

Evaluation of North Dakota State University Cooperative Extension Service Crop Management Short Course

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EVALUATION BACKGROUND

For over a decade, the Cooperative Extension Service of North Dakota State University has offered North Dakota farmers a six-day short course on current agricultural research, pest management and application of new farming ideas. Between 1971 and 1985, 1912 farmers and agribusiness representatives took the short course which was offered 54 times between 1976 and 1985. The primary topics presented in the short course over the years were optimum crop establishment, grain varieties selection, effective fertilization and management, weed, insect and disease control, and grain storage and handling systems.

Over time, topics have been added, such as pesticide application, row crop production, computer application and reduced tillage systems. The selection of courses reflected the need to maintain a knowledge of changes in existing agricultural practices as well as new techniques and production systems available to farmers.

A central problem in evaluating extension work has been determining the impact or influence of educational information and quantifying the degree of adoption of new knowledge into farming practices. In the early days of the Extension Service, extension agents presented new ideas to their farmer clients. County Agents and the Land Grant System had a role of creating awareness among the farmers of a new idea or practice. However, a "knowledge explosion" and a proliferation of information has occurred for agricultural information since the late 1960s. Besides making farmers aware of new ideas, a second important role of the Extension Service is in legitimizing new ideas. Legitimization of ideas is done by presenting a scientifically objective analysis of a new idea. This objective analysis may be based upon cost effectiveness or the integratability of the new practice into an existing sequence of farming practices.

This legitimization role of extension has implications for extension specialists and the educational format they use. Older teaching methods revolved around "common sense" to a large extent. Extension material was more focused upon the practical application of knowledge to farming. With the knowledge explosion, far greater in-depth knowledge of problems in farming was available. The new knowledge directed to farmer clients was synthesized from sources grounded on scientific method.

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The roles of extension specialists/teachers then revolve around synthesizing research findings, judging their scientific validity and reliability and presenting the material through the delivery system to adopter and interested parties. The short course format is favorable for presenting a broad array of scientifically relevant material and providing personal interaction with those individuals responsible for the synthesis and the teaching. This is not the same context as a demonstration project on a farm or experiment station; rather the social context of the short course provides both the flow of integrated information and expert opinion.

EVALUATION PROCEDURES

A group of short course presentors from the NDSU Extension Service developed a mail survey format. Five central issues in the survey instrument design were emphasized.

- 1) the utility of the course information at the time of the course and after ideas were implemented;
- 2) the estimated financial impact of each course section;
- 3) the level of adoption of new practices or innovations;
- 4) the stimulation of participants to search for information from other sources;
- 5) the change in primary sources of information used when considering new ideas or integrating new ideas into an existing farming operation.

The topics in the short course were grouped into the following categories:

- A) Routine Farm Management (enhancement of the farming operation and present practices)
 - Optimum Crop Establishment
 - Grain Variety Selection
 - Row Crop Production
- B) "High Tech" Topics (high technology and enhanced skills to manage farming operation through crisis)
 - Effective Fertilization and Land Management
 - Weed Control
 - Insect Control
 - Disease Control
 - Pesticide Application
 - Grain Drying and Handling Systems
- C) Gateway Innovations (new equipment that would lead to dramatically new and different operations)
 - Computer Applications
 - Reduced Tillage Systems

Lists of course participants from 1976 to 1985 were obtained from enrollment sheets maintained on file for these

years. Duplicate names and non-farmers were deleted, leaving 939 names out of the total of 1047 course participants. Survey forms were mailed in January, 1985. Only 859 of the 939 persons were still actively involved in farming. Surveys were returned by 473 persons or 55 percent of the 859 active farmers. Only 384 of the 473 responses were usable since about 90 surveys were incomplete.

BACKGROUND OF RESPONDENTS

Survey respondents were from all regions of North Dakota; 35 percent had been farming less than 12 years at the time they took the course and 40 percent had farmed between 13 to 29 years. About 25 percent had been farming for 30 years or more. The median time in farming for the group was 16.2 years. Almost 25 percent of the husbands and 20 percent of their spouses were college graduates. About 40 percent of both husband and wife groups had had some college or vocational education. The median education for both groups was beyond one year of college. Finally, 33 percent of husbands and spouses are high school graduates.

