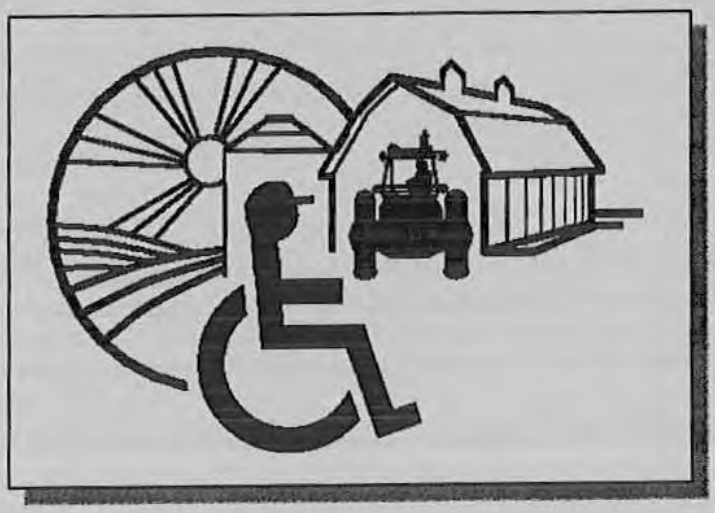
Assistive Technology Needs Assessment of Farmers and Ranchers with Spinal Cord Injuries

FINAL REPORT

Prepared by
Breaking New Ground Resource Center
Agriculture Engineering Department
Purdue University
West Lafayette, Indiana



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SCRF Grant #760-02

ABSTRACT

The purpose of this study was to enhance the quality of life of farmers, ranchers, agricultural workers and family members who have experienced a spinal cord injury. The study was designed to gain a better understanding of the needs of this population, explore strategies to increase the use of appropriate assistive technology and to develop resources for use by rural rehabilitation professionals. In addition, an effort was made to estimate the number of individuals involved with agricultural production who have spinal cord injuries.

It was determined that there are approximately 4500-6500 farm or ranch family members in the United States with spinal cord injuries and that an estimated 250-300 new cases occur each year. The lack of an effective or comprehensive system to identify cases of spinal cord injury among the farm or ranch population was identified as a serious problem.

Surveys and on-site visits involving approximately 300 farmers and ranchers with spinal cord injuries found that the population is primarily male owner/operators who consider themselves as actively engaged in agricultural production, and who generally experience lower levels of unemployment than the rest of the disabled population, are active in their communities, depend largely upon their family unit for assistance and utilize a wide range of homemade and commercial assistive technology.

Critical needs identified included the need for strategies in many rural communities for early intervention and assistance in the rehabilitation process, local or community-based resources and expertise, greater utilization of peer support networks, training and resources for primary caregivers, resources on alternative employment opportunities and information on ways to accomplish essential agricultural production tasks with a spinal cord injury.

FOREWARD

In the Spring of 1979 I watched as Bill used a collection of straps to pull himself from his chrome-plated E&J wheelchair into the cab of a five ton; four-wheel drive, shiny green John Deere tractor. With a roar from the 200 horsepower engine and a belch of black smoke, Bill headed for a field being prepared for a new crop. It will be hard to forget the expression of confidence and self-worth that radiated from his face. He was doing what needed to be done — what he wanted to do more than anything else.

It is my hope that this study, kindly supported by the Spinal Cord Research Foundation of the Paralyzed Veterans of America, will make it possible for other farmers and ranchers with spinal cord injuries to get back into the fields, growing crops, raising livestock and contributing to America's tremendous ability to feed and clothe so many.

Bill Field
Project Director

ACKNOWLEDGEMENTS

There have been numerous contributors that have helped in completing this study of the assistive technology needs of farmers and ranchers with spinal cord injuries. All of the staff at the Breaking New Ground Resource Center have contributed in one way or another in the review of the research design, completion of on-site assessments and the completion of the final report. This includes Dean Brusnighan and Melissa Deason. A special thanks also goes to Denise Heath and Deb Felix for completing numerous drafts and making many changes, to Steve Freeman for preparing presentation visuals, and to Dal Dinger, Ed Kirkpatrick and Scott Whitman for their editorial contributions. The authors are especially appreciative of the support received from the Paralyzed Veterans of American Spinal Cord Research Foundation under Grant #760-02.

Special thanks are extended to the many farm and ranch families who completed survey forms and took part in the on-site visits and case studies. Our hope is that the information we gathered will be shared with farmers/ranchers and rural professionals, so that others will be helped in years to come.

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SECTION I. INTRODUCTION

A. Background

In 1979, a farmer who had experienced a spinal cord injury (SCI) contacted the Department of Agricultural Engineering at Purdue University requesting assistance on modifying his equipment so he could continue to farm. As a result, the Breaking New Ground (BNG) Resource Center was established. Since that time, the BNG Resource Center has responded to more than 11,000 individual requests for information regarding assistive technology in the agricultural workplace. Individuals with SCI's have been one of the largest groups to utilize BNG's services. Since 1979, an estimated 3,000 farmers/ranchers and rural residents with SCI's have requested information or have participated in BNG sponsored events such as workshops, on-site visits or worksite assessments.

With the support of the Paralyzed Veterans of America's Spinal Cord Research Foundation, the BNG Resource Center undertook a study of the assistive technology needs of farmers and ranchers with SCI's. In completing the study, BNG surveyed approximately 300 farmers/ranchers with SCI's, conducted 56 initial on-site visits to complete interviews and worksite needs assessments, and surveyed farmers concerning their employment experiences following a SCI. In addition, a series of 10 follow-up on-site visits were made nearly 2 years after the initial survey to assess the progress and current problems of the original participants.

Another outcome of this project has been the delivery of a wide range of rehabilitation services to the farmers who participated in the survey and on-site visits. In several cases, the BNG staff has been successful in helping farmers receive needed services from Vocational Rehabilitation or other agencies, as well as providing technical assistance on needed worksite modifications and independent living needs. As a result of this project, many farmers with SCI's have now completed extensive modifications to their agricultural operations that have enabled them to continue operating their equipment and completing essential farm tasks.

B. Statement of the Problem

Because of the hazardous nature of farming, many farmers/ranchers incur serious injuries (including SCI's) each year. In the past little has been done to document the special needs of farmers with SCI. Because farmers/ranchers are isolated from urban areas, rehabilitative and medical services have been limited or available only after traveling a long distance. Many of the community and social activities in which the farmer/rancher had been involved frequently become inaccessible because of the SCI. Experience indicates that with appropriate technology, an individual with a SCI can remain productive in an agricultural setting. However, in order to develop appropriate strategies of service delivery, the need exists to accurately substantiate the size and distribution of this special population, and to document their needs with respect to rehabilitation services and assistive technology.

C. Goals and Objectives

The purpose of this study was to enhance the quality of life of farmers, ranchers, agricultural workers and family members who have experienced a SCI. The study was designed to gain a better understanding of the needs of this population, explore strategies to increase the use of appropriate assistive technology and develop resources for use by rural rehabilitation professionals. A summary of the primary goals and short term objectives are as follows:

GOAL #1: Develop an estimate of the number of individuals with SCI's who live and/or work on American farms and ranches or who are involved in some aspect of agricultural production. This will include attempts to determine population distribution and projected population changes.

Short Term Objectives

1.1 Review the literature on the number and distribution of individuals with SCI's and develop an estimate of this population who live in rural areas, on farms, and on ranches.

1.2 Utilizing the BNG Resource Center network and other organizations designed specifically to provide services to individuals with SCI's, develop a mailing list of individuals with SCI's living in rural areas, on farms and ranches with SCI's.

1.3 Prepare a publication on the size of population and distribution of individuals with SCI's living on farms, ranches, and in agricultural dependent communities.

1.4 Present findings at selected national forums (RESNA, PVA, NRA, etc.).

GOAL #2: Complete a comprehensive assistive technology needs assessment with a special emphasis on worksite accessibility, for individuals with SCI's living on farms and ranches, or employed in agricultural production.

Short Term Objectives

2.1 Develop a rehabilitation technology needs assessment instrument specifically for individuals with SCI's living on farms and ranches or employed in agricultural production. The instrument will have a primary focus on worksite accessibility.

2.2 Complete a minimum of 50 on-site need assessments of the target population in the following states with large agricultural populations: Indiana, Ohio, Illinois, and Iowa. Each visit will be documented with narratives and photographs of needs.

2.3 Investigate the assistive technology needs of individuals with SCI's employed in agricultural-related businesses in rural areas. This would include sales and services of agricultural products and equipment.

2.4 Conduct a mail survey of each individual identified during the duration of the project to determine their perceived assistive technology needs.

2.5 Prepare a summary of the assistive technology needs of the target population.

2.6 Develop an audio-visual presentation on farming with a SCI.

2.7 Present findings at selected national forums (RESNA, PVA, NRA, Common Threads 92, etc.).

D. Procedures

The design of the proposed research project was performance based, with 11 specific objectives that were written to ensure effective evaluation. The following section summarizes the procedures utilized to complete each objective the project.

1.1 A review of the literature relating specifically to SCI's and the rural or agricultural setting was completed. It was anticipated that little published information existed in this area. Such a review was needed, and it was believed once the review was completed it could be kept up-to-date by the BNG Resource Center. Searches were conducted using electronic data bases, periodical reviews, and existing resources gathered by the Center.

1.2 In order to develop a mailing list of farmers and ranchers with SCI's, a complete review of all correspondence received by the BNG Resource Center since 1979 was completed. This process involved reading approximately 5,000 letters requesting information. All those that indicated the writer had a SCI were separated for eventual follow-up.

Throughout the duration of the project, aggressive efforts were also made to identify and contact other individuals with SCI's living on farms and ranches. This was done through articles in the popular press (See Appendix A), reports in the BNG newsletter and other media releases. Those identified were contacted and encouraged to participate in the study. Anyone unwilling to participate was excluded from the final list. Every effort was made to maintain the confidentiality of all information unless permission for its use was granted by the participant.

1.3 Using data from the U.S. Census Bureau, the Census of Agriculture, and estimates of the number of individuals with disabilities, an attempt was made to ascertain population size and distribution of individuals with SCI's in rural areas. Factors contributing to the number and distribution of this population were identified and trends explored. Contacts were also made to organizations serving the needs of individuals with SCI's to identify information relevant to the study.

1.4 During the past three years, the findings from this study have been included in various presentations to national audiences; including technical presentations at The President's Committee on the Employment of the Disabled, RESNA, the Canadian Seating Conference and the American Society of Agricultural Engineers. In addition, the findings have been used in training programs for rural rehabilitation professionals and staff of the U.S.D.A. Extension Service AgrAbility Program.

2.1 Using the Agricultural Worksite Assessment Tool developed by the BNG Resource Center, worksite assessments were conducted for farmers in the Midwest who had experienced a SCI. (See Appendix B for copy of Assessment Tool.) The tool's primary focus was worksite accessibility, but it also addressed basic independent living needs. One of the farmers agreed to allow the use of the completed assessment tool and related information as part of the final report (See Section V). In addition, a survey instrument was developed to identify the needs of farmers and ranchers with SCI's. This was initially field-tested with a group of farmers being served by the BNG Outreach Program, a program which provides services to farm families in Indiana (See Appendix C for a program brochure).

2.2 A total of 66 on-site visits covering 10 states were made to farmers and ranchers with SCI's. This was the most time-consuming component of the project due to the travel time involved. However, it was through these visits that considerable first-hand knowledge was gained on the personal successes and struggles involved with farming/ranching with a SCI. Each visit was documented with narratives and photographs that illustrated specific problems or applications of assistive technology.

2.3 The investigation of assistive technology needs of individuals working in agricultural-related businesses was not completed to the extent originally planned. However, in a separate research activity conducted by the BNG Resource Center, an extensive survey of the employment experiences of farmers/ranchers with SCI's was carried out. This work was accomplished by Ed Sheldon as part of a M.S. dissertation.

With the passage of the Americans with Disabilities Act (ADA), and the increasing awareness in rural areas of the disability issues, the need exists to further explore employment opportunities and barriers to employment in rural communities.

2.4 Utilizing the survey instrument developed, a group of 300 farmers and ranchers with SCI's and identified as being actively involved in agricultural production was surveyed using the Dillman method of surveying. The results were coded for ease in computer analysis. The results of this survey are found in Section IV.

2.5 A summary of the assistive technology needs are included as part of this report. This summary consists primarily of the needs identified through the survey and on-site visits. It is hoped that this information will provide the basis for improving the services provided to this population, enhance the benefits of assistive technology and increase the independence of farmers/ranchers with SCI's.

2.6 Utilizing the data and materials gathered from the surveys and on-site visits, two slide sets were developed. One has been used to report on the general findings, and the other to provide technical information on farming/ranching with a SCI. A copy of both slide sets in their completed form will be provided to The Spinal Cord Research Foundation.

2.7 As noted in 1.4, every effort has been made to utilize the findings in local, state and national settings. For example, a one-hour program on Farming With a Spinal Cord Injury was presented at the 1991 RESNA Conference. A similar presentation is scheduled for the National AgrAbility Workshop in December of 1992. It is anticipated that over the next few years this study will produce several additional "spin-off" presentations.

E. Personnel

The activities of this project were conducted primarily by research assistants and students. Several were initially hired with the intention of completing the entire project, but for a variety of reasons left prior to its completion.

1. Harry Cook was the first research assistant hired for the project. Cook, a former dairy farmer with advanced degrees in agriculture and geology, gave up farming due to multiple sclerosis which significantly impaired his mobility. His extensive farming experience, easy going style, and his disability opened up many farm gates for on-site visits. During his work on the project, Harry completed more than 35 on-farm visits, prepared case histories, documented worksite modifications, and prepared the survey (Farming With a Spinal Cord Injury Survey). He helped identify over 250 farmers to participate in this mail-type survey. Due to health problems Harry felt it necessary to leave the project.

2. Brian Linville, an agricultural engineer who had experienced a SCI while hang gliding, was hired part-time to complete the project. He began the job of analyzing about 100 returned surveys and refining the case histories drafted by Harry Cook. He was also employed part-time on another project to complete a technical report entitled "Improving Worksite Mobility for Farmers with Physical Disabilities" (See Appendix D). This report contained considerable information relevant to farmers with SCI's. Brian was with the project for only about three months when he returned to graduate school full-time.

3. Greg Schnepf, a research assistant at Purdue, was assigned the job of completing the 50 case histories and summarizing the survey data. He completed an additional 15 case histories and assembled them into a consistent format. In addition, he prepared a summary of 131 returned surveys that was presented at the 1991 RESNA Conference in Kansas City and published in the RESNA proceedings (See Appendix E). Greg was offered an opportunity to coordinate a state-wide childhood injury prevention program, and left the project in February 1991.

4. Gary Stoops began his responsibilities with BNG in August of 1991. Initially, Gary assisted with the review of the data and case histories, then assumed full time responsibilities as BNG Outreach Program Coordinator.

5. Mike Sears, a junior in agricultural engineering, assisted with the project on a part-time basis for more than a year, tabulating data, entering data, compiling statistics, and creating the tables and figures found in this report.

6. Barry Delks, Rural Rehabilitation Specialist at Purdue joined the BNG staff in January 1992. He was assigned the task of analyzing and summarizing the survey data and overseeing the completion of the project.

SECTION II. LITERATURE REVIEW

Although little has been published concerning the scope and magnitude of the rural rehabilitation problem, particularly as it relates to farm and ranch families, a few sources of data suggest the number of persons living in rural areas with severe physical disabilities is significant. The following review of the literarure is designed to document the magnitude of the rural population with physical disabilities, including SCI's, and to summarize the delivery of rehabilitation technology services in rural areas.

