center for Governmental Studies, Table 16.

Table 4.6. Selected characteristics of demonstration project cooperators. N= 52.

Size of farm operation

Acreage ranges	1991 total acres farmed	1991 acres acres owned	1991 acres planted to crops
0 - 400 acres	25.0%	75.0%	44.2%
401 - 600 acres	25.0%	13.5%	15.4%
601 - 1000 acres	28.8%	5.7%	23.1%
1001 - 3200 acres	21.2%	5.7%	17.3%
Means, in acres	798.2	328.0	675.4
Standard deviations, acres	609.2	340.3	637.3

Farm operator's education

Grade school or some H.S. only	0	0%
H.S graduate	15	28.8%
Technical school, post H.S.	1	1.9%
Some college	19	36.5%
College graduate	6	11.5%
Some post-graduate education	9	17.3%
Post-graduate degree(s)	2	3.8%

Farm operation's farming experience

5 - 10 years	8	15.4%
11 - 20 years	19	36.5%
21 - 30 years	14	26.9%
31 - 54 years	11	21.2%

mean = 21.3 median = 19.5 standard dev. = 10.2

Cooperator's subscriptions to periodicals on sustainable, reduced-input, or organic agriculture

7 subscriptions	1	1.9%
5-6 subscriptions	8	15.4%
3-4 subscriptions	23	44.2%
1-2 subscriptions	19	36.6%
0 subscriptions	1	1.9%

mean = 3.0 median = 3.0 standard dev. = 1.55

Table 4.7. Demonstration project cooperators' memberships in interest groups. N = 52.

Group type	Memberships (%)
Local soil & water cons. district	40 (77%)
Farm Bureau	29 (56%)
National Farmers Union	5 (10%) [a]
American Agriculture Movement	5 (10%)
Farm commodity organization	17 (33%) [a]
Livestock raisers association	20 (38%) [a]
Sustainable agriculture society of the particular state	37 (70%)
American Farmland Trust	9 (17%)
Other conservation groups	19 (37%)

[a] Includes one respondent who previously belonged to the group.

Table 4.8. AFT sustainable-agriculture demonstration cooperators's prior experience with demonstration or research projects.

Item	% "yes"
Cooperator had taken part in any demonstration project, sponsored by a university, company, or other organization, prior to participation in the AFT demonstration (n = 52)	69.2%
Prior demonstration had involved comparison of yields from two or more kinds of seeds (n = 51)	52.9%
Prior demonstration had involved a comparison of yields/costs of different tillage practices (n=52)	30.8%
Prior demonstration had involved comparison of yields/costs of different fertilizer management practices (n = 52)	28.8%
Prior demonstration had involved comparison of yields/costs of different pesticide management practices (n = 52)	25.0%
Prior demonstration had involved comparison of yields/costs of other management practices (n=52)	11.5%

Conclusions

This chapter has attempted to identify why cooperators volunteered to participate in AFT's demonstration project in two ways. We examined respondents' answers to a direct question about their reasons for participating, and we examined the characteristics of participants for clues about their motivations. Both sets of questions reveal a fairly clear pattern. First, a large majority of the cooperators are members of SA associations. Second, the cooperators tend to have a background of volunteering to participate in demonstrations or studies, have a disproportionately high level of post-bachelors education, and say that they like to learn and participate in studies. Third, they are disproportionately younger, full-time farmers who manage large farm operations.

These findings are consistent with past literature on the characteristics of farm operators who are adopters of management practices for soil conservation or sustainable agriculture. For example, Nowak (1982) and Ervin and Ervin (1982) report that younger farmers are more receptive to soil conservation practices. Epplin and Tice (1986) and Carlson and Dillman (1988) report that farmers who manage larger farm operations are more likely to adopt new agricultural practices, such as conservation tillage. At least in part, a large farm operation decreases the risk of trying a new practice on one portion of the farm operation. Basu et al. (1982) note that there is a strong positive association between farm income and adoption of conservation practices, but argue that the relationship is probably a confounding effect of the size of the farm operation. The AERO survey (Rusmore, n.d.) of adopters of organic practices in the northern Great Plains notes that full-time farmers are more likely to adopt such practices. Finally, Carlson and Dillman (1988) and Ervin and Ervin (1982) report that higher education is associated with adoption of conservation practices.