In terms of farm size and expansion, respondents were probably **not** typical of the North Dakota average. The median size of the respondents' farm was 1725 acres, about 500 acres larger than the state average in 1985. One-third of the respondents operated over 1,920 acres and owned an average of 40 percent of the land they farmed. Half of all respondents indicated they had purchased land since 1980. Among those who reported purchasing land, the median size of the land purchased was 193 acres. Of those who had bought land, 37 percent indicated they had purchased land from a family member or relative. The median amount of land purchased from relatives was 410 acres as compared to 193 acres for all land purchased.

In regard to farm finances, about 75 percent of the course respondents relied on wheat and other small grains as their principal source of income while 53 percent reported sunflower as a secondary source of income. Thirty-five per-

cent reported livestock as a source of income. The median for farm debt liabilities was \$86,000, while the median for present estimated assets was \$320,000. These farmers were not typical of farmers in financial risk.

UTILITY OF SHORT COURSE TOPIC

In the Extension Short Course, participants were exposed to six or eight sessions (two days per week over three consecutive weeks). Table 1 shows the number of respondents that have taken each topic session of the Crop Management Short Course. Also, the usefulness of each topic session was estimated when the participant took the course as well as at the time of this survey.

These results indicate a selective preference for certain topic sessions. Most participants took the routine farm management courses, but the estimates of utility changed little with time. More participants took the high tech sessions. Greater usefulness was assigned to the high tech session content **after** the information was tested in a farming operation. Fewer participants took the new innovation courses but these courses have been added recently. However, more respondents reported an increased estimate of usefulness for the course content after having taken the Crop Management Shortcourse.

FINANCIAL IMPACT OF COURSE SESSIONS ON FARMING OPERATION

In the financial impact section of the survey, 29 percent of the respondents indicated that the Crop Management Shortcourse had "turned around" their farming operation.

Assessing the financial impact of a set of ideas on farming operations is difficult. Little is known about individual farmers' management practices, land conditions, or farming practices before and after ideas are presented. Table 2 shows how respondents attributed increased yield or specific financial benefit to each course taken.

Table 1. Frequency of Selection of Course Topics and Estimated Usefulness of Course Content Then and Now.

| | % Having Taken Topic | Usefulness of Course (1 = Lo; 7 = Hi) | | Difference Between Then and Now |
|---|----------------------|---------------------------------------|-----|---------------------------------|
| | | Then | Now | |
| A. Routine Management | | | | |
| 1. Crop Establishment | 69% | 5.0 | 5.0 | 0 |
| 2. Grain Selection | 75% | 4.9 | 5.0 | + .1 |
| 3. Row Crop Production | 39% | 5.0 | 5.2 | + .2 |
| B. High Tech | | | | |
| 1. Effective Fertilization and Management | 82% | 5.1 | 5.2 | + .1 |
| 2. Weed Control | 90% | 5.3 | 5.3 | 0 |
| 3. Insect Control | 78% | 4.5 | 4.9 | + .4 |
| 4. Disease Control | 70% | 4.5 | 4.7 | + .2 |
| 5. Pesticide Application | 68% | 4.9 | 5.0 | + .1 |
| 6. Grain Drying & Handling | 55% | 4.7 | 4.7 | 0 |
| C. New Innovations | | | | |
| 1. Computer Application | 22% | 3.8 | 4.0 | + .2 |
| 2. Reduced Tillage | 45% | 4.4 | 4.9 | + .5 |

Table 2. Estimated Financial Benefit to Farm Operation Attributed to Short Course Topic Sessions.

| | % Yes to Experience Yield Increase Attributed to Course | % Indicating Financial Gain | Estimated Amount of \$/Acre Attributed to Course | | | |
|---|---|-----------------------------|--|--------|--------|---------|
| | | | \$1-6 | \$7-12 | \$13 + | MD |
| Routine Mgmt. | | | | | | |
| 1. Crop Establishment | 9 | 16 | 33% | 15% | 52% | \$13.67 |
| 2. Grain Selection | 24 | 13 | 33% | 33% | 34% | \$12.37 |
| 3. Row Crop Prod. | 6 | 24 | 61% | 10% | 29% | \$ 5.00 |
| High Tech | | | | | | |
| 1. Effective Fertilization & Management | 8 | 35 | 31% | 36% | 34% | \$10.55 |
| 2. Weed Control | 29 | 31 | 24% | 34% | 42% | \$11.00 |
| 3. Insect Control | 15 | 22 | 50% | 18% | 32% | \$ 6.08 |
| 4. Disease Control | 11 | 19 | 69% | 12% | 19% | \$ 3.34 |
| 5. Pesticide Application | 11 | 20 | 62% | 16% | 22% | \$ 5.13 |
| 6. Grain Drying | 7 | 20 | 74% | 7% | 19% | \$ 4.14 |
| New Innovations | | | | | | |
| 1. Computer Application | 4 | 18 | 80% | 14% | 7% | \$ 2.18 |
| 2. Reduced Tillage | 11 | 24 | 60% | 14% | 26% | \$ 3.62 |