A. Prevalence of Disability Within the Broader Rural Community

An examination of a U.S. map would reveal that much of the country is rural and sparsley populated. Extremely large areas even lack major access highways. However, if one were to apply the Standard Metropolitan Statistical Area definition used by the U.S. Bureau of the Census, approximately one quarter of the nation's population resides in rural areas. Furthermore, the nation's three most hazardous occupations: mining, agriculture, and forestry predominantly employ individuals in the more isolated rural areas. This situation suggests that there is potentially a higher proportion of individuals with disabilities within the rural population. Even if a narrower definition is used, the rural population is still a substantial minority in need of services.

It is estimated that approximately 8.5 million rural residents have disabilities. The RTC: Rural at the University of Montana estimates that 13 million rural residents have at least one chronic or permanent impairment (RTC: Rural 1990). The 1980 National Health Interview Survey showed that while 10.37 percent of the urban population is disabled, 12.75 percent of the rural non-farm population and 12.6 percent of the farm population have serious limitations due to disabilities (National Center for Health Statistics, 1984). In that study, states such as Mississippi, Oklahoma, West Virginia, Alabama and Kentucky, all primarily rural, had over 11 percent of the population reported as disabled.

The Health Interview Survey also showed that in 1980, there were approximately 1.936 million males ages 16-64 who were vocationally disabled living in rural areas. For females of the same age group, this population was 1.577 million in size. In addition, the survey indicated that the prevalence of specific types of common disabilities is substantial as shown in Table 1.

Table 1. Prevalence of Disabilities in Rural America*

Disability Type	Estimated Population (Both Sexes)
Epilepsy	429,000
Speech Impairment	738,000
Hearing Impairment	7,086,000
Visual Impairment	2,930,000
Back Impairment	4,384,000
Paralysis of Extremities	417,000
Absence of Extremities	856,000

*Not part of a Standard Metropolitan Statistical Area.

B. Prevalence of Disability Within the Rural Agricultural Community

There are 2.2 million farm families in the United States who are responsible for the production of food and fiber essential to all of us. In addition, there are about 5-7 million agricultural workers who assist in this task on a full-time or seasonal basis. History has shown that the agricultural-related sector of the population is particularly susceptible to disabling injuries. A recent report from the National Safety Council has classified agriculture as one of the most hazardous occupations in America (Accident Facts, 1991 Edition). If accidents involving children in the agricultural workplace were included, agriculture's injury rate would be even higher.

Another National Safety Council report which summarized farm accident data from 21 states found that 64% of all farm work injuries were considered severe injuries (Hoskin and Miller, 1979). Approximately 1% of the non-fatal farm injuries that occur each year prevent the farmer from continuing to work due to a permanent disability (National Safety Council, 1991). This was estimated to be approximately 1500 individuals in 1990. An even greater number of individuals continue farming, but due to a permanent disability are unable to perform essential work-related tasks. Approximately 2% of the full-time farm operators and workers have suffered permanent disabling injuries due to farm-related accidents (Accident Facts, 1986 Edition).

Farmers and agricultural workers are also disabled as the result of non-farm or non-work related accidents. In fact, of the severely disabled farmers/ranchers who have contacted the BNG Resource Center over the past 13 years, motor vehicle and recreational accidents each accounted for more disabilities than farm-related mishaps.

Farmers/ranchers and agricultural workers can be affected by a variety of physical disabilities which restrict their ability to perform their jobs and participate actively in the rural community. A study of Indiana farm operators, completed at Purdue University in 1981, revealed that 66% were affected by at least one physical impairment. Over 30% cited musculoskeletal impairments, 25% indicated hearing impairments, 24% cited cardiovascular impairments, and 22% indicated respiratory impairments (Tormoehlen). Over 17% indicated that there were agricultural-related tasks on their farms that they were no longer able to perform, and over 19% stated that because of their physical impairments they were hindered or limited in their ability to perform necessary farm-related tasks. In addition, 19% stated they required assistance from a neighbor, employee, or family member to perform necessary tasks in their farm operations.

The National Center for Health Statistics (Series 10, No. 133, 1975-76) reported that 16.4% of the farm population experience some limitation of activity due to chronic conditions whereas, only 10.5% of the total labor force encountered such problems. Back problems appear to be more prevalent among the farm population as 17.7 persons per 1,000 had displaced intervertebral discs compared to 13.5 per 1,000 for the non-farm population (Series 10, No. 124, 1976). The farm population is more severely plagued by arthritis — 130.7 cases per 1,000 as compared with 109.2 cases per 1,000 non-farm people (Series 10, No. 124, 1976).

A comparison of general versus farm population data concerning the nature and scope of physical disabilities suggests that the rural and farm populations have a greater proportion of disabled persons. According to the President's Committee on Employment of the Disabled (Facts about Disabled People), 9% of the general population suffers from some form of serious physical disability. Other sources of data suggest the figure is as high as 17%. In comparison, the data available on the proportion of farm operators and farm workers who are disabled suggests that between 15 to 30% are limited in their activities due to physical disabilities.

Another indicator of the scope of the problem has been the demand for information concerning farming with a disability. During the past 13 years, the BNG Resource Center at Purdue University has responded to over 11,000 individual requests for information regarding rehabilitation technology from farm and ranch family members and rural rehabilitation professionals. In 1991, approximately 1,100 separate requests were received. These came from all 50 states, 7 Canadian provinces, and 9 foreign countries. The states from which the most requests were received included, California, Illinois, Indiana, Iowa, Kansas, Minnesota, New York and Wisconsin. Each is a major agricultural producing state.

Research relating to the scope and nature of physical disabilities among farm and ranch children is virtually non-existent. Likewise, there is a void of information concerning the potential rehabilitation needs of this population. The BNG Resource Center, during 1991, had contact with several boys under the age of 12 who had lost one or both arms in augers and power-take-off shafts, or feet and hands in various machines. Others had sustained permanent injuries from livestock accidents, suffered falls or were involved in all-terrain vehicle (ATV's) accidents. In nearly all these cases, the parents and child wanted information on assistive technology that would enable them to continue participating in farm or ranch activities. Because of this interest, the Fall 1988 and Winter 1992 issues of the Breaking New Ground newsletter focused on children with disabilities living and working on farms. This included several reports on children who have experienced SCI's. The BNG newsletter was sent to every 4-H Youth Agent in the United States (See Appendix F).

Based on the previously discussed data, the BNG Resource Center has estimated that over 520,000 farm/ranch family members and agricultural workers have physical disabilities which hinder them from completing essential farm tasks. Furthermore, this population is probably the most isolated from rehabilitation services and resources, such as rehabilitation hospitals and independent living centers, which have the potential for reducing the impact of their disability.

Experience has shown that for every disabled individual who reaches out for rehabilitation assistance by taking the time to call or write a letter, there are many more who remain underserved and isolated from the potential benefits of rehabilitation.

C. Prevalence of Spinal Cord Injuries in Rural Areas

No definite data were located on the prevalence or distribution of individuals with SCI's living in rural areas. At the present, it is believed that no one can determine this information from published sources.

In 1986, Terry Wilkinson, a research assistant working with the BNG Resource Center at Purdue, completed a mail survey of 500 farm operators with unknown physical disabilities who had previously utilized the services of the Center. The sample was drawn from 36 states and 6 Canadian provinces. Of those responding, approximately 95% were males. The respondents averaged 44 years of age. Over 36% of the farmers were paraplegia and 12% had quadriplegia. Table 2 presents the findings relating to the distribution of disabilities reported by the 186 respondents in Wilkinson's survey.

Table 2. Distribution of Farmers by Type of Disability. (Wilkinson 1987)

Disability	Number of Farmers	Percent of Farmers
Paraplegic	68	36.4
Upper Limb Amputee	29	15.5
Quadriplegic	23	12.3
Lower Limb Amputee	18	9.6
Musculoskeletal	14	7.5
Neurological	14	7.5
Lower Leg Impairment	9	4.8
Respiratory	6	3.2
Vision	5	2.7
Polio	5	2.7
Hearing	4	2.1
Back Problems	4	2.1
Muscular Dystrophy	3	1.6
Cardiovascular	2	1.1
More Than One Handicap	28	15.0

In 1992, Edward Sheldon, a graduate research assistant at Purdue, completed a study entitled "The Survey of Employment Experiences of Farmers/Ranchers with Physical Disabilities." Again, he used a sample of those farmers/ranchers who had previously contacted the BNG Resource Center. Of the 1,700 surveyed, 452 reponded, 175 (39%) of which were SCI. This larger study showed a percentage of SCI's similar to that found by Wilkinson.

It should be noted that both the Wilkinson and Sheldon studies did not contain a random sample of all farmers with disabilities, but rather a group of those farmers who had requested assistance from the BNG Resource Center. Experience suggests, and the surveys confirm, that those who have contacted the Center tend to be more severely disabled. This group also appears to be more educated and more economically secure. Consequently, the percentages obtained through these studies could not be used to estimate the number of SCI's in the farm population.

The Wilkinson and Sheldon studies do suggest, however, that the farmers/ranchers with SCI's identified to date represent only the "tip of the iceberg" with respect to the total SCI farm population. It is clear that in addition to those who are aware of and able to contact the Center, there is a substantial number who remain underserved due to lack of effective communication skills, low perception of need, lack of knowledge and pride.

D. Barriers to the Delivery of Rehabilitation Services

Several studies have been done on a local or regionalized basis to identify barriers to the effective delivery of rehabilitative services to rural residents. Some of these appeared to be relevant to the needs of farmers/ranchers with SCI's. The Arkansas Rehabilitation Research and Training Center conducted a needs assessment in several rural areas and identified the following eight barriers (NIHR, 1983):

1. Economic limitations (income levels which are 20-40% lower than for urban residents).
2. High unemployment and under employment (lack of suitable employment opportunities which will accommodate individuals with disabilities).

3. Health care (shortage of health care professionals and a general absence of preventative and health maintenance activities).
4. Limited educational opportunities (rural educational institutions often lack adequate facilities, qualified staff and specialized educational programming and services).
5. Restricted transportation (isolation, non-existent public transportation and low income greatly restrict travel opportunities).
6. Attitudes (poor image of those with disabilities and agencies which provide services to those individuals).
7. Ethnicity (complications of providing services to individuals with various ethnic subcultures).
8. Inadequate data (limitations in knowing the needs prevent the development of effective plans of action).

A study by The National Rural Health Care Association (1985) stated:

"Migrant and seasonal farm workers face serious social problems: poverty, poor nutrition, unsafe unsanitary living and working conditions, physical isolation in remote rural areas, a mobile lifestyle, and for some conditions such as parasites, rates of illness comparable to those in developing nations. The lack of health care services or the inability to use available services is widespread."

The report further stated that some of the obstacles to delivery of health care services are:

1. Lack of transportation;
2. Language barriers;
3. Limited health clinic hours;
4. Farm workers' lack of money to pay for basic health care services and lack of health insurance coverage; and
5. Major cutbacks in existing support programs.

These observations concerning the health care delivery system for migrant and seasonal farm workers apply equally well to the delivery of rehabilitation services to many rural residents.

In 1986, the Independent Living Research Utilization Program (Richards, 1986) in Houston, Texas, identified eight rural independent living barriers: housing, attitudes, transportation, finances, architectural barriers, limited job opportunities, limited recreational/social opportunities, and difficulty in accessing information.

The Rehabilitation Engineering Society of North America (RESNA) — Rural Special Interest Group, has identified several barriers relating to the application of rehabilitation technology to rural settings. These include: information dissemination, consumer awareness of available technology, funding, potential liability exposure, and existing service delivery methods.

E. Availability of Rural Rehabilitation Technology Resources

Until recently, the rehabilitation professional has had few resources to turn to for the solution of a rural rehabilitation technology problem. Few modifications and assistive devices for use by rural residents with disabilities have been documented, and little effort has been made to assemble useful concepts in a central location or publication. The result has been frequent "re-inventing of the wheel," and the accompanying frustrations of both the professional and consumer.

Several events have recently occurred which should help fill the void of documented rehabilitation technology which has been successfully used by individuals with disabilities living in rural areas. These include:

1. The preparation of resource material by the BNG Resource Center at Purdue University, including Volumes I and II of "Agricultural Tools, Equipment, Machinery, and Buildings for Farmers and Ranchers with Physical Disabilities," and "Identifying, Selecting and Implementing Assistive Technology in the Agricultural Workplace." (See Appendix G for a listing of available resources.)
2. The hosting of two International Conferences on Rural Rehabilitation Technologies hosted by the University of North Dakota, Grand Forks.
3. The experiences gained by the Easter Seal Society of Iowa's FaRM and the BNG Outreach Program in a community-based approach to the delivery of rehabilitation technology services.
4. Establishment of the National AgrAbility project involving Idaho, Illinois, Indiana, Iowa, Louisiana, Montana, New York, Vermont and New Hampshire, Wisconsin, and most recently Michigan, Minnesota, North Dakota and South Carolina. All 14 of these states are now serving farmers/ranchers with disabilities.

F. Dependence Upon Family

It is important to note that the problems farmers/ranchers with SCI's face are not merely technical in nature. Linda Bertino, R.N. stated, "Spinal cord injuries are an insult to the body; people with these injuries need to adapt to both physical and psychological changes. The way people react to changes may be related to their perception of the injury, sociocultural attitudes, lifestyle adjustments, and response of others to the injury. Reaction may also be dependent upon stresses present at the time of injury. Stress and coping are factors that need to be considered by people with traumatic injuries, disabling conditions, and paralyzed hospitalization. In addition, stress affects the extent to which a disabling condition becomes a handicap" (Paraplegia News, January 1992).

The family is an extremely important factor in the well-being of any person, and the individual with a spinal cord injury is certainly no exception. When an individual is disabled by a SCI, it affects the whole family.

The text *Perspectives on Disability* discusses the importance of the family and the possible family stress that may be experienced in re-establishing community acceptance and involvement. "In many instances, parents and other family members must become advocates for their disabled counterparts in attempting to solicit the most positive care and involvement available. In many cases, the disabled encounter economic, educational, and social constraints which inhibit if not prevent them from achieving acceptance and integration into society... disability in any area often leads to family crisis" (Nagler, 1990).

"Dependence as a way of functioning can mean security for one person and insecurity for another. One of the issues that arises early the rehabilitation experience is that the dependence upon others for even the simplest physical needs...Dependence upon devices, systems, and other people is usually a reality for people with spinal cord injuries... Interdependence lies somewhere between dependence and independence... More than most other people, however, to live an interdependent lifestyle the person with a disability must have the strength and courage to communicate openly with others when help is needed and when independent action is preferred" (Phillips, Ozer, Axelson, Chizeck, 1987).

Dr. Nick Stinnet completed a study on farm families sponsored by the University of Alabama and *Progressive Farmer*. He concluded, "farm families seem to use a more positive approach to dealing with adversity — and they're happier." He went on to state that farm families "...are connected to themselves, to each other, to their land, to their communities, and to God... and this may be the key to their strength in surviving life's rough spots" (Kerr Center Newsletter, 1990).

G. Summary

These data, though by no means conclusive, strongly indicate that the level of rehabilitation needs among farm and rural residents — especially those with SCI's — are significant, but not widely recognized. There are few active programs designed to meet these needs. Furthermore, the number of professionals with expertise in the areas of rural rehabilitation services and the application of assistive technology in rural settings is extremely limited. Currently, their are few formal training opportunities in the field of rural rehabilitation, particularly as it relates to farmers with SCI's. Far too little is being done to expand the body of knowledge or advance the state-of-the-art of rural assistive technology service delivery strategies. Until recently, the conscious dissemination and application of assistive technology information has not taken place in many rural areas. These issues must be meaningfully addressed if the level of rehabilitation services to rural people with SCI's is to be raised to a level comparable to the services being provided to many urban residents.

SECTION III. ESTIMATING THE NUMBER OF FARMERS/RANCHERS WITH SCI's

In an attempt to address the first goal of this project, the authors conducted an extensive review of current literature addressing the U.S. SCI population. The review of literature revealed no data specifically addressing the prevalence of SCI's among the United States farm/ranch population. However, by utilizing available farm population data, SCI demographics and general SCI rates, it is possible to develop a reasonable estimate of the number of individuals with SCI's living and/or working on American farms and ranches, or who are involved in agricultural production.