These findings should be read in two ways. First, the characteristics of the cooperators in AFT's demonstration program are typical of adopters of new management practices. Second, the characteristics of the AFT cooperators present a classic case of self-selection bias. That is, the cooperators are not a representative sample of farm operators. In the next and final chapter we will discuss the implications of the selection bias for future evaluations of the on-farm demonstration program that AFT may wish to consider.

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CHAPTER 5

EVALUATING SUSTAINABLE AGRICULTURE DEMONSTRATION PROJECTS: SUGGESTIONS FOR FUTURE RESEARCH

In this concluding chapter, we address the implications of our survey findings for a future, full-scale evaluation of AFT's sustainable agriculture demonstration program. As a preliminary point, we note some of the implications of the findings reported in Chapter 4 about the composition of the cooperators who volunteered for the 1989-91 program. Next we report on cooperators' record keeping, based on a series of survey questions that were designed to assess the information base for a thorough evaluation. Finally, we present some ideas for evaluations of the economic efficiency of the program's reduced-input practices and of the effectiveness of the dissemination of the demonstration projects' results.

Cooperator Self-Selection Bias

We concluded the previous chapter by noting that the 52 cooperators in AFT's sustainable agriculture demonstration program are not a representative sample of midwestern farm operators. They represent, from a research design standpoint, a case of program volunteers who exhibit self-selection bias (Campbell and Stanley, 1963). Their demographic characteristics--younger, better educated, higher income, and more professional farm operators--are unrepresentative of the average farmer, but quite typical of adopters of conservation-oriented farming practices. Finally, most of the cooperators have an affiliation with the sustainable-agriculture movement.

The selection bias in the population of cooperators and, hence, respondents to our survey raises two questions about evaluations to date of AFT's demonstration program. First, many of the key questions asked in our survey involved service clients' approbation of the program in which they participated. For example, key findings in earlier chapters include tables 2.5 to 2.12, which reported cooperators' generally high approval of the technical and other assistance received in the program and of the program generally. Campbell (1969) has pointed out the reactivity generally involved in relying on statements of approbation by program clients. That is, participants in a SA program who are members of the sustainable agriculture movement may not be inclined to criticize a SA program both because they participated in the program and because they believe in sustainable agriculture.

Second, in its published reports of earlier years' demonstration projects, AFT (1990, 1991a, 1991b) has presented its results as a series of comparison-group quasiexperiments. These projects depart from pure experimental designs in a number of minor ways. Principally, the treatment is not assigned in true random fashion among a large number of plots. In the 1989-90 demonstrations, 87% of the projects involved a single treatment plot and a single comparison plot. By the 1991 projects, however, the staff had persuaded a majority, 70%, of the cooperators to employ an alternating-strips design in which the treatment was applied in pseudorandom fashion among a number of strips in the demonstration plot. In addition, both the nature of the treatment and the assignment rule are negotiated between AFT and the cooperators. Nonetheless, the individual demonstrations, especially those using alternating-strips designs, represent a good comparison-group quasiexperiment and, as we have noted before (Culhane, 1991), provides the opportunity for a very robust quasiexperimental evaluation.

We are not sure what plausible effect the self-selection bias in the population of cooperators could have on the results of the demonstration comparisons. If one were comparing only reactive indicators of outcomes between the cooperator group and some comparison group or randomly selected farmers, the analysis would most likely be invalid. However, since the analysis focuses on yield and other differences between each cooperator's treatment and comparison plots, self-selection bias could affect the results only if the cooperator subconsciously (or intentionally) favored the treatment plot in managing the two plots. Since such discrimination would harm the cooperator's financial interest in his yields from the comparison plot, we consider this to be a low-plausibility threat to the validity of AFT's demonstration program.

Cooperators' Record Keeping

As a part of our survey we asked AFT's cooperators several questions designed to estimate the ability of a future evaluator to use the records of AFT's cooperators to do a pooled evaluation of the economic efficiency of the 1989-91 demonstrations' SA practices. Tables 5.1 and 5.2 provide summaries of the responses to a set of forced-choice questions about whether cooperators felt they could calculate the differences in costs between the treatment and comparison plots for four cost components. Across all four components, almost all cooperators reported they could calculate the differences in costs or that costs did not differ between the treatment and comparison plots. Cooperators reported the highest confidence in their ability to account for fertilizer costs (97%), with only slightly lower ability to calculate cost differences for labor costs (94%), pesticide costs (91%), and fuel and fieldwork costs (90%).