These figures must be used judiciously. For most course offerings, between 25 and 50 percent of the respondents answered the questions on financial benefits. Many indicated an unspecified yield increase to the material from the course, but were unwilling to estimate an actual dollar per acre figure. For most course offerings, between 15 and 35 percent were able to make a financial gain estimate. For each topic, a median (or middle point) was calculated to reflect an average attributed financial gain per acre. The respondents reported that optimum crop establishment, grain variety selection and weed control were topics that provided the greatest estimated financial gain per acre. For all topics some estimate of financial gain was reported.

ADOPTION OF COURSE SPONSORED IDEAS AND SEARCHES FOR INFORMATION AFTER THE EXTENSION SHORT COURSE

The North Dakota State University Extension Service may not always be the source of new ideas, but extension programs provide a context wherein examination of new ideas and contact with expertise are possible. In this survey, respondents were not asked if they had heard of the new farming ideas or adopted such ideas before the short course was taken. The survey was designed to determine whether new ideas from the course were adopted into the farming operations and whether outside information was sought after the course but before adopting the new idea. In Table 3, the number of respondents taking each session is listed in the first column, the percent seeking information on the topic after the session is in the second column, and the percent taking the course that have adopted course ideas into farming practices is in the third column.

For all topics, most participants sought information after the course and before the decision to adopt ideas. In many cases, however, the decision to adopt seed varieties, fertilizer or chemicals may have been made **before** or just after taking the extension short course. One educational objective of the Extension Service has been to encourage farmers to

objectively consider ideas and look for other sources of information. In all topics, over half the respondents reported seeking additional information. Also, in most topic areas, the adoption of the new ideas was quite high.

THE SEARCH FOR FURTHER INFORMATION

Who the farmer/participant contacted for further information was quite revealing. Table 4 lists the distribution of those who contacted single sources and those who contacted two or more sources for additional information. The Land Grant University System refers to either the county agent and (or) North Dakota State University campus staff. The agribusiness or seed dealer are a second source. And "other" includes media sources, family, friends or neighbors. Multiple sources include any combination of these sources.

Farmers generally indicated Land Grant sources were contacted in two of the three information searches in the "Routine Management" area. Most consulted multiple sources of information. Land Grant University system sources were consulted more frequently than agribusiness dealers for the "high tech" sessions in four of six topics. Within the Land Grant response, those using the county agent and those using NDSU campus directly were about equal. Finally, among those who had taken the Gateway Innovation courses, most respondents indicated using the Land Grant system. For computer application, the county agent was more frequently named than the NDSU campus. For reduced tillage, each source was used about equally.

Approximately 20 percent of the respondents who took the "Routine Management" sessions indicated using the Land Grant system for additional information. This appeared prominently in grain variety selection and optimum crop establishment. Finally, over 50 percent sought information from three or more sources, most frequently including county agent, NDSU staff and agribusiness dealers.

For high tech, a different pattern of additional information source usage was reported. Less than one quarter sought in-

formation from the Land Grant system. The percentage using NDSU and agribusiness and three or more sources was over 50 percent.

Finally, for "gateway" sessions, about 40 percent used the county agent and NDSU campus directly. Less than 20 percent reported using the combination of the county agent and agribusiness dealers. Just over half reported using the combination of county agent, NDSU directly and a third source (principally an agribusiness or seed dealer). Finally, less than one third of the respondents indicated using sources other than the Land Grant University system.

Some reliability checks were done on the data set. We found those respondents who had taken the course between 1978 and 1982 relied upon the county agent as a single information source more than people taking the course earlier or later. The educational level of the respondent was not associated with any single use pattern. Larger farmers and older farmers both showed patterns of relying slightly more on NDSU campus direct contact, but smaller and younger farmers showed no pattern for information seeking. Respondents with the most formal education used multiple information sources more frequently than those with less education.