According to the American Disabilities Act (ADA), 43 million Americans have some type of disability, and 1.2 million people are partially or completely paralyzed (ADA to Empowerment). Roberta Trieschmann offered 200,000 as a "reasonable figure" for the total number of persons with SCI's living in the United States (Trieschmann, 1988). Dr. Mike Devio from the National Spinal Cord Injury Statistical Center estimated the total population of SCI's in the United States to be between 175,000 and 225,000 (personal interview, February 1992). Rebecca White from the National Spinal Cord Injury Association Resource Center confirmed this estimate. She stated that the total SCI population fell within the range of 177,000 to 250,000. Devio stated 8,000 to 10,000 new SCI's occur each year. Trieschmann said SCI's occur at an estimated rate of 50 per million population in the United States each year or approximately 12,500.

According to the 1990 Yearbook of Agriculture, over 20 millions persons are involved in some phase of the United States food and fiber system. This figure includes those working in all areas of food production and processing, not just producers. The Yearbook states, "If we count all the people in households that report having either a farm operator or income from farm employment, the total population of such households comes to just 5.3 million, or 2% of the United States population". It is this later population that is relevant to this study.

Applying a rate of 50 SCI's per million to the estimated number of people in agricultural households provides a preliminary estimate of 265 SCI's occurring in the agricultural population each year. Similarly, multiplying the total number of SCI's in the United States (approximately 225,000) by the percentage of agriculture-related persons in the total population (2%), yields a figure of 4,500 for the total agricultural SCI population. This estimate, however, does not consider any factors which may positively or negatively skew the agricultural SCI's rate in contrast to that of the general population.

According to Trieschmann, the primary causes of SCI's include motor vehicle accidents (47.7%), falls (20.8%), acts of violence (14.6%), and sports-related injuries (14.2%). She said, "It is important to note that for ages 61 and older, falls and motor vehicle accidents account for almost 90% of all SCI's" (Trieschmann, 1988). According to the 1987 Census of Agriculture, over 33% of all farm/ranch operators are over the age of 60. Considering that physically demanding labor, the prevalent use of machinery and vehicles, and the high injury rate are characteristic of the agriculture industry, one could reasonably conclude that the SCI rate among farmers and ranchers is probably higher than in the general population.

The National Spinal Cord Injury Statistical Center (NSCISC) at the University of Alabama-Birmingham has accumulated information regarding the demographics of persons with SCI's. According to NSCISC, SCI's occur primarily to young people — 61% of new SCI's occur to individuals between 16 and 30 years of age. Many children 18 and younger work on farms and ranches, thus increasing their risk of injury. Though many women work on and manage agricultural operations, farming is still a predominantly male occupation. According to the 1987 Census of Agriculture, 93.7% of all farm/ranch operators are male. The NSCISC reports that males account for 82% of SCI's. All of these factors would serve to positively skew, or increase, the rate of SCI's in the agricultural population.

Other demographic characteristics of the general SCI population could be interpreted to decrease the rate of SCI's among farmers and ranchers. In the general United States population, for example, SCI's occur at a disproportionately lower rate among whites. Trieschmann reports, "Although 83.1% of the United States population is white, only 73.9% of the SCI's occur to whites" (Trieschmann, 1988). The United States farm population is predominantly white. However, because the number of black farm/ranch operators is so small (only 23,000 according to the 1990 Yearbook of Agriculture), the proportionately higher occurrence of SCI's among blacks is unlikely to have a significant affect on the farm/ranch SCI rate.

The following summarizes some of the factors which could positively or negatively skew the SCI rate of the US farm/ranch population:

1. The National Safety Council has rated agriculture as one of the most hazardous industries.
2. Farming is a predominantly male occupation — 82% of all SCI's occur to males.
3. Many children 18 and younger work on farms and ranches — 61% of all new SCI's occur in the 16-30 age group.
4. One third of all United States farm/ranch operators are over 60 years of age — in the 61 and older age group, falls and motor vehicle accidents account for 90% of all SCI's.
5. SCI's occur at a disproportionately lower rate among whites in the general population — although 83.1% of population is white, only 73.9% of SCI's occur to whites.

The fact remains that there is no accurate data on the number of SCI's in the United States agricultural population. However, by adjusting the preliminary estimate of 265 to reflect factors that might increase the incidence of SCI's, one could reasonably state that SCI's would occur in the agricultural population at a rate of approximately 250-300 per year. Likewise, a reasonable range for the total number of SCI individuals among the United States agricultural population would be 4,500-6,500 (see Appendix H).

Considering the great impact of a SCI on an individual, and the long-term costs associated with a SCI, additional efforts should be made to accurately determine the scope of the agricultural SCI population. Establishing a national registry for all SCIs in the United States — to document the cause, nature of injury and geographic location (urban or rural) of injured persons — would greatly assist in addressing this need, and would make great strides in identifying and serving the needs of SCI individuals in rural areas.

SECTION IV. SUMMARY OF SURVEY DATA

A. Introduction

In April 1990, 300 surveys (See Appendix I) were either mailed or hand delivered to farmers/ranchers with SCI's. This population was identified from the mailing list at the BNG Resource Center and from contacts made in other states. The BNG staff identified many of the SCI individuals by reviewing letters received from farmers and sending surveys to those who clearly identified themselves as SCI. Many of the letters and phone contacts received at the BNG Resource Center do not identify the nature of the injury, but the surveys previously done suggest that over 35% of the consumer mailing list have SCI's.

B. Survey Procedures

The survey consisted of 7 pages with 10 sections covering:

1. personal information,
2. description of farming activities,
3. physical abilities,
4. mobility aids,
5. services received,
6. community involvement,
7. work-related activities,
8. priorities of worksite accessibility,
9. willingness for an on-farm visit, and
10. selection of a gift in return for completing the survey.

In return for completing the survey, the farmers/ranchers selected to receive either a BNG hat, or a resource book entitled "Modified Agricultural Equipment."

Of the 300 surveys sent out, 162 surveys were completed and returned to the BNG Resource Center. Thirteen of the surveys were not usable because of incomplete data. A usable survey return rate of 49.6% was achieved. Those who took part in the survey represent 32 states and 4 Canadian provinces (See Figure 1 and 2).

Fig. 1. U.S. Distribution of Respondents.

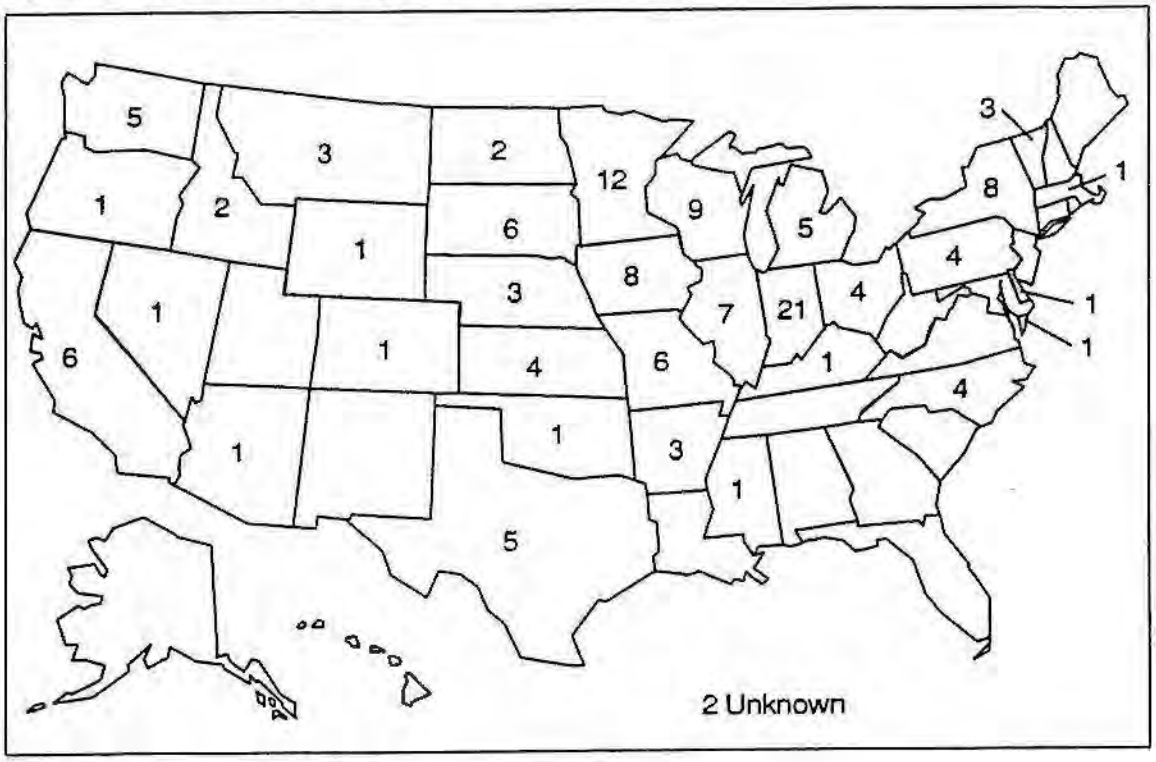
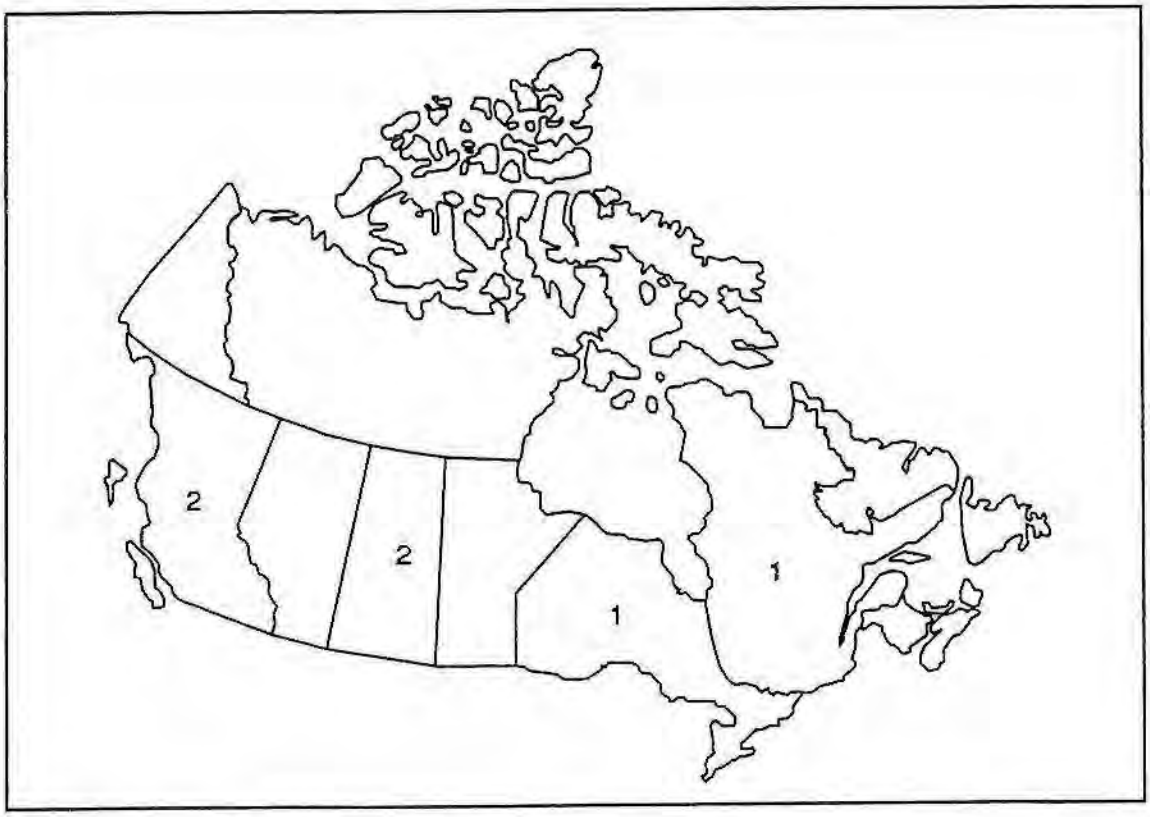


Fig. 2. Canadian Distribution of Respondents.



C. *Survey Results*

The following tables and narratives represent the findings from the 149 surveys that were usable (usable survey return rate of 49.6%).

1. Personal Information

A. *Age and Sex*

The average age of farmers/ranchers completing the survey was 43. Of those who responded to the survey 96.6% were male — about 14% higher than the national male distribution for all SCI's. This reflects the higher percentage of male farm operators.

B. *Residence*

Almost 80% of those surveyed resided on a farm or ranch. The remaining 20% reported a variety of reasons for living off the farm, including sale of farm, moved to town, and residence in long-term care facilities.

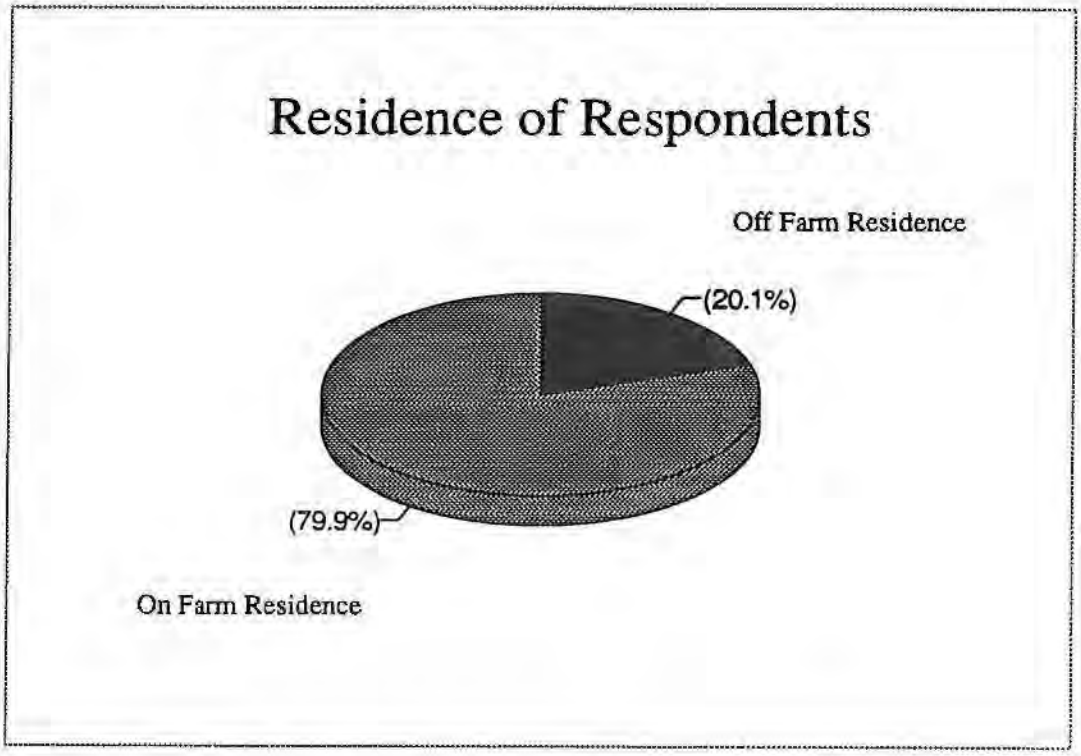


Fig. 3. Residence of Respondents.

C. *Occupation*

More than 79% of the farmers with SCI's surveyed received at least some portion of their income from a farming operation, with nearly 40% stating that their principal source of income was from farming activities. Over 31% received some income from off-farm employment. Seven respondents selected more than one response, resulting in a total greater than 100% (See Table 3).