Both tables 5.1 and 5.2 combine "yes" and "no difference" responses to the cost components questions. If one examined the full distribution on which

Table 5.1. Cooperators' reported ability to estimate demonstration project cost components, by state. Percents answering, to questions, "Could you calculate the difference in ---- costs between the demonstration and comparison plots," either "Yes" or "no difference in cost." Pooled responses for both 1989/90 and 1991 participants.

Cost component	% "Yes" or "No Difference" IL	IN	MI	MO	Totals
Fertilizer costs	100%	96%	94%	100%	97%
Herbicide,pesticide costs	91%	87%	94%	94%	91%
Fuel, fieldwork costs	91%	87%	81%	100%	90%
Labor costs	100%	92%	87%	100%	94%
"Overall .. do you feel you can compare those costs very accurately, reasonably accurately, or not ..?" Percent "very accurately."	73%	58%	87%	39%	62%
Valid N's	11	24	16	18	69

Table 5.2. Cooperators' reported ability to estimate demonstration project cost components, by project type. Percents answering, to questions, "Could you calculate the difference in ---- costs between the demonstration and comparison plots," either "Yes" or "no difference in cost." Pooled responses for both 1989/90 and 1991 participants.

Cost component	% "Yes" or "No Difference" Nitrogen	Herbicide	Other	Totals
Fertilizer costs	100%	100%	80%	97%
Herbicide, pesticide costs	100%	95%	70%	91%
Fuel, fieldwork costs	95%	90%	70%	90%
Labor costs	100%	95%	70%	94%
"Overall .. do you feel you can compare those costs very accurately, reasonably accurately, or not ..?" Percent "very accurately."	66%	52%	70%	62%
Valid N's	38	21	10	69

Table 5.2 is based and separated "yes" from "no difference" responses, one would see an intuitively sensible pattern: all 38 cooperators with fertilizer projects stated they could calculate fertilizer cost differences (that is, they did not say there were "no differences" in fertilizer costs); 17 of 21 cooperators with herbicide projects said they could calculate herbicide/pesticide costs (with only three "no difference" responses); but often pronounced majorities gave "no difference" responses regarding non-fertilizer costs for fertilizer projects or non-pesticide costs for pesticide projects.

We also asked an impressionistic question: "Overall, .. do you feel you can compare [the four costs, specified in the preceding questions] very accurately, reasonable accurately, or not accurately?" Cooperators' reported confidence in their ability to estimate overall costs is high--with 62% answering "very accurately," 32% "accurately" and only one respondent "not accurately"--though not as high as the 90%+ responses indicating ability to compare differences in the various components of total cost. There are some odd contrasts between responses to the "overall cost" question and responses to the cost component questions. Only 39% of Missouri cooperators said they were confident of their ability to estimate overall costs, even though Missouri respondents gave the highest rates of "yes" and "no difference" answers on the cost-components questions. The odd pattern of responses in Table 5.2 in the "other projects" column seems to be an artifact of the small number of cases in that grouping.

When cooperators stated that they could calculate differences in a particular cost component, we also asked them to explain exactly what method they would use to make such comparisons. Cooperators' basis for estimating differences in fertilizer costs would appear to be the most reliable; 85% of

cooperators' valid responses indicated their cost comparison would be based on the difference between the amount of fertilizer times the cost (in pounds) applied to the treatment and comparison plots, respectively, and that they kept records on these quantities. The cost basis for comparisons of pesticide applications seemed less reliable than for fertilizer costs. We received fewer codable responses (19) than "yes" answers to the question shown in Table 5.1 (30). Only 68% of the codable responses suggested that the cooperator had clear cost data on the differences in pesticide application rates and chemical costs, while 32% suggested substantial vagueness in the cooperator's response.