Table 3. Proportion of Course Participants Who Adopted New Farming Practices Presented in Courses (within two years) and Who Sought More Information About Course Content After Course Was Finished.

| | # Taking Course | % Seeking Info After Course | % Taking Course, Adopting New Ideas to Farming Practice |
|--------------------------------|-----------------|-----------------------------|---|
| A. Routine Farm Mgmt. | | | |
| Optimum Crop Est. | 264 | 60% | 48% |
| Grain Var. Selection | 286 | 74% | 89% |
| Row Crop Production | 150 | 71% | 81% |
| B. High Tech | | | |
| Effective Fertil. & Land Mgmt. | 313 | 58% | 92% |
| Weed Control | 349 | 60% | 87% |
| Insect Control | 299 | 69% | 57% |
| Disease Control | 269 | 61% | 47% |
| Pesticide Appl. | 261 | 70% | 74% |
| Grain Drying | 210 | 78% | 71% |
| C. New Innovations | | | |
| Computer Appl. | 85 | 84% | 36% |
| Reduced Till. Mgmt. | 174 | 84% | 87% |

Table 4. Trends in Uses of Information Sources for Short-Course Participants After the Course and Before Adoption Decision.

| | -----Single Source----- | | | |
|---|------------------------------|-----------------------------|---------------------|------------------|
| | Land Grant University System | Agribusiness or Seed Dealer | Other Press, Friend | Multiple Sources |
| Routine Farm Management | | | | |
| 1. Crop Establishment | 22% | 16% | 6% | 45% |
| 2. Grain Variety Selection | 24% | 9% | 7% | 60% |
| 3. Row Crop Production | 14% | 20% | 11% | 55% |
| High Tech | | | | |
| 1. Effective Fertilization & Management | 19% | 31% | 7% | 43% |
| 2. Weed Control | 19% | 18% | 2% | 61% |
| 3. Insect Control | 22% | 19% | 48 | 55% |
| 4. Disease Control | 26% | 17% | 1% | 57% |
| 5. Pesticide Application | 17% | 26% | 2% | 55% |
| 6. Grain Drying | 15% | 14% | 18% | 53% |
| New Innovations | | | | |
| 1. Computer Application | 17% | 5% | 28% | 40% |
| 2. Reduced Tillage | 15% | 8% | 14% | 63% |

CHANGES IN THE INFORMATION NETWORK

Farmer sources of information about crop management may have changed in the last few years with more complex technology and capitalization in farming. Respondents were asked to rank the importance of eight information sources as higher, about the same, or lower at the time they completed the questionnaire as compared to the year they took the Extension Crop Management Short Course. Table 5 lists the eight information sources and the changes that have taken place.

Information sources that lost importance were farm magazines, elevators and friends and neighbors. Information sources that increased by three percent in importance were agribusiness dealers and county agents. Information sources that increased in importance by greater amounts were Soil Conservation (+8%), the Experiment Station (+9%) and NDSU campus direct (+10%).

CONCLUSION

Most respondents noted high utility for the Crop Management Short Course sessions and these usefulness estimates increased over time. Fewer respondents completed the series of questions on increased yield or attributed financial gain per acre than other questions in the evaluation. The

figures are positive but must be read judiciously. The course also was shown to trigger both the adoption of new ideas and practices as well as searches for further information **after** the course. In most cases, Land Grant sources were prominent within the further information searches.

The types of courses indicate patterns of information seeking and shed light on emerging roles for county agents and North Dakota State University campus staff. For routine farm management topics, county agents received farm referrals after the course. But for "high tech" session participants, more complex information is sought from North Dakota State University campus staff and from agribusiness dealers. For "gateway" innovations (computers, reduced tillage), North Dakota State University campus staff and dealers are sought after the course for further information. We feel the data indicates that county staff were prominent for routine farm management decisions, but not as prominent for complex information topics (high tech, computers and reduced tillage). This coincides with the importance of information sources (Table 5). Respondents indicated that NDSU campus sources and Experiment Station sources were more important now than before they took the short course.

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Table 5. Comparative Importance of Information Sources Before and After Extension Course.

| | -----percent----- | | |
|--|--------------------------|-------------------|---------------------------|
| | Lower now than before | About the same | Higher now than before |
| 1. Farm Magazines (N = 265) | 28% | 53% | 20% |
| 2. Agribusiness Dealer (N = 240) | 21% | 55% | 24% |
| 3. Elevator (N = 186) | 36% | 51% | 13% |
| 4. County Agent (N = 304) | 15% | 67% | 18% |
| 5. Soil Conservation Service (N = 155) | 17% | 58% | 25% |
| 6. NDSU Campus (N = 213) | 17% | 56% | 27% |
| 7. Branch Exp. Station (N = 217) | 15% | 61% | 24% |
| 8. Friends/Neighbors (N = 210) | 37% | 50% | 13% |