Table 3. Distribution of Respondents by Present Occupation	
Full-time farm operator	29.5
Part-time farm operator with principal source of income from the farm	10.1
Part-time farmer with principal source of income from off-farm employ	31.5
Retired farm operator (working part-time on the farm)	8.1
Retired farm operator (not working)	6.0
Hired farm worker	3.4
Farm wife	2.7
Student	4.7
Unemployed	8.7
Total	104.7

Only 8.7% of the respondents considered themselves to be unemployed. In another survey completed by Sheldon of the BNG Resource Center on employment experiences, disabled farmers reported about an 8% unemployment rate. It is interesting to note that statistics provided by the United States Architectural and Transportation Barriers Compliance Board indicate that 73% of the total disabled population is unemployed.

D. Income

The percent of income received by respondents was listed in four categories (See Table 4). Almost 70% reported some income from farm activities. More than 11% listed supplemental on-farm activities as a source of income. Almost 29% receive income from off-farm employment. Some disability-related income was received by 61.9% of the farmers surveyed.

Table 4. Source of Income Received by Respondents				
	0-25%	26-50%	51-75%	76-100% of income
Farm Activities	25.5%	15.4%	10.1%	18.8%
Off-farm Employment	7.4	6.7	4.0	10.7
Supplemental On Farm Activities	10.1	.7	.7	0
Disability-related Income	17.5	16.8	5.4	22.2

E. Age When Injured

Table 5 shows an age breakdown of the survey respondents at the time the SCI occurred.

Table 5. Age of Respondents When Injured		
	Age When Injured	Percent
Below 16	8	5.4
16 to 20	23	15.4
21 to 25	23	15.4
26 to 30	23	15.4
31 to 35	21	14.1
36 to 40	14	9.4
41 to 45	4	2.7
46 to 50	5	3.4
51 to 55	7	4.7
56 to 60	7	4.7
61 to 65	6	4.1
Above 65	0	0.0
Unknown	8	5.4
Totals	149	100.0%

National statistics confirm that SCI's occur primarily to young people. In the BNG survey over 60% of the SCI's occur to individuals in the 16-35 year age group. This concurs with the NSCISC data showing that 61% of new SCI's occur to individuals in the 16-30 year age group (Trieschmann, 1988). Possible factors contributing to the high occurrence of SCI's among young people may include lack of experience, greater acceptance of risk, lack of safety education, and the hazardous nature of farming. Over 5% of the reported SCIs occurred at age 15 or younger. This reflects the early age many children begin working around the farm in potentially hazardous situations.

2. Description of Farming Activities

A. Type and Size of Operation

More than 28% of the SCI individuals surveyed farm over 200 acres of corn or soybeans (not to mention the other grain crops, speciality crops, and livestock production). Farm sizes ranged from less than 5 acres to over 10,000 acres.

Survey data indicates that corn, hay, small grains, range/pasture, and soybeans were the most common crops grown. Of the farmers growing corn, over 27% produced 100 acres or more (See Table 6).

Table 6. Percent of Respondents Raising Particular Crops									
	(ACRES)								
	0-5	6-25	26-100	101-200	201-300	301-500	501-1000	+1000	Total %
Corn	3.4%	4.7%	12.8%	10.7%	4.0%	5.4%	6.0%	1.3%	48.3%
Soybeans	0.7	4.7	10.1	9.4	3.4	3.4	4.7	0.0	36.2
Small grains	2.0	9.4	16.1	4.7	2.0	1.3	2.0	5.4	43.0
Range & pasture	0.7	6.7	19.5	2.0	2.7	2.0	0.7	2.7	36.9
Hay	2.0	14.1	20.1	5.4	2.7	1.3	1.3	0.7	47.7

Other crops included fruits, vegetables, cotton, tobacco, pecans, trees, and several other agricultural products. Three producers listed sweetcorn; two producers listed strawberries; others listed snap beans, citrus dry beans, watermelon, potatoes, grapes, broccoli, garbanzo beans, sunflowers, or pecans.

Beef was listed twice as often as any other type of livestock; with 30% of all the farmers raising some beef cattle. Horses, dairy cows, hogs, sheep, and poultry ranged from 12.7% to 6.7% respectively. Other livestock produced included donkeys, goats, geese, rabbits, and honeybees (See Table 7).

Table 7. Percent of Respondents Involved in Raising Particular Type of Livestock

	(HEAD)								
	1-10	11-25	26-100	101-200	201-300	301-500	501-1000	+1000	Total %
Hogs	2.0%	0.7%	3.4%	0%	1.3%	0.7%	2.0%	0.7%	10.8%
Beef	6.7	3.4	14.1	1.3	2.7	1.3	0	0.7	30.2
Sheep	0.7	4.0	3.4	0	0	0	0	0	8.1
Dairy	2.0	2.7	4.7	1.3	1.3	0	0	0	12.0
Horses	8.7	2.0	2.0	0	0	0	0	0	12.7
Poultry	2.7	0.7	2.0	1.3	0	0	0	0	6.7

B. Acres Owned/Rented/Rented Out

More than 81% of the producers owned some portion of the ground farmed. Fifty-three percent (53%) owned 100 acres or more. Only 8.6% of the farmers rented out any of their land (See Table 8).

Table 8. Acres Owned, Rented, and Rented Out

	Less than 51 Acres	51-100	101-200	201-300	301-1000	+1000	Total
Acres Owned	16.1%	12.1%	16.8%	9.4%	20.1%	6.7%	81.2%
Acres Rented	12.1	2.0	5.4	2.7	13.4	8.7	44.3
Acres Rented Out	1.3	1.3	2.0	2.0	2.0	0	8.6

C. Farm Management Responsibilities

The farmers/ranchers with SCI's surveyed performed many of the manual and physical duties required in their operations. In addition to normal physical labor, many assumed managerial duties, as well. Over 70% were responsible for sales and purchases related to the farm business. Slightly over 67% were responsible for maintaining farm business records, and 64.4% were responsible for management of labor (See Table 9).

Table 9. Percent of Respondents Responsible for Various Farm Duties			
	Yes	No	Unknown
Sales and Purchases	70.5%	25.5%	4.0%
Maintain Farm Records	67.1	29.5	3.4
Labor Management	64.4	26.9	8.7

D. Who Do You Rely on to Help Perform Difficult Tasks?

Reports indicate that the quality of the relationship within the family is more important in the success of rehabilitation than the disability itself. "If the family communicates an attitude of worth to the disabled person, his self-concept will be maintained, and he is more likely to participate in the rehabilitation process" (Trieschmann, 1988). Results of this survey confirm that family assistance on the farm is of high importance. The spouse and children were identified by 56% of those responding as providing physical assistance. Other family members were listed by 45% of those surveyed. Hired labor (39%) was commonly listed as a source of physical assistance. Neighbors accounted for 12% of the responses. Only 2% stated that "no one" was required for physical assistance.

3. Physical Abilities

A. Level of SCI

Of those surveyed, 26.8% classified themselves as a Class I injury (C1-C8), 12.1% as a Class II (T1-T5), 18.1% as a Class III (T6-T10), 21.5% as a Class IV (T11 - L2), and 21.5% were listed as "unknown." More than 65% of those surveyed reported being paraplegic, and 27.5% reported being quadriplegic. No response was provided by 6.7% of the responders.

B. Level of Movement

Table 10 shows the level of movement of those who responded to the survey. Only 5.6% had full movement of their lower extremities. More than 80% said they had no movement in their knees, 87.9% stated they had no movement in their ankles and 77.2% had no movement in their hips. Over 18% had no movement in either their finger, hands or arms. Full movement of their head and neck was reported by 73.2%.

Table 10. Percent of Respondents with Full, Partial, or No Movement				
	Full Movement	Partial Movement	No Movement	Unknown
Head/neck control	73.2%	5.4%	0%	21.5%
Upper extremity movement				
Arms (movement at shoulders & elbows)	81.2	15.4	0.7	2.7
Hand (movement at wrist joint)	70.5	22.1	1.3	6.0
Fingers (able to touch fingers to thumb)	51.0	13.4	16.1	19.5
Trunk Control				
Ability to bend forward and backward at the waist	34.9	39.6	24.8	0.7
Ability to bend side to side at the waist	33.6	37.6	26.2	2.7
Ability to twist at the waist	30.9	36.2	30.2	2.7
Lower Extremity Movement				
Hip (able to raise leg)	2.3	20.5	77.2	0
Knee (able to kick foot)	2.3	15.8	80.5	1.3
Ankle (able to move foot)	1.0	97	87.9	1.3

4. Mobility Aids

A. *Distance from Source of Mobility Aid*

Distance was a major factor with respect to purchasing and servicing mobility aids. Over one-third of those surveyed purchased and obtained service for their primary mobility aid more than 100 miles away. More than 23% traveled 100 miles or more to purchase and service their manual wheelchairs (See Table 11.) One farmer purchased his wheelchair from England (this was not included in the survey results).

Table 11. Distance From Sources Where Mobility Aid Was Either Purchased or Serviced				
Type of Mobility Aid	1-25 miles	26-50 miles	51-100 miles	101+ miles
Manual wheelchair	21.5%	19.5%	18.1%	23.5%
Powered wheelchair	2.0	4.0	4.0	4.0
Power chair (Amigo/Braun Type)	0.7	1.3	0	0.7
ATV	12.1	2.7	3.4	4.0
Other	3.4	2.7	1.3	1.3

B. *Licensed to Drive a Motor Vehicle*

Almost 80% of those surveyed are licensed to drive. Only 11.4% stated they did not have a license; the remaining 8.7% did not answer the question.

C. *Type of Vehicle*

The automobile was the most common mode of transportation reported by the respondents. However, pick-up trucks (43.6%) and vans (36.2%) were a close second and third respectively (See Table 12). The heavy use of pick-up trucks is probably not parallel among the non-farm population with SCI's.

Table 12. Percent of Respondents Driving Specific Vehicles	
Car	51.7%
Van	36.2
Pick-up	43.6
Larger truck	7.4

D. Types of Modifications Used in Motor Vehicles

Of course, vehicle modifications play an important role in allowing a person with a SCI to drive. Hand controls, CB/communication aids, and wheelchair lifts were the three most common modifications. Hand controls were used to modify over 40% of the vehicles. More than 18% of the vehicles were modified with some type of CB/communication aid. Several farmers from the survey listed cellular or mobile phones as an important modification. About 15% of the vehicles were modified with wheelchair lifts, 9% had power doors, 6% were equipped with powered transfer seats, 3% had low effort steering, and over 7% listed "other" types of modifications. There does appear to be a discrepancy between the percentage of respondents who reported that they were licensed to drive and the percentage of vehicles modified to enable an individual with a SCI to operate them.

E. Feelings About Driving a Motor Vehicle

From the survey it appears that most of the respondents drive with little fear or hesitation. Only 2% stated they were "very uncomfortable" driving and 13.4% said they were "cautious." More than 77% stated they were "very comfortable" driving a motor vehicle (See Table 13). One farmer stated that although he was "very comfortable" driving himself, his wife was not, and that she insisted on doing the driving.

Table 13. Percent of Respondents Feelings Concerning Driving a Motor Vehicle	
Very comfortable	77.2%
Cautious	13.4
Very uncomfortable	2.0
Unknown	7.4

5. Services Received

A. From What Source Have You Received Special Rehabilitation Services?

Those who received "special rehabilitation services" were most frequently served by a rehabilitation hospital (53%), others by Vocational Rehabilitation (37%), and Social Security (26%), respectively. Veterans administration, disability insurance, Easter Seals, local support groups and "other" agencies accounted for the remaining sources of "special rehabilitation services."

B. Vocational Rehabilitation Worksite Assessment

Efforts were made during the early stages of developing the assessment tools to come up with one that could be self-administered. This concept was briefly tested, but it was soon concluded that the client often focused on only the immediate needs rather than on

developing a more comprehensive assessment of worksite accessibility. The outside professional who is detached from the day-to-day activities but experienced with agricultural production activities is able to raise questions, not only about the immediate needs, but also other problems that will eventually be encountered.

According to the survey, over 40% of the farmers reported that someone visited their farm to conduct a worksite assessment. Vocational Rehabilitation, BNG, and FaRM were the three most commonly listed providers for worksite assessments. Almost 60% of the producers had had no one come out to their farm to evaluate the worksite needs (See Table 14).

Of those who received a worksite assessment 8.1% were from Vocational Rehabilitation, 7.4% from BNG, 2.7% from the FaRM Program, and 16.7% listed "other."

Table 14. Percent of Respondents Whose Worksite Needs Were Evaluated

Yes	Yes Unknown Evaluator	No
34.9	5.4	59.7

C. *Distance from Nearest Medical or Rehabilitation Service*

More than 30% of the farmers with SCI's traveled more than 26 miles just to obtain medical services. Over 58% traveled 26 miles or more to receive rehabilitation services; 33.6% traveled 50 miles or more (See Table 15).

Table 15. Distance from Medical Care or Rehabilitation Service

	1-10 miles	11-25 miles	26-50 miles	+51 miles	Unknown
Distance from medical care	37.6%	24.2%	18.8%	11.4%	8.0%
Distance from rehab service	9.4	18.8	24.8	33.6	13.4

D. *Useful Resources*

There are many good resources for individuals with disabilities, however, not everyone who could benefit from them are aware of their existence. Resource publications can provide ideas on how to do a simple task, or identify agencies or organizations that might be helpful. Table 14 identifies publications related to disabilities and rates their perceived usefulness. The publications rated most useful were Breaking New Ground newsletter, Paraplegia News and Sports "n" Spokes. (By using a weighted average 3=very useful, 2=useful, and 1=not useful; the publications were rated in Table 16.)

Table 16. Usefulness of Publications Received				
Publication	Very Useful	Useful	Not Useful	Weighted Average
Breaking New Ground	55	52	0	2.5
Paraplegia News	18	26	2	2.4
Sports "n" Spokes	11	25	2	2.3
Other	4	6	2	2.3
Accent on Living	6	6	2	2.2
Challenged American	0	2	1	1.7

The BNG newsletter is distributed to more than 8,000 individuals and 3,000 organizations with no charge or subscription fee required (See Appendix J).

6. Community Involvement

A. *Current Involvement in Community Activities*

The survey found that almost 60% of the SCI respondents were "very active" or "active" in church. This ranks highest among their involvements in community activities. Yet, over 11.4% of the churches were rated as "not accessible" and 29.5% as "partially accessible." Hunting and fishing were rated the second most popular activity with about 48% being "active" or "very active." Still, more than 52% of parks and recreational facilities were rated as "partially" or "not accessible" (See Tables 17 and 18). Personal interviews with farmers with SCI's revealed that getting in and out of a fishing boat and accessing hunting areas were two specific obstacles to outdoor recreational activities.

Table 17. Percent of Respondents Current Involvement in Various Activities				
Activity	Very Active	Active	Not Active	Unknown
Church	23.5%	35.6%	33.6%	7.3%
Farm Organizations	5.4	32.2	45.0	17.4
4-H/Extension	2.0	14.1	55.7	28.2
FFA	2.7	4.0	59.7	33.6
School	5.4	14.1	52.4	28.1
Local Politics	4.0	16.1	53.0	26.9
Hunting/Fishing	19.5	28.9	35.5	16.1
Sports	7.4	16.1	49.0	27.5
Other	8.1	2.7	10.7	78.5

Farmers surveyed ranked farm organizations as their third most common form of community involvement, with about 38% being "active" or "very active."

B. *How Accessible are Public Facilities?*

The buildings that were rated as very accessible were grocery stores (63.8%), banks (63.8%), farm equipment dealers (53%) and churches (53%). Grocery stores, banks, and equipment dealers are probably more accessible due to the level surfaces commonly found in these types of businesses and the common use of automatic electric door openers.

Table 18 shows the ranking of the level of accessibility of public facilities. The Post Office was rated the least accessible. County office buildings, ASCS offices, SCS offices, extension offices, and libraries all serve as meeting places for many farm organizations. However, more than 48% of the county office buildings, 41% of the ASCS and extension offices, and 45% of the libraries were classified as "partially" or "not accessible" by the respondents.