Cooperators' descriptions of their ability to provide data on fuel or fieldwork and labor costs appear least reliable. A minority, 48%, of the codable responses suggested the cooperator could provide reliable fuel cost differences, or better (e.g., one cooperator would factor in tractor depreciation), for fieldwork costs, and another 10% would use custom rates (i.e., the rate charged to perform farming operations for others). In estimating labor costs, only 8% indicated they would use an imputed (monetized) labor cost rate, but another 14% would use their custom rate. The modal response, which accounted for only 28% of codable responses, was that the cooperator would simply compare the time spend on the different plots. Altogether, the relatively reliable methods for estimating labor costs only totalled 55% of codable responses.

Finally, one question in the survey asked 1989 and 1990 cooperators about the method they used to compute yields in the treatment and comparison group plots. (A parallel question was not asked of the 1991 subpopulation, because the survey was conducted during the harvest season.) This question was answered by only 30 of the cooperators, and the responses indicate some variance in the methods used to estimate crop yields. Half of the respondents did not provide

a clear statement of the exact method they used to measure the different yields from the comparison and treatment plots; many of these answers were not vague, but instead focused on other aspects of the yield calculation, such as drying the loads to a common moisture proportion. Among the remaining, more specific responses, a third weighed the yields from sample rows within the plots and the remainder stated or implied that they weighed the yields of the two plots separately. Weighing the yields from selected rows seems to be a less reliable yield-measurement method. But on the whole the yield figures provided by cooperators are probably fairly reliable.

In short, our survey suggests that the cooperators in the 1989-91 demonstration program should be able to provide useful data on fertilizer costs in most cases, and useful data on pesticide costs in fewer, but still probably a majority of cases. Cooperators' ability to provide meaningful, reliable data on fieldwork, fuel-use, and labor costs appears suspect.

Alternative Evaluation Designs

As stated in our earlier proposal (Culhane, 1991), AFT's demonstration program presents some important opportunities for a robust evaluation, as well as some technical design problems. AFT's program is designed to allow comparisons between treatment or SA plots (or strips) and comparison plots. We feel the existing group of projects presents the opportunity for a strong, valid evaluation of the cost-effectiveness of SA practices. The more difficult problem is to evaluate the effectiveness of the demonstration objectives of the program--that is, to document whether the projects' strengths were disseminated to and influenced other farm operators.

Efficiency of the 1989-91 Projects. The existing group of demonstration projects are a set of comparison group designs. The standard comparison group

design is usually diagrammed as

$$O \quad P_X \quad O$$

$$O \quad P_O \quad O$$

This design, unless cases are assigned to the treatment (P_X) and control (P_O) fields on a random basis, is considered to suffer from various threats to validity. The robustness of the AFT demonstration program stems from the fact that <u>different</u> treatments are applied in different years by different cooperators, resulting in a pattern that should cancel out biases that could more simply determine a two-group design. That is, the set of projects could be thought of as

$P_{N=hi}$	O	$P_{N=med}$	O	$P_{N=lo}$	O	$P_{N=lo}$	O
$P_{N=hi}$	O	$P_{N=hi}$	O	$P_{N=hi}$	O	$P_{N=hi}$	O
$P_{N=med}$	O	$P_{N=lo}$	O	$P_{N=lo}$	O	$P_{N=lo}$	O
$P_{N=med}$	O	$P_{N=med}$	O	$P_{N=med}$	O	$P_{N=med}$	O
$P_{H=med}$	O	$P_{H=med}$	O	$P_{H=lo}$	O	$P_{H=null}$	O
$P_{H=med}$	O	$P_{H=med}$	O	$P_{H=med}$	O	$P_{H=med}$	O

In the first two rows a cooperator, after a baseline year, experiments with a medium N application in year 2 and low N applications in years 3 and 4, compared to high N applications in the comparison plots. The third and fourth rows represent a second cooperator who tries low N applications in years 2-4, but compared to medium N applications in the comparison plots. The fifth and sixth rows represent a third cooperator, who joined the program in the third year, and experimented with medium herbicide applications in year 3 and no pesticide application in year 4, compared with medium pesticide applications in the comparison plots. In short, this design minimizes several validity problems, such as the interaction between the treatment and unpredictable year-to-year

effects (e.g., weather). Since each project involves a side-by-side comparison, the design also should validly control for factors widely regarded as important influences on yields, such as weather, soil type, and cooperators' management skills. As noted above, we do not find it plausible that the cooperators' evident commitment to sustainable agriculture would bias the difference in yields between the treatment and comparison plots.