Table 18. Perceived Accessibility of Public Facilities in Respondents' Community

	Very Accessible	Partially	Not Accessible	Unknown
Churches	53.0%	29.5%	11.4%	6.1%
Schools	46.3	37.6	5.4	10.7
Restaurants	43.6	49.7	4.0	2.7
Service Stations	38.9	42.3	12.1	6.7
Hardware Stores	45.6	42.3	8.7	3.4
Farm Equipment Dealers	53.0	36.2	4.0	6.8
Grocery Stores	63.8	30.2	3.4	2.6
Banks	63.8	22.8	9.4	4.0
County Office Buildings	43.6	36.9	11.4	8.1
Co. Ext. & ASCS Offices	46.3	30.9	10.1	12.7
Parks/Recreation Areas	38.3	50.3	2.0	9.4
Libraries	42.3	27.5	17.5	12.7
Post Office	43.6	29.5	21.5	5.4

C. *Individual Most Helpful in Achieving Independence*

When asked, "Which of the following individuals have been the most helpful to you in achieving greater independence in your community?" the respondents overwhelmingly ranked spouse first. The "other" category (#6) included common responses of family members such as cousins, uncles and girlfriends. The "professionals" who typically might serve the disabled population rank the lowest (See Table 19). Responses were weighted 1st = 3, 2nd = 2, 3rd = 1, then ranked with 1st being the most helpful (and receiving the highest total weight).

Table 19. Individuals Who Have Been Helpful in Achieving Community Independence (Responses are in rank order, with number 1 being the most hepful.)

	Total Weighted Value
1. Spouse	205
2. Parent	119
3. Neighbor/Friend	79
4. Physical Therapist	74
5. Children	73
6. Other	53
7. Vocational Rehabilitation Counselor	31
8. Occupational Therapist	30
9. Clergy/Pastor	17
10. Physician	7
11. Extension Agent	6

7. Work Related Activities

A. Difficulty of Various Activities

Twenty-seven work-related activities were listed, and those surveyed were asked to rank the level of difficulty they had experienced when completing each task. A weighted average was used, with "No difficulty" = 1, "Some difficulty" = 2, "Difficult" = 3, "Very difficult" = 4, and "Need help" = 5. The 27 work activities were ranked 1-27, with #1 being the most difficult (See Table 20). Making heavy machinery adjustments or repairs (changing tires, wheel spacing, switching combine heads, etc.), loading or moving livestock, and harvesting logs or splitting firewood were all listed as the most difficult activities requiring the most assistance. Maintaining farm buildings (painting and repair) was ranked as the second most difficult activity. Hitching implements to tractors, cleaning the milkhouse and working milking equipment, giving shots and attending to the medical needs of stock, and castration/docking tails/clipping teeth all ranked third in level of difficulty and required assistance to complete. Work related activities ranked the *least* difficult were (1) operating tractor or combine controls, (2) mowing the lawn and moving to and from fields, and (3) getting to and from farm buildings and handling common farm shop tools.

The responses tend to reflect the greater attention that has been given to assisting farmers with SCI's in operating agricultural equipment and completing mechanical activities. Less attention has been given to the problems of completing livestock-related activities.

Table 20. Difficulty of Various Farm/Ranch Related Activities in Descending Order

		Weight average
1	Making heavy machinery adjustments or repairs	4.5
1	Loading or moving livestock	4.5
1	Harvesting logs or splitting wood	4.5
2	Maintaining farm buildings (painting and repair)	4.4
3	Cleaning milkhouse and washing milking equipment	4.3
3	Giving shots and attending to the medical needs of stock	4.3
3	Castration/docking tails/clipping teeth	4.3
3	Hitching implements to tractor	4.3
4	Barn cleaning and handling manure	4.2
5	Maintaining the orchard (pruning, etc.)	4.1
5	Moving grain or concent. to feed livestock	4.1
6	Milking	4.0
7	Routine machinery maintenance and repair	3.9
7	Moving hay and feeding hay to livestock	3.9
8	Fueling and routing maintenance of tractors, etc.	3.8
9	Making PTO connections	3.6
9	Feeding and watering young stock	3.6
10	Welding	3.5
11	Gardening	3.4
11	Coupling hydraulic lines	3.4
12	Opening and closing barn doors, gates, etc.	3.2
13	Getting on or off tractor or other self-prop. machinery	3.1
14	Getting to and from farm buildings in most kind of weather	2.5
14	Handling common farm shop tools	2.5
15	Moving to and from fields to check field work, crops, fences, etc.	2.4
15	Mowing the lawn	2.4
16	Operating tractor and combine controls	2.0

B. Worksite Modifications

Almost 48% of the SCI farmers reported modifying their tractor or combine with hand controls, and over 37% reported installing a lift on such equipment (See Table 21). The high number of ramps to houses and farm buildings (68%), smooth pathways (25%) and concrete work areas (19%) reported account for the ease of moving to and from farm buildings.

On the opposite end of the scale, only 2.6% reported using special hitching devices. Hitching farm equipment was ranked as one of the most difficult tasks. Other modifications included additional steps, electric doors and an electric feed cart.

Table 21. Modifications to the Farm Operation	
1. Lift on combine or tractor	37.6%
2. Modified hand controls on tractor or combine	47.6
3. Special hitching devices	2.7
4. Concrete work areas	18.8
5. Automatic gates	6.0
6. Ramps to houses and farm buildings	67.8
7. Smooth pathways	24.8
8. Lowered benches in shop	19.5
9. Other	3.4

8. Prioritize Goals for Worksite Accessibility

Using a weighted average, with 1 = "Least important" and 8 = "Most important," worksite accessibility goals were prioritized and ranked. The higher the weighted average, the higher the priority was ranked by the respondents. The survey revealed farmers were most concerned with improving their ability to effectively and safely use machinery and equipment. This response reflects the fact that the single most frequent type of call received by the BNG Resource Center relates to accessing agricultural equipment following a disability.

Improving overall mobility around the farmyard was listed second. Interviews with numerous SCI farmers confirm that this is an important issue. Mobility in manual wheelchairs across gravel continues to be a common barrier for many farmers. The applicability of outdoor powered wheelchairs and all-terrain vehicles is also a frequent question asked by this population.

The third and fourth priorities were improving their ability to perform general maintenance activities and improving farm management skills, respectively. Improving livestock handling abilities and abilities to perform miscellaneous farm chores were prioritized fifth and sixth respectively.

Identifying alternative farm enterprises was listed seventh, and obtaining part or full-time off-farm employment eighth. This may confirm that farmers desire to stay on the farm and remain self-employed, and thus may often fail to consider off-farm employment.

Table 22. Prioritized List of Goals Concerning Worksite Accessibility	
	Weighted Average
1. Improve ability to effectively and safely use equipment and machinery, including accessing, operating, and maintaining equipment and hitching implements.	6.9
2. Improve overall mobility or accessibility around farmyard, buildings, and fields.	6.8
3. Improve ability to perform general maintenance activities around the farm, including effective use of hand tools, power tools, and maintenance materials.	6.0
4. Improve ability to manage farm/ranch operation successfully, including the maintenance of business records, sales and purchases, and labor management activities.	5.8
5. Improve livestock-handling abilities related to feeding methods, health-care needs, waste removal, and building sanitation.	5.3
6. Improve my ability to perform the following farm job _____	5.0
7. Identify an alternative farm enterprise which would better suit my abilities and limitations.	4.4
8. Obtain part or full-time off-farm employment.	3.5

Because the farm or ranch is not just a place of employment, but also a home, and because the operation may have been part of the family for generations, seeking off-farm employment may be the least desirable option for most farmers with disabilities. In addition to these factors, many farmers may have little or no off-farm employment experience. Thus, seeking off-farm employment may result in greater levels of anxiety and stress.

Thirty-two percent (32%) of those surveyed did list obtaining off-farm employment as a priority, and 37% listed alternative farm enterprises as a priority. A report by the USDA and the Census Bureau states that more than 50% of farmers earn money from off-farm employment (Washington Post, 6/9/92). Currently, the BNG Resource Center is conducting 2 projects concerning the employment experiences of farmers with disabilities. One project seeks to identify alternative farm enterprises and the other will result in a resource guide for farmers making career decisions following a disability. Both projects address the special employment needs of farmers with disabilities.

The farmers surveyed ranked "Improve my ability to perform the following farm job (specify task)" as the sixth priority. The number and type of responses to that question varied almost as much as the number of surveys returned. Only "finances for equipment" was listed twice. Other responses included: operate farm machinery, operate tractor, putting on duals and wheel weights, handling livestock, fencing, grain handling equipment, unloading seed and feed, maintenance, access to grain truck, feeding animals, need lift for tractor, planting, swathing, communication, keep employer happy, milking, and checking row crops to name a few.

9. Would You be Willing to Have a Member of BNG Visit Your Farm to Collect Additional Information?

One hundred and six (106) farmers, or 71.1% of those surveyed, agreed to an on-site visit. Of those 106 farmers, 63 on-site visits (almost 60%) have been completed. Approximately twenty (20.2%) said "no" and 8.7% did not answer the question.

10. Select One of the Following Items You Would Like to Receive in Return for Completing the Survey

- ☐ BNG Hat
- ☐ Modified Agricultural Equipment, Agricultural Equipment Manlifts for Farmers and Ranchers with Physical Handicaps

Almost 56% of those completing the survey selected and received the book, "Modified Agricultural Equipment." Thirty-nine percent (39%) selected the BNG hat and 3% gave no answer. Two percent (2%) checked both.

SECTION V. AGRICULTURAL WORKSITE NEEDS ASSESSMENTS FOR FARMERS/RANCHERS WITH SPINAL CORD INJURIES*

A. Introduction

One of the first steps in determining the vocational and assistive technology needs of a farmer or rancher with a physical disability is to conduct an assessment of the workplace and evaluate his/her ability to complete the desired tasks. Outcomes of conducting such an assessment include:

1. A better understanding of the size and scope of the total operation and the individual's role in it, including the potential for alternative enterprises.
2. Identification of significant workplace barriers and functional limitations that prevent completion of desired tasks.
3. The opportunity to discuss desired worksite modifications, possible task restructuring, or the reassignment of certain hard-to-perform tasks to other family members or employees.
4. The opportunity to identify specific goals that will help the farmer or rancher to increase independence, productivity, and profitability.

Another proven outcome of conducting the on-site assessment is that it demonstrates to the individual and his or her family that the rehabilitation professional is genuinely interested in their needs. This willingness to visit them in their immediate surroundings and to become familiar with the situations they must cope with on a daily basis helps to open lines of communication and win their respect.

Experience has shown that not every farmer or rancher with a disability needs a comprehensive worksite assessment. In many cases the immediate need is very simple and the solution easy to provide from existing resources. However, as the severity level of the disability increases, the need for a more thorough assessment becomes of greater importance. This is especially the case with respect to SCI's.

B. Role of Assessment Tool

Health care and rehabilitation professionals have used various patient/client assessment tools for a number of years. These assessment tools provide valuable information on the health care and rehabilitation needs of disabled individuals and aid in developing a plan for meeting these needs.

Members of farm and ranch families affected by physical disabilities often have special needs relating to the agricultural worksite that existing assessment tools may not uncover. Furthermore, many health care and rehabilitation professionals are not familiar with the agricultural worksite and its particular challenges, or with the resources available to help clients to continue participation in their farm and ranch operations. In other words, they may not have the experience to ask the right questions to uncover potential workplace problems. Such a lack of information can lead to inappropriate solutions, delays in returning to work, unsafe modifications, and frustrations for everyone involved.

The primary purpose of using an assessment tool is to provide a standardized method of gathering and recording information about a client's workplace and the client's needs related to performing desired tasks. Upon completion, the assessment tool becomes a part of the client's file along with other records, and is updated when needed. If kept up-to-date and reviewed periodically, the assessment tool can also

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* Reprinted from "Conducting Agricultural Worksite Assessments."

provide a means of tracking the client's progress towards eliminating major worksite barriers and increasing independence.

C. Completing the Assessments

As part of this study, 56 agricultural worksite assessments were conducted with farmers participating in the survey. The assessment tool used was developed earlier by the BNG Resource Center, and was considered appropriate for application with farmers with SCI's (See Appendix B).

A client file was developed for each farmer, and over 10 have received follow-up visits to assess the need for additional technical assistance and to evaluate progress towards meeting individual goals. In addition, there have been numerous other contacts made by phone and through mail.

The information gained through these visits served to supplement the objective data obtained from the survey. For example, the worksite assessments confirmed the survey findings that even though this population places a high value on being able to operate agricultural equipment, there are other barriers that create serious impediments to independent living. The on-site visits also clearly showed the problems faced by the primary care-givers, which in most cases were the wives of the farmer. Other findings are reflected in the conclusions and recommendations found in Section VIII.

D. Case Example — Arlan Bookwalter

One of the farmers involved with the study, Mr. Arlan Bookwalter of Walton, Indiana, agreed to allow the information gathered through the assessment on his farm to be included as an example in this report. In addition, he agreed to allow a summary of his case narrative to be included. This summary reflects the follow-up activities that occurred between the BNG Resource Center and clients, as well as the progress that was made in achieving specific rehabilitation goals.

It should be noted that the following example is not representative of all the assessments that were conducted. Not all of the farmers involved with this aspect of the study desired as much input from the BNG staff.

To protect the confidentiality of those involved with the assessments, access to the files developed has been restricted.

ACTUAL CLIENT NARRATIVE

Referral Source Ron Erdely, Methodist Hosp. **Initial Contact Date** 1/5/89

AGRICULTURAL WORKSITE ASSESSMENT TOOL FOR FARMERS AND RANCHERS WITH PHYSICAL DISABILITIES

I. PERSONAL DATA

Name: Arlan Bookwalter SSN:

Address: 625 S. Cunning Road City: Walton

County: Cass State: IN Zip code: 46994

Spouse's name: Kay Phone: (219) 626-2090

Directions to farm/ranch: Head East on Hwy 218 into Walton, IN. Just past RR tracks is 700 E (Davis St.). Turn N/left onto that St., go past a Methodist Church to the 1st "T" intersection (625 S). Turn E/right. Go to 5th house/farm on S/right side of road. 1:15 from W.L. (55 miles)

Date of birth: 46 Sex: M Marital Status: M

Names and ages of children at home: Jeff, 18 yrs.

Disability: T-10 (SCI) compression Date of injury/diagnosis: 11/15/88

Describe the cause of disability: Arlan fell into a ditch while hunting causing compression injury at T-10 (spinal column) joint.

Functional limitations as described by client and/or referral source: paraplegia, uses w/c for mobility; full use of upper extremities for transfers, work/home situations including full range of motion and no lifting restrictions. Trunk support scheduled to be removed May/June of '89.

Include exact measurements if known: (Db of hearing loss, visual acuity, lifting limits, range of motion, specific limitations on standing, sitting, transferring, carrying, walking, bending, stooping, balance, etc.)

Occupation:

(X) Full-time farmer/rancher (primary income from farm/ranch)

( ) Part-time farmer/rancher (primary income from off-farm/ranch job)

( ) Dependent of farm/ranch family

( ) Farm/ranch employee

( ) Agricultural business (type):

( ) Other:

II. GENERAL FARM/RANCH DATA

A. Type and size of operation:

( ) Dairy _____head
( ) Hog _____head
( ) Beef _____head
( ) Sheep _____head
( ) Poultry _____flock size

( ) Hay (acres):_____
(X) Grains (types and no. acres):1300 acres corn & soybeans
( ) Specialty crop(s) (type):_____
( ) Agr. business (type):_____
( ) Other:_____

Describe other alternative agricultural enterprises:_____

B. Summarize the farm/ranch responsibilities of the client prior to acquiring the disabling injury or diagnosis of disability:

All aspects of owner/operator: bookkeeping, marketing, purchasing, maintenance, labor management and production.

C. List family members and co-workers who assist on the farm:

Name	Relationship	Age	Responsibilities
Jeff	son	18	assists in maintenance & production
(1) temporary empl			summer help

Additional Information

III. OVERALL FARM/RANCH ASSESSABILITY

Terrain is generally flat with grass yards, concrete sidewalk from house to driveway; driveways are surfaced with crushed rock, as are the parking aprons to his shop. Other areas are flat, with grass or hard dirt. Access to fields is normally flat with little or no ditch to cross. Field terrain and soil varies with flat, sandy loam prevailing. Farmstead is well drained but mud and snow can still be a problem if heavy precipitation occurs. Sheds and shops are all one level.

IV. GENERAL FARM/RANCH MAINTENANCE

Arlan cannot currently access his shop because of small landing in front of door with high threshold. Inside, floor is dirt; high work bench with stationary power tools also high. Further assessment of shop/tools was not performed as all of it is currently inaccessible.

V. EQUIPMENT AND MAINTENANCE

Primary storage includes one enclosed shop at farmstead (dirt floor, one level), one rented barn (elsewhere, dirt floor, two levels) and one shed at father-in-law's (enclosed, dirt/crushed rock). Some equipment is parked outside, and shop has space to hitch/unhitch and service most equipment.

Equipment is as follows:

Tractors - International 1466, 1586 (easily adaptable), and 5488. All have cabs, radio, and a heater.

- International 560 and 1066 are without cabs.

Combines - International 1460 has a radio and heater/air conditioner.

- International 750

Implements

John Deere 7000 planter (eight row)
two 45 vibra shank field coaters
field cultivator/finishing tool
490 disk
mulcher
four plows - (two 618 and two 616)
14 row bean cultivator
eight wide row cultivator
front mount field cultivator (with spray cart)
culdipacker
five point "V" ripper
rotary hoe

Arlan has reported no other problems (seeing, hearing, etc.) in operation of equipment beyond physical access to operators seat and controls.

VI. CROP PRODUCTION

Storage includes five steel round grain bins (ladder access only) with five stationary augers and one portable auger, plus one continuous flow grain dryer. Mr. Bookwalter is currently unable to move auger or access controls on other augers and dryer.

VII. & VIII.

Livestock and other specialty production was of no concern at this time.

IX. FARM MANAGEMENT ACTIVITIES

Mr. Bookwalter feels he will be able to continue all aspects of the farm management once independent mobility is fully realized.

X. ADDITIONAL VOCATIONAL SKILLS

Mr. Bookwalter included wood working as a craft/skill hobby, and along with fishing, wishes to pursue these modifying his boat (if possible) as well as his wood shop.

XI. ESTABLISHING PRIMARY GOALS

Mr. Bookwalter is aware of vocational rehabilitation and intends to contact the appropriate counselor for Cass County.

Arlan was provided with a variety of information including resource manuals, brochures on available lifts, literature on building ramps, names of support persons, etc. He further requested to be placed on the newsletter mailing list, receive information regarding modifications to make bathrooms accessible, and fishing resources for the physically disabled. With that information I intend to include an address for "Paraplegia News/Sport-n-Spokes." I will contact Mr. Bookwalter in three to four weeks, after he has had a chance to review the material. His son Jeff intends to return the manuals that were left with Arlan when he is at Purdue in a few weeks.

Mr. Bookwalter signed a release of information form. I intend to contact Ron Erdely regarding our visit. Mr. Erdely referred Arlan to the Breaking New Ground Outreach Program. He is a social worker at Methodist Hospital in Indianapolis.

MODIFICATION NEEDS

(2-7-89)

Mr. Bookwalter was visited on two separate occasions to share information and access his modification needs for his farming operation. Arlan incurred a level T-10 spinal cord injury compression November 15, 1988. He and his family, along with a "hired hand," farm 1300 acres of corn and soybeans. Recommendations for modifications to their farming operation are:

1. A vertical-screw lift from Simplicity Lifts, Inc. for Mr. Bookwalter's 1460 International Harvester combine.
2. A vertical-screw lift for the 1586 International Harvester tractor.
3. Hand controls for the tractor.
4. Specialized seating to absorb field vibrations on the equipment Arlan will operate.
5. Appropriate dry chemical fire extinguishers on each piece of equipment Mr. Bookwalter will operate.
6. Installation of rearview mirrors as needed on each piece of equipment for safety purposes.
7. Automatic hitching devices for wagons and other trailed implements.
8. Concrete floors and travel ways (sidewalks) for accessibility and maneuverability.
    a. a concrete floor in the shop
    b. a concrete work area outside the shop
    c. sidewalks with landings for travel to and from Mr. Bookwalter's home and shop
9. A strongly-built motorized or manual wheelchair for yard/shop accessibility outside of Arlan's home.
10. FM two-way radios for communication and safety.
    a. a base unit for the house
    b. a hand unit for Mr. Bookwalter to carry with him
    c. a unit to be mounted on his IH 1460 combine and his IH 1586 tractor
    d. units to be mounted on his transportation vehicles
11. An automatic door opener to the shop.
12. Modifications to existing work benches for the purpose of making tools accessible.
13. An "A" frame tool rack for accessibility and mobility of tools.
14. A four-wheel, all terrain vehicle (ATV) for farm/field accessibility. Considerations when purchasing are:
    a. an automatic transmission or hand controls for any foot petals

b. reverse capability in the shift mechanism

c. foot platforms or baskets to decrease the possibility of a foot slipping off when riding in rough terrain

d. a backrest

e. carrier racks, wagon attachments

f. helmet, goggles, gloves, and boots

15. Modifications to Arlan's van or truck to be used for farm purposes.

a. hand controls

b. means to access the vehicle

Copies of this report will be sent to Ann Kniesly, Counselor at the Office of Vocational Rehabilitation in Logansport and Mr. Bookwalter.

CASE NARRATIVE

Arlan Bookwalter

(12-13-88) Received referral phone call from Ron Erdely, ACSW of Methodist Hospital's Spinal Cord Injury Unit for Arlan Bookwalter; he's to be discharged before the holidays; will set up for farm visit after first of the year.

(1-5-89) Initial farm visit and assessment (see outline); to follow-up with information (see goals).

(1-17-89) Letter to Arlan; includes names and addresses on Sportsman's Associations.

(1-26-89) Received disclosure of information to VR; will forward modifications recommendations to VRC Ann Kniesly.

(2-8-89) Farm visit follow-up

Mr. Bookwalter was visited at his home/farm by myself and Bill Field, Friday, February 3, 1989. The purpose of the visit was to complete the assessment and make modification recommendations for his operation. A summary of modifications will follow this report.

I was contacted by Ann Kniesly, Mr. Bookwalter's counselor at the Vocational Rehabilitation office in Logansport, Indiana. She sent me a copy of a newspaper clipping concerning Arlan.

(2-14-89) Letters with list to VRC and Arlan

(3-16-89) I called and spoke with Mr. Bookwalter, March 15, 1989. He said that he was getting along "pretty good."

Arlan informed me that by the first of next week (March 20, 1989), the lifts on his tractor and combine should be given the "go ahead" to be installed by Vocational Rehabilitation. Mr. Bookwalter said that they have begun modifying their bathroom. He invited me to come and see his modifications once they are complete.

I intend to contact Arlan again in about one month.

(4-27-89) I called and spoke with Mr. Bookwalter, April 26, 1989. Arlan informed me that he has received hand controls and a vertical-screw lift for his 1586 IH tractor, hand controls and a lift for his wheelchair on his truck, and a cellular phone. Arlan is expecting to receive the Bi-Powered, Tri-Wheel chair in May and the vertical-screw lift for his 1460 IH combine in June of 1989.

Mr. Bookwalter did not have any additional needs at this time. We intend to be in touch with each other near the end of June so I can get some pictures of all of his modifications.

(6-28-89) I spoke with Diane Deel of Simplicity Lifts, Inc., June 27, 1989. Mr. Bookwalter has also spoken with her recently. Diane and Arlan have discussed various options for entering his combine. Simplicity Lifts, Inc. will take care of the necessary adjustments.

In addition, vertical lifts manufactured in the future will be ball/screw vs. chain-driven. Apparently the ball/screw-driven lifts are more reliable and require less maintenance over a period of time. Mrs. Deel feels that the ball/screw-driven lift operates at the same speed as a chain-driven lift.

(8-9-89) I spoke with Mr. Bookwalter on August 7, 1989.

Someone from Simplicity Lifts, Inc. made an extension on the lift for Arlan's combine which enables him to transfer more safely from the chairlift to the operator's seat.

Mr. Bookwalter is not interested in automatic hitching devices. Someone is generally around to assist with that task.

Modifications are being done to the Bookwalter's bathroom to make it more accessible and usable for Arlan. Mr. Bookwalter intends to let me know when the modifications are completed.

Arlan went on a fishing trip in Minnesota. Also, he and his wife, Kay, vacationed in South Carolina this summer.

I informed Mr. Bookwalter that Vance Hiner, WBAA News Director, is continuing to work on the story about the Outreach Program and his experience.

Arlan said that I am welcomed to visit to see the extension made to the lift on the combine; in addition to their remodeled bathroom.

(9-29-89) I visited with Mr. Bookwalter at the Farm Progress Show on September 26, 1989. He was riding his Bi-Powered, Tri-Wheel Chair from Simplicity Lifts, Inc. Arlan spoke highly of the chair.

Repairs are continuing to be made to the lift on his combine. It should be operating well in the near future.

Mr. Bookwalter said that he intends to cement the machinery storage area perhaps sometime this fall.

The bathroom modifications are about three-quarters of the way completed.

(10-10-89) I visited Arlan at his farm on October 9, 1989.

A cement slab was poured as a ramp to help access the Bookwalter's shop area. Arlan intends to have the machinery storage area floor cemented in addition to a work area just outside of the storage area.

Mr. Bookwalter installed a contour seat on his Bi-Powered, Tri-Wheel Chair. He feels the chair is very useful to him on his farm.

I was shown the modifications being done to the Bookwalter's bathroom. An addition was built onto their home. The bathroom, when completed, will include a roll-in shower, dressing table, toilet, sink, and roll-in closet.

Repairs were completed on the vertical lift to the I.H. 1460 combine. Arlan is able to transfer inside the cab from the chairlift to the operator's seat. Mr. Bookwalter commented that the lift moves rather slowly. I called Simplicity Lifts, Inc. about his concern. They are aware of the problem and are looking into improving the speed of their lifts in the future. A larger motor may enable the lift to operate faster than its current capacity.

Hand controls were made for the clutch, tilt steering, and brake pedals in the combine. Pictures were taken of these modifications. The controls were made at Mr. Bookwalter's shop. Cost of all the controls totaled approximately $100. The levers are removable because they are mounted by a bolt. The "ball" grasp was purchased from an I.H. dealer for about $10 each.

(12-27-89) I called and spoke with Mrs. Bookwalter (Kay) and their son, Jeff, on December 20, 1989.

The cement floor to the machinery storage area was completed. They intend to use it as a shop once an electric door is installed. Vocational Rehabilitation provided some financial assistance for the cement floor.

(2-27-90) The purpose of the visit was to see the additional modifications that have been made to Mr. Bookwalter's shop.

The most recent modifications include a cement floor to the shop and bi-fold doors. The bi-folds doors are automatic. Vocational Rehabilitation covered the cost of these modifications.

Arlan and I updated his modifications needs list. Mr. Bookwalter does not have dry chemical fire extinguishers on his tractors, however, there is an extinguisher on his combine. Additional rearview mirrors have not been installed on his machinery. An approximately 10 foot concrete work area was laid outside the automatic door to his shop. A ramp has been laid to the back door entrance of the wood shop. Mr. Bookwalter has obtained the Freedom I wheelchair for yard/shop accessibility. Arlan has not made the necessary modifications to make his tools and workbench accessible. He intends to do this in the near future.

I was also shown the most recent modifications that were made to the Bookwalter's bathroom. Bathroom modifications include a walk-in shower, a changing table, a walk-in closet, a toilet and sink that are wheelchair accessible and the proper height. The lower cabinets of the vanity are yet to be completed.

Arlan shared with us a few ideas that he is considering making. One potential innovation is a lift in the back of a pickup truck to raise his Freedom I wheelchair into the bed. Another innovation includes a lift that would enable Arlan to transfer into a boat. The last innovation is a sliding chair in a van that would allow Mr. Bookwalter to move from the front to the rear of the vehicle.

Mr. Bookwalter, with additional help, sets up farm equipment for the Case-IH dealer in Logansport, Indiana.

Arlan continues to attend outpatient therapy at Methodist Hospital in Indianapolis on Tuesday and Thursday mornings from 9:00-10:00 a.m. He is presently working on using leg braces.

Mr. Bookwalter will contact the Outreach Program if we can be of any assistance in the future.

(7-31-90) Mr. Bookwalter has made a lift to get himself into his boat. He encouraged me to stop by to see the lift when I am in his area.

Mr. Bookwalter has purchased a 6' x 10' trailer for his Freedom I wheelchair. He has taken the Freedom I with him on vacation. Arlan and his family have traveled to Florida and Minnesota.

Mr. Bookwalter said that anytime during the day is a good time to call to arrange a visit.

(9-20-90) Farm Visit

Congressman Jim Jontz (D-IN) and David Nagle (D-IA) visited Mr. Bookwalter and were shown some of his modifications. I intend to send the Bookwalters pictures of this event.

Pictures were taken of the lift Arlan has made to get him in/out of his boat.

Mr. Bookwalter uses a commercial, covered trailer to transport his Freedom I versus a special trailer he would have built himself.

Workbench and tools have been made accessible in the machinery shop area. A wall has been added in this area as well.

(3-27-91) Farm Visit

Mr. Bookwalter's latest modifications were seen during the visit; these include workbenches in his woodworking shop raised for easier use and a tool rack. The

tool rack is 6½ x 8' and contains over 100' of metal tubing. It is placed on wheels for easier maneuverability. Arlan had no idea of the cost. Pictures were taken of these modifications.

Apparently the lift to his combine looks the same, it just operates more quickly with a larger motor and different size gears.

The lift that was made for Mr. Bookwalter's boat has not yet been mounted. Arlan is considering making a vertical-screw type of lift versus the swing-arm type of lift for his boat.

Mr. Bookwalter has also not yet constructed a sliding chair for his van. He said that the chair is one of many "irons in the fire."

Fire extinguishers and rearview mirrors are mounted on Mr. Bookwalter's equipment. They intend to mount additional mirrors on his machinery in the future.

(6-6-91) Farm visit

Filming

Lauri Logan, Bill Field, and an interviewer and camera man from the USDA visited Mr. Bookwalter. Filming and interviewing took place to develop a two-three minute segment that will be broadcast nationally by USDA contacts. The filming will highlight the recent funding by USDA for programs that serve agricultural workers who have physical disabilities.

Additional Information

Concrete travelways have not yet been laid from Arlan's home to his shop.

Pictures were taken of the equipment Arlan's "hired hand" sets-up for a nearby Case-IH dealer. This is a supplemental source of income for the Bookwalters.

Pictures were also taken of the lift that was mounted on the boat Mr. Bookwalter uses.

Follow-up

Mr. Bookwalter and the Outreach Program are suppose to receive copies of the final tape upon completion.

SECTION VI. CASE HISTORIES

A. Introduction

Case histories are a useful tool in providing a concise overview of a particular farmer or rancher's medical history, farming operation, worksite needs and personal recommendations or observations. As common procedure, BNG develops a case history for each individual served by the Resource Center. Case histories were developed for the SCI individuals participating in the on-site assessment portion of this project.

B. Individual Case Histories

The seven case histories included in this section provide an overview of the various agricultural operations and worksite situations observed in this study. The information presented here is done so with the permission of each individual identified.