As proposed last year, the analysis of results from the on-farm demonstrations would need to be analyzed using a statistical controls model of the general form

$$\begin{aligned} \text{Net\$} = a &+ b_0\text{SA} + b_1\text{Yield} + b_2\text{N} + b_3\text{Herb} + b_4\text{Insod} + b_5\text{Till} \\ &+ b_6\text{Til2} + .. + b_7\text{P\$1} + b_8\text{P\$2} + .. + b_9\text{F1} + b_{10}\text{F2} + .. \\ &+ b_{11}\text{OEd} + b_{12}\text{OExp} + .. \qquad + b_{13}\text{T} + e \end{aligned}$$

where **Net$** is the net dollar proceeds per acre (whether in the treatment or comparison plots); **SA** is a dummy variable representing treatment/comparison plots; **Yield** is the bushel yield per acre, normalized by crop type; **N** is the amount of fertilizer applied; **Herb** is the amount of herbicide applied; **Insod** is the amount of insecticide; **Till**, **Til2**, .. represent different tillage practices; **P$1**, **P$2**, .. represent controls for federal price supports, commodity prices, and other systemic sources of income variance; **F1**, **F2**, .. are farm size, soil types, and other farm characteristics; **OEd**, **OExp**, .. are cooperator characteristics, such as education, experience, SA group membership, etc.; and **T** is the program year.

In our earlier proposal, we assumed that computation of the net dollar proceeds per acre would be straightforward. Our survey, however, indicates that, while yield figures and chemical-input costs seem fairly reliable, the fieldwork components of cost (fuel, equipment depreciation, and labor) are much less

reliable and would require serious consideration. A substantial segment of the cooperator group apparently could not produce monetized fieldwork costs, using an accounting scheme that would be consistent from one cooperator to the next. Thus, it might be best to adopt the approach of those respondents who said they would use their custom-farming rates to estimate the fieldwork costs.

Otherwise, we see few problems implementing such a cost-effectiveness evaluation. In particular, there is probably little extra gain in validity that would justify the multiyear evaluation proposed by Culhane (1991); an evaluation carried out in the fall of 1992 or spring of 1993, using data from the 1989 Illinois demonstrations through the 1992 four-state program should be quite satisfactory and less expensive than the one proposed by Culhane (1991).

Net Efficiency, Improving Cooperator Group Diversity. The cooperators who have participated in AFT's program thus far are a very biased subpopulation of farm operators. They farm significantly larger operations, are proportionately better educated and more full-time operators, and belong to sustainable-agriculture groups at a much higher rate than the average farmer. As discussed above, we do <u>not</u> regard this bias as a threat to the internal validity of the findings of the quasiexperimental comparisons between the treatment and comparison plots in the various projects. While we would disagree with any referees or critics who would question the validity of the quasiexperimental findings, we would not be surprised if referees or critics raised this point. Moreover, by the book, this bias limits AFT's ability to generalize the findings to the full population of farm operators.

The solution to this problem would be to recruit a substantial number of cooperators--for example, 20-30 cooperators, who would begin in the 1992 program year--with farm operations below the average acreage in their state, that is,

less than 300 total acres farmed in Illinois down to less than 200 in Michigan (see Table 4.3). Only six cooperators currently in the program had farming operations that small in 1991. These additions to the cooperator subpopulation should also preferably work off-farm forty or more weeks per year, which is generally true of over a third of farm operators in the four states, though not of most current cooperators. And the additional cooperators should not be active in or even members of sustainable agriculture groups.

With such an added cohort of cooperators, an analyst should be able to confirm that *selection bias did not affect* the treatment-comparison group findings, and improve the external validity of the demonstration program. While this selection criterion would be no more costly than usual, it would present greater recruitment difficulties, since AFT's field staff appear to recruit cooperators principally through state sustainable agriculture networks.

Dissemination. The more difficult evaluation of the demonstration program is to assess the success of what AFT sees as its primary objective, which is disseminating understanding of the effectiveness of sustainable agriculture. That is, does the experience of participants carry over into continued use of reduced-input practices and, more important, adoption of sustainable practices by nonparticipant neighbors, acquaintances, and other contacts of participants?