1. Case History: Arlan Bookwalter, Walton, Indiana
Conducted July 18, 1990

Personal Data

Mr. Bookwalter incurred a level T-10 spinal cord injury compression as the result of an accident, while he was hunting on November 15, 1988. Mr. Bookwalter was a patient and attended physical therapy at Methodist Hospital in Indianapolis, Indiana.

Arlan is 48 years old. He and his wife, Kay, have a 20-year-old son, Jeff.

General Farm Data

Arlan has been operating his farm since 1963. He and his family, along with a "hired hand," farm 1300 acres of corn and soybeans. They also produce 20 acres of small grains.

Farm Accessibility

Arlan uses the Freedom I all-terrain, motorized wheelchair for yard/shop accessibility. It was purchased in May of 1989 from AmeriPower, Inc. in West Lafayette, Indiana. Mr. Bookwalter installed a contoured seat in this wheelchair for added comfort and support. He also has a Braun motorized wheelchair for indoor use. Arlan uses a modified pick-up truck for both on-farm and off-farm use.

A cement floor was added in the machinery storage area in addition to a ten-foot concrete work area just outside the automatic door to the storage area. A cement ramp was laid to the back door entrance of the wood shop.

Arlan Bookwalter transfers from his 3-wheeler to his lift on the IH 1460 combine.

Equipment and Machinery

The Bookwalters utilize five International Harvester tractors of the models 560, 1066, 1466, 1586, and 5488. The 1466, 1586 and 5488 models have cabs, radios, and heaters. The 560 and the 1066 models are without cabs. The 1586 tractor has been modified with a vertical, chain-driven lift for entering and exiting the operator's station with ease. Hand controls were attached to the clutch and the brake. The control on the clutch is removable so that others may easily access and use the tractor.

The Bookwalters have International Harvester combines of the models 750 and 1460. The 1460 combine has a vertical-screw lift which enables Arlan to transfer from his wheelchair to the operator's seat. Removable hand controls were installed for the clutch, the tilt steering, and the brake pedals. These levers were manufactured at Mr. Bookwalter's shop. The combine also has a fire extinguisher, a radio, and heating/air conditioning.

Arlan has a portable cellular phone which can be moved to each piece of farming equipment.

Additional Information

Vocational Rehabilitation funds were used for many of Mr. Bookwalter's farm modifications.

The Bookwalters modified their bathroom for Arlan's use. It has a roll-in shower, a dressing table, a roll-in closet, a toilet, and a sink which are wheelchair accessible.

Alternative Sources of Income

The Bookwalters are involved in setting up farm equipment for the Case-IH dealer in Logansport, Indiana. This involves receiving new farm equipment from the dealer in crates and assembling it for delivery to other farmers. This activity makes good use of Arlan's extensive shop facilities.

Recent Updates

Mr. Bookwalter and his son have increased their acreage by about 300 acres this year. Their part-time employee is now full-time. In the winter the hired employee works with Arlan setting up farm equipment. in Arlan's machinery shop.

Mr. Bookwalter has "perfected" an electric lift for his boat and continues to enjoy fishing. He has also modified the clutch and brake controls on his tractor so that he is able to push on the levers instead of pulling. He has found that pushing on the levers is much easier, and that the chair in the tractor supports him while he pushes.

The cellular phone he on carries while operating equipment literally saved his life when his combine caught on fire while harvesting corn. Now his son and employee carry their own individual cellular phones. They have also found the portable phone beneficial in saving time during planting and harvest seasons. helpful safety precaution.

Mr. Bookwalter's phone "literally" saved his life when his combine caught fire while harvesting corn.

2. Case History: Ed Bell, Hagerstown, Indiana
Conducted July 3, 1990

Personal Data

Ed Bell has spinal cord level T-1 paraplegia. He was a violent crime victim of a gunshot wound which caused his paralysis. This incident occurred in 1982 when Ed was 21 years old.

Ed and his wife, Debbie, live on a farm which is located west of Hagerstown, Indiana. Ed has resided at this address since he was seven years old. Debbie is a registered nurse who works at Community Hospital in Indianapolis part-time. The remaining time she spends working on their farm.

When Ed started using a wheelchair, he decided he was not about to give up the farming life he loved. With help from friends and family, Ed began adapting his farm equipment, modifying it to fit his limited mobility. He installed hand controls and high-back seats with seat belts on his tractors. By the time he learned of BNG, Ed had been working on his farm with modified equipment for about two years.

General Farm Data

Ed has a fruit and vegetable operation. He sells direct to local customers and markets his fresh-picked produce either at the farm direct or through retail outlets. About 60% of his strawberries are sold as "U-pick".

Ed owns and manages about 72 acres. Among the crops grown on his farm are 10 acres of strawberries, 15 acres of sweet corn, eight acres of green beans, and several acres of vegetables such as broccoli, green bell peppers, cabbage, and melons. He also farms 20 acres of grain crops. Ed hires local people during the summer to plant and harvest the crops.

Farm Accessibility

Ed uses a lightweight Quickie II wheelchair for around the house and for traveling. When working in the field, Ed uses the the Freedom I, a powered wheelchair, which allows him to work in rough ground, in bad weather and around his livestock. He carries a remote telephone and a business band radio system with a 60 mile range and has dial out telephone capabilities on the backpack of his wheelchair. A loud buzzer resounds in the center of his home and farm when he receives a telephone call. Ed also has a business band radio system with a 60 mile range and dial-out telephone capabilities.

In the past Ed field tested a Freedom I powered wheelchair fabricated by AmeriPower, Inc., of West Lafayette, Indiana. He found the chair ideal for getting to his fields and carrying out other chores.

General Farm Maintenance

Ed does a large portion of maintenance work such as changing oil and greasing machinery.

Livestock Production

Ed raised hogs with his father from 1972-1983. Now, in addition to his vegetable farm, Ed has a few horses, two beef cattle, a few geese, peacocks, one raccoon, dogs, cats, a small flock sheep, and finishes out 50-100 head of fat hogs annually. Ed commented that the geese help with traffic control and the vegetable buyers enjoy the peacocks.

Recently, he has reduced his emphasis on livestock because of the extra labor required and the growing demand on his time from the vegetable crops. However, he stated the Freedom I powered wheelchair is reducing the time and need for extra labor.

Equipment and Machinery

Ed owns a 62-horsepower Fiat Hesston tractor which he uses for heavy fieldwork such as plowing, planting, disking, and spraying. This tractor is modified with a platform lift and hand controls. It has a roll bar and a canopy which provides the driver with shade.

The 18-horsepower Allis Chalmers tractor used for mowing, cultivating, and rototilling is equipped with hand controls. Ed can transfer to the driver's seat without a lift. Ed modified both tractors by himself with a little help from friends.

Ed can transfer to the tractor without a lift.

Avocational Activities

Ed has served, in the past, as the director of Sunrise, Inc., a volunteer program for physically/mentally handicapped people in Richmond, Indiana. Ironically, Ed began serving this position in 1980, before his injury. In 1988, Ed won the "Handicapped Hoosier of the Year" award. Presently, Ed is active in church, the Masonic Lodge, and serves on the Board of the Indiana Easter Seal Society.

Additional Assessment Areas

Ed travels in a van and a family car: which are equipped with lifts and hand controls. He has a ramp leading to his house. The bathroom is fully accessible. Vocational Rehabilitation provided some funding for the ramp and bathroom.

Additional Information

Ed has been contacted and visited by staff members of BNG. Pictures have been taken of his modifications, an "experimental" vegetable field, and the place where he sells his vegetables.

Ed has been featured in a variety of media stories such as *Courier Times* (a county newspaper with a circulation of 1300), *Palladium Items* (Richmond, Indiana), the *Indianapolis Star*, *Vision* (newsletter from the Indiana Governor's Planning Council for People with Disabilities), *Farm Futures Magazine*, *Occupational Therapy Week*, and the *New York Times*, South West Airlines "Spirit Magazine," Local TV interviews, Channels 6,8, 13 and Public Access.

Recent Updates

Ed continues to work and manage his farm. He points out that management and marketing are two important aspects of running a successful farm. Ed was asked to the luncheon speaker at the 1992 Indiana and Ohio Farm Management tour.

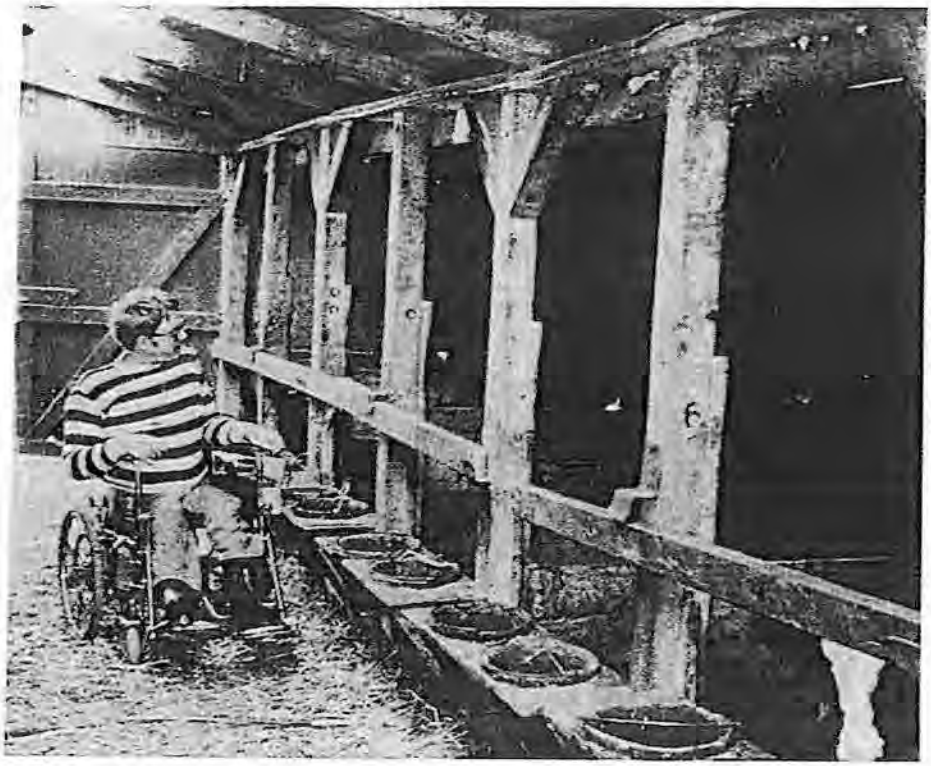
Ed is now working very closely with the BNG Resource Center as a farmer/liaison. Ed will be assisting with public awareness activities, visiting farmers and participating with the BNG staff on on-site ADA accessibility evaluations.

In July, Ed and Debbie had their first child. A girl they named Nellie.

3. Case History: Rick Buckland, Richmond, Indiana
Conducted July 16, 1990

Personal Data

When Rick was 2 years old, he was ran over by a farm truck. He is paralyzed from the waist down. Rick Buckland lost his farm in 1985. The death of Rick's father and complications with the livestock feeding system are some of the reasons for this loss.



Rick checking the calves.

General Farm Data

When in operation, the Buckland's farm consisted of 288 milking cows with 1200 acres of land among other assets. While farming, Rick used no lifts on his equipment, only his arms for climbing onto equipment. He currently drives a van which is not equipped with a lift. Because of his injury at a early age, he has tremendous arm strength.

Avocational Skills

Rick is presently active in public service and is particularly involved with children (4-H, church groups, etc.) He has been a 4-H leader for 23 years and a little league baseball coach for 18 years.

Additional Information

Rick attempted to custom combine for a while after selling the farm, but he developed blood poisoning in his legs from rough handling of his paralyzed lower extremities. The Bucklands ran a snack food and video store for a short period.

Recent Updates

Rick is currently attending Indiana University at Richmond and plans to become a High School teacher or go on to seminary. Mr. Buckland recently won a writing contest concerning the story of his farm, entitled "The Death of a Dream."

4. Case History: Daniel Gwin, Linden, Indiana
Conducted July 2, 1990

Personal Data

Mr. Gwin fell while scraping ice off of a semi-truck on February 9, 1988. His vertebrae were shattered at the T-10 level and his spinal cord was bruised (compressed 50%); therefore paraplegia resulted. Dan was taken to Home Hospital in Lafayette and then transferred to Methodist Hospital in Indianapolis for surgery and rehabilitation. For his medical benefit, a six-inch rod was surgically implanted next to his vertebral column beginning at the T-10 level, causing the immobilized vertebrae to fuse together. Dan returned home from the hospital on March 25, 1988.

Dan continued to receive therapy after his hospital discharge. His trunk brace was removed August 3, 1988. Dan currently works with long-leg braces. Dan feels that his long-leg braces help to increase the possibilities of accessibility and maneuverability. Dan is able to place his wheelchair in his car and pickup independently. He does not have difficulty with transfers.

Dan graduated from Purdue in 1980 with a Bachelors Degree in Agricultural Economics and Farm Management. He ran semi-trucks before his accident. He is now 31 years old.

General Farm Data

Dan and his father are grain farmers. They own their land which is used to produce 1200 acres of corn and 400 acres of soybeans. Dan also operates a seed dealership.

Farm Accessibility

The Gwin's farm is quite hilly with gravel or rock-covered driveways. This makes some travel difficult for Dan. Safe, controlled mobility is essential, especially in adverse weather conditions. Dan's Yamaha Terrapro all-terrain vehicle (ATV) and his Freedom 1 Bi-Powered, Tri-Wheel Chair are particularly important for mobility and accessibility. Each of these machines serve a different, yet important, function. The ATV, purchased from C & C Cycle Sales in Frankfort, Indiana, can be used for greater field accessibility. It has a power take-off and hydraulic hook-up. The motorized wheelchair is maneuverable enough to use for repair work and shorter distance travel (i.e. from the garage to the house and around farmstead). The motorized wheelchair is also useful indoors because of its electric motor.

Dan uses ATV for many purposes — including mowing side ditches.

General Farm Maintenance

Dan participates in farm maintenance activities as he is able. The Freedom I powered wheelchair helps in reaching various tools. It is difficult to transport the Freedom I; therefore, it is only used at the home location. Dan's father and others help assist with hitching/unhitching implements as well as other necessary tasks.

Equipment and Machinery

Dan owns a John Deere 4630 tractor and a 7700 combine. In the fall of 1988, both were modified with lifts made by AmeriPower, Inc., of West Lafayette, Indiana. Hand controls for the brake and clutch on Dan's tractors were a part of the modifications. Dan also uses hired help in handling seed corn instead of purchasing additional modifications for his fork lift. Vocational Rehabilitation has been instrumental in providing the necessary services and resources to obtain the modifications. The BNG-Resource Center has provided modification recommendations and acted as a liaison between the farmer, vocational rehabilitation, and potential vendors. Additional information and support persons were also provided.

Farm Management Activities

Dan maintains the farm business records, handles sales and purchases, and deals with labor management.