The former question, continuation by demonstration participants, is fairly straightforward. Our survey asked cooperators about their intentions to continue SA practices (see tables 2.13, 2.14 and 3.1), and a thorough evaluation of this point would only need to verify actual continuation in subsequent years. Given the relatively small number of cooperators and their clear identification with the sustainable agriculture movement, however, such verification would represent only a small point in the evaluation.

The more difficult problem is to estimate diffusion of sustainable practices from program participants to plausible target audiences. The direct target audience would consist of farm operators who have received direct communication from cooperators of the results of their SA projects; this group would include farm operators who had visited the demonstration project, for example, as part of an AFT-sponsored field day, or with whom the cooperator had discussed his project. According to cooperators' responses to our survey (see tables 3.2 through 3.4), we can estimate that on average 11 farmers visited each demonstration site and each cooperator discussed his project with an additional 19 farmers, on average. So, even allowing for some reactive responses and double counting, a "snowball" sampling strategy should be able to produce a population of over 500 farmers who had direct communication with AFT's cooperators about their projects. A relatively simple telephone survey should be able to identify the frequency of adoption of sustainable practices among this group, as well as the timing of that adoption.

In addition, we should examine the rates of adoption of sustainable practices among neighbors and other operators in the general vicinity of the cooperator. The point of this survey, which would involve the same questions as to a sample of the "snowball" population of direct contacts, would be to determine if information about the projects had diffused within the local agriculture community. In other words, we suggest that diffusion could have occurred through either direct communication or diffuse "treatments."

Finally, we believe that the diffusion probably requires a true comparison group to have any ability to assert that the demonstration projects had influenced adoptions within the direct or diffuse treatment groups. In our earlier proposal (Culhane, 1991), we proposed to use adoption rates reported in

a variety of agriculture demonstration projects as a standard against which AFT's demonstration could be compared. That approach is probably unsatisfactory, given the currency of sustainable agriculture and its "movement" aspects. In any case, we doubt it would impress many referees as an adequate comparison group demonstrating the validity of any assertion that the demonstration projects had influenced adoptions in the direct or diffuse treatment groups. Thus, we would propose to survey a modest comparison group of randomly selected farm operators in matched counties that are not near cooperators in the AFT demonstration. This survey would ask the same questions about sustainable agriculture adoptions and timing as we asked of the direct and diffuse treatment groups. In both the treatment groups and the comparison group, we would need to monitor the comparability of the subsamples with the farm types and operator characteristics of the AFT cooperator group.

Conclusions

It is clear that the cooperators to date in AFT's sustainable agriculture demonstration program have been relatively professional farm operators with a pronounced identification with the sustainable agriculture movement. It seems reasonable to assume that, if reduced-input agriculture is to grow in the United States, several processes must occur. Reduced-input or organic techniques must be developed that can achieve important agriculture management objectives with less or no reliance on chemicals, especially persistent chemicals that may have adverse environmental and health effect. Second, because farm managers operate in a competitive market, these techniques must be demonstrated to be truly efficient, that is, as predictably providing better net revenue than higher-input methods. Third, information on these management practices and their effectiveness must be diffused widely among potential users.

AFT's demonstration program could make a substantial contribution to two of these requirements. Most important, the varied nature of the program's projects provides a much more compelling database for evaluating the economic efficiency of sustainable agriculture than does a simple one-treatment experiment. The data needed for a strong evaluation appears to be reasonable obtainable, and the population of cooperators seems sufficiently large to permit a valid statistical test of the net benefits of sustainable agriculture. It would be a shame if the expense and effort that led to the excellent set of quasiexperimental findings of the 1989-1991 (plus, probably, 1992) projects were not pulled together to perform the relatively straightforward pooled analysis discussed above (pages 42-45).

In addition, the program provides an opportunity to assess the effectiveness of dissemination of a demonstration project. Frankly, it seems that the dissemination effort to date has been consistent with the fairly nondirective style of the process of negotiating individual projects. Cooperators' dissemination efforts seem to have been relatively informal, by and large. But, with a more integrated analysis of the overall effectiveness of the program, AFT should have a basis for a more effective dissemination effort, involving, for example, media in farm country (e.g., radio interviews with an AFT staffer familiar with the overall findings and a local cooperator), wide-circulation periodicals, and so forth. But a key requirement for such a wider, more aggressive dissemination effort would seem to be the kind of pooled analysis that could summarize the overall effectiveness of the projects in the demonstration program.

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