Additional Assessment Areas

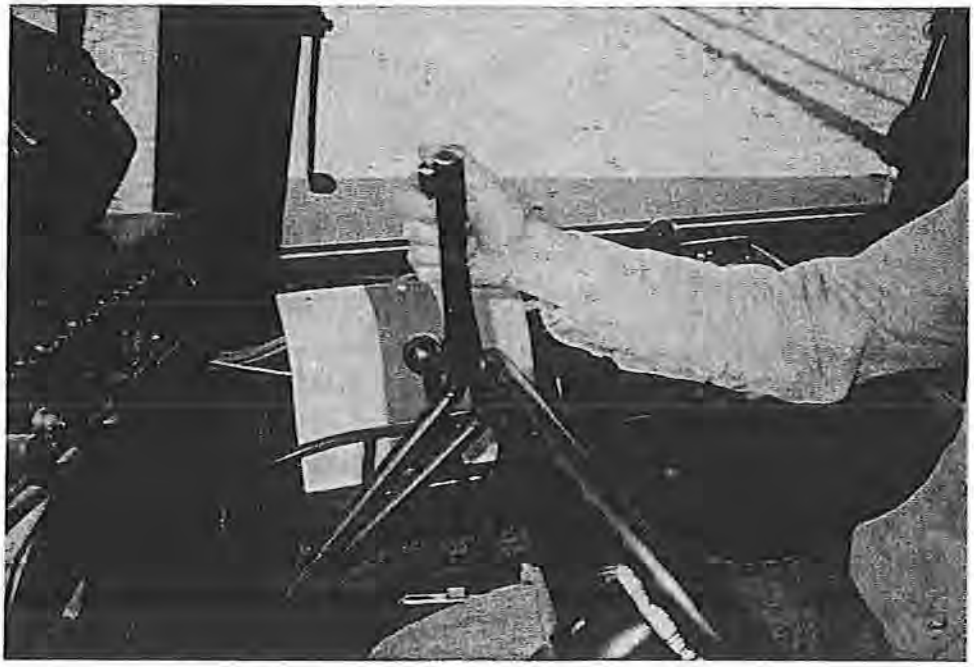
Dan had a concrete ramp laid in 1988. This ramp allows Dan to travel from his home to his shop/garage area. This shop has a concrete floor for easier wheelchair maneuverability. He also had an automatic garage door opener installed for his shop. He drives a car and a pick-up truck. Both are modified with hand controls and a communication aid. Dan utilizes a high wattage (60 watt) 2-way FM radio for communication and safety. This type of radio is capable of reception within a 25-30 mile radius.

Recent Updates

In a recent farm visit, May 1992, Dan shared several important updates to his work style. In the past Dan stated that he would try to do everything he was able to do before his injury. Many times his efforts would result in a severe bruise or injury that would require several days in bed. He now spends more time on farm management decisions and utilizes his hired labor more effectively to complete certain physically demanding task.

By focusing his energies on farm management decisions, spending time with the soil fertility specialist at Purdue University and hiring a crop consultant, Dan estimates a savings of thousands of dollars in fertilizer cost this past spring.

Dan was featured on the Easter Seals Telethon this year with Gary Stoops from the BNG staff.



Dan's tractor cab includes hand controls, planter monitor and cellular telephone (top left).

5. Case History: Bill Gundrum, Royal Center, Indiana
Conducted July 16, 1990

Personal Data

When Bill Gundrum was 19 years old, he was in a car accident resulting in a SCI. He was paralyzed from the waist down and has limited use of his left hand.

General Farm Data

Bill farmed 500 acres until 1985. He then decided to rent his land. Mr. Gundrum continued to operate machinery, on a decreasing basis, until 1987. Bill stopped farming due to health problems. He lives at home with his parents. Mr. Gundrum was planning to look for work in the spring of 1989.

Bill, one of the first farmers with a SCI to contact Purdue University, transfers from his tractor seat to the lift.

Additional Information

Bill was featured in an article called "Working the Land: Adapting Farming for Disabled People" in *Disabled USA* magazine in 1981 when he still farmed.

Recent Updates

Bill continues to live at home with his parents. He misses farming very much. He is involved with a professional weight loss system. He has also begun to exercise more to prevent future health problems and to build up his endurance.

Bill has utilized the services of two career resource centers in Logansport, Indiana. He has had no opportunities for employment yet. Bill is working with BNG on an informal basis in developing a "Resource Guide for Farmers Making Career Decisions Following a Disability."

6. Case History: Robert Schendel, Wilton, Indiana
Conducted May 23, 1990

Personal Data

Robert Schendel is a 44 year old paraplegic who was injured in 1978.

Bob and his wife, Viena, have 4 children. Viena is quite supportive of the farming operation and helps in its operation to a considerable extent. The two of them milk one day each week, allowing the herdsman a day off. The oldest son is working for another dairyman near Madison, but is considering moving home to work. The youngest son and daughter live at home.

General Farm Data

Bob operates a 518 acre farm (320 acres owned and 198 acres rented). The Schendels grow corn, small grains and hay with the main farm emphasis toward a dairy herd of 119 cows.

The farm is quite modern with a herringbone milking parlor, a Harvestor silo, and a one level home, which is very convenient for Bob's wheelchair needs and is ramp accessible. A second set of buildings is home for the hired herdsman and the barn houses dry cows and young stock.

Bob is currently interested in purchasing another parcel of land nearby.

Equipment and Machinery

Bob owns an IH tractor with a locally constructed lift. He also makes use of a Honda four-wheel ATV and his truck is equipped with hand controls.

Farm Management Activities

Bob is responsible for maintaining the farm business records, for sales and purchases related to the farm business, and for labor management.

Concerns

Rehabilitation aid is a concern. While Vocational Rehabilitation has helped with a tractor lift, it appears that no more funds are available.

Bob is also very concerned with keeping good hired help.

7. Case History: David Roos, Havana, Illinois
Conducted April 27, 1990

Personal Data

David Roos is a 27 year old full-time farmer with paraplegia. He was injured in 1986.

David is married and his wife, Cheryl, is a bookkeeper for her father's four grocery stores.

The couple have no children.

General Farm Data

David, his brother Steve, and their father, farm 1500 acres of rented or leased land in the Illinois River Valley growing corn, soy beans, and some wheat. The operation grew in size from 500 acres at the start to 1000 acres in 1986 to the present size of 1500 acres. The farm lies flat on the Illinois River flood plain. Buildings are well cared for and in good repair. All real estate is rented from several landlords who live in several locations so it appears that the Roos family has good landlord-tenant relations and take pride in the farm. The farm is well cared for and is well equipped with modern up-to-date machinery.

Farm Accessibility

The terrain around the farm is flat and for the most part, easily manageable with the Iron Horse manual wheelchair of which David is well pleased. David's home and shop are ramp accessible with the home having a large bathroom for added convenience. David also uses a 1948 Willy's Jeep to travel to the various farms.

Equipment and Machinery

The Roos' full line of equipment includes three tractors as well as a John Deere 9500 combine. Three tractors have been modified with lifts and controls, for easy access and operation by David. David is able to operate most of the power equipment independently and thus is very involved in field work. David's father indicated that it is their policy to trade tractors frequently and to trade the large combine yearly to avoid repair expenses.

In addition to the modified farm equipment, David operates a jeep with hand controls and a Dodge van with a lift and hand controls.

Farm Management Activities

David is not responsible for maintaining the farm business records, but does take an active role in the sales and purchases related to the farm business.

Concerns

David would like to see the costs of adaptive equipment come down.

C. Summary of Case Histories

Perhaps the best way to summarize the case histories and attitudes of the farmers/ranchers with SCI's is to provide a few personal stories shared by some of them who participated in this study.

- When the doctor told one farmer he would never walk again his reply was, "I guess I better make the best of it." He now successfully farms 1500 acres.
- While in the hospital after a violent crime had left this farmer paralyzed for life and he had no insurance to pay the medical bills, he stated, "That was the lowest day of my life," but after receiving 500 get well cards he determined, "I will not let them down." He now runs a successful fruit and vegetable farm.
- One farmer who was run over by a truck at age 2 stated, "I had learned to live with pain." However, due to several circumstances the four-generation family farm was sold. He kept one cow from his herd and remarked, "when that cow dies a part of me will die." He is now attending college and plans to be a High School teacher.
- One farmer stated, "farming smart and putting more time into management and hiring labor for physically demanding jobs saves thousands of dollars and prevents many days in bed from injuries." He successfully farms 1200 acres and plans to increase his acreage to 1700.
- One farmer was crushed by a bale of hay while in his late 50's. He said, "A lot of things are difficult, but you gotta do it anyway." He continues to farm several hundred acres with his son.
- Finally, one individual summarized the attitude of the majority of farmers/ranchers interviewed: "If I didn't get out of the house I would have gone crazy, nothing is impossible — you just do it slower."

Almost without exception, the farmers/ranchers involved with this study have exhibited tremendous determination and persistence. However, almost every farmer interviewed spoke of the emotional pain and stress on their families during the first year after the injury. Many openly stated that they were driven close to the point of suicide until they were able to get "back outside on the farm, in the fresh air," as one stated so clearly. The feelings, emotions and hardships that so many have dealt with are impossible to document with words.

SECTION VII. SUMMARY OF FINDINGS

A. Introduction

Surveys were completed by 149 farmers and ranchers concerning their rehabilitation technology needs. In addition, 56 worksite needs assessments and 10 follow-up visits were conducted. A comprehensive review of the literature was completed regarding the number and distribution of individuals with spinal cord injuries who live in rural areas, and on farms and on ranches.

A major benefit of conducting surveys and making on-site assessments is seeing the "common threads" among the lives of those individuals with SCI's in rural areas. On the whole, farmers with spinal cord injuries are no different than farmers without such injuries; they are independent, ambitious people who desire to make their livelihood on the farm without the aid of government or other groups. In fact, hesitation to rely on existing support services appears to be an obstacle for many SCI farmers to return to a productive lifestyle. Following a SCI, a once independent, self-reliant individual could benefit from financial, physical and emotional assistance.

B. Number of Farmers/Ranchers with Spinal Cord Injuries

Estimates have been made that 8.5 million disabled Americans live in rural areas. BNG estimates that over 520,000 farm/ranch family members and agricultural workers have physical disabilities which hinder them from completing certain tasks on their farm. Over the past 13 years BNG has responded to over 11,000 individual requests from farm and ranch family members and rural professionals regarding rehabilitation technology. Due to the hazardous nature of farming, the number of children and elderly working on farms, and the prevalence of males in the farming population, BNG estimates the number of new SCI's to farmers/ranchers to be approximately 250-300 each year. The total population of farmers/ranchers with SCI's in the United States is estimated to be between 4500 and 6500. Without the establishment of some type of SCI registry, obtaining a more accurate number of individuals with SCI will not be possible.

C. Summary of Survey

While the farmers who participated in this survey do not represent a random sample of all U.S. farmers/ranchers with SCI's, they do represent the largest collection of data on such individuals to date. As such, the results of the survey conducted for this study provide a basis for identifying general trends for farmers/ranchers with SCI's.

Of those who responded to the survey, almost 97% were male and 80% reside on a farm. Over 60% of the SCI's occurred to individuals in the 16-35 age group with about 66% reporting to be paraplegic and 28% quadriplegic.

The following summary illustrates some of the trends and concerns of farmers/ranchers with SCI's:

Employment

- 80% received some income from farming
- 40% received their principal income from farming
- 29% received some income from off-farm employment
- 9% were unemployed

Vocational Rehabilitation Needs

- 60% have not benefited from a worksite assessment
- 58% have to travel 26 miles or more to receive rehabilitation services
- 30% have to travel 26 miles or more to receive medical services
- 33% have to travel 100 miles or more to purchase their primary mobility aids

Community Involvement & Accessibility to Public Facilities

- 60% are "very active" or "active" in church
- 40% of the churches they attended were rated as "partially" or "not accessible"
- 48% are "very active" or "active" in hunting or fishing
- 52% of the local parks/recreational areas were rated as "partially" or "not accessible"
- 38% are "very active" or "active" in farm organizations
- 48% of county office buildings, 41% of ASCS and Extension offices, and 45% of the libraries were rated as "partially" or "not accessible"

Most Difficult Work Related Task

- Heavy machinery adjustment
- Wood splitting
- Loading or moving livestock
- Maintaining farm buildings
- Castration and docking tails of livestock
- Hitching implements to tractor
- Livestock medical needs and shots

Common Modifications Made

- 68% have ramps to houses and/or farm buildings
- 50% have hand controls for tractor or combine
- 37% have a lift on the tractor or combine
- 25% have smooth pathways
- 19% have concrete work areas
- 18% have a CB/communication aid
- 9% have power doors

*All percentages rounded to whole numbers.

D. Other Concerns

The survey results demonstrate the importance of the family in helping the SCI farmer/rancher achieve community independence. The spouse was overwhelmingly ranked as the individual most helpful in achieving independence. Parent was listed second, and children ranked fifth. One farmer, stated during an on-site visit that, "my children are my legs." The spouse and children were identified by 56% of the respondents as providing physical assistance to help perform farm tasks. Other family members were listed by 45% of those surveyed.

Other concerns often mentioned by farmers/ranchers with SCI's included accessibility to public buildings, the high cost of modifying equipment, the need to obtain more comfortable equipment, and the difficulty in dealing with changing temperatures (particularly the heat in summers).

SECTION VIII. CONCLUSIONS AND RECOMMENDATIONS

A. Introduction

It is apparent after completing this study that SCI farmers have an intense desire to remain in farming, though not all were able to do so on a full-time basis. Because of physical restrictions many farmers sought to develop alternative enterprises on the farm. Seed sales, agricultural consulting, lumberyard management, machining, vegetable production, crafts, assembling agricultural equipment, and custom harvesting were a few of the alternative enterprises listed by farmers.

The type of farm operation, and the number of acres and livestock varied immensely. Respondents seemed to be very realistic with regard to their work load. Each individual constantly evaluated his/her operation and made adjustments and modifications that allowed him/her to continue farming. Many farmers made major changes and modifications to their farming operation to accommodate their disability. The degree and type of modification depended upon the level of the injury, the age when the injury occurred, finances, and to a certain extent, the attitude of the farmer.

Common concerns that were shared by many of the individuals included maintaining self-esteem, acceptance by the public, and concern about their ability to work and still receive certain disability benefits.

B. Responding to the Needs

The study has greatly enhanced BNG's ability to respond to the needs of farmers/ranchers with SCI's who contact the Resource Center. Through the course of the study BNG staff have become more familiar with both the problems and the resources available to farmers/ranchers with SCI's.

In regard to the eight worksite priorities identified by farmers/ranchers with SCI's (See Section IV, Part C, No. 8), the BNG Resource Center is now able to respond in the following ways:

Priority	BNG's Resource
1. Improve ability to effectively and safely use equipment and machinery	• Volume II — "Agricultural Tools, Equipment, Machinery and Buildings" • Plowshares #1 — "Potential Health and Safety Risks of Farming with Physical Handicaps" • Plowshares #6 — Farming Following a Spinal Cord Injury (See Appendix H) • Ongoing study of the potential for secondary injuries • Safety related information in all BNG resources
2. Improve overall mobility and accessibility of the farm	• Plowshares #9 — "Improving Worksite Mobility for Farmers with Physical Disabilities" (See Appendix D) • Plowshares #11 — "Guidelines for Construction of Ramps used in Rural Settings" (See Appendix K) • "Conducting Agricultural Worksite Assessments" Resource Guide • Plowshares #5 — Selection and Operation of All-Terrain Vehicles by Physically Impaired Farmers (See Appendix L)

Priority	BNG's Resource
3. Improve ability to do general maintenance	• Plowshares #6 — "Farming Following a Spinal Cord Injury" • Volume II — "Agricultural Tools, Equipment, Machinery and Buildings"
4. Improve ability to manage farm	• Referals to county and state extension offices provide publications on farm management, marketing, labor relations, and computer record keeping • BNG personnel trained in farm financial analysis
5. Improve livestock handling abilities	• Volume II — "Agricultural Tools, Equipment, Machinery and Buildings" • On-site recommendations for modifications
6. Improve ability to perform a specific task	• Plowshares Series • Volume II — "Agricultural Tools, Equipment, Machinery and Buildings"
7. Identify Alternative Farm Enterprises	• Research Project — "Off-farm Employment and Alternative Enterprise Options for Farmers with Physical Disabilities" • Plowshares #10 — "Alternative Farm Enterprises for Farmers with Disabilities" (See Appendix M)
8. Obtain part-time or full-time off-farm employment	• BNG is currently developing "A Guide for Farmers Making Career Decisions Following a Disability"

C. Recommendations

Based on the findings of this study, the following recommendations are made:

1. Greater efforts are needed to identify those with SCI's who live or work on farms or in isolated rural communities and who could benefit from existing services and resources. There appears to be a sizable population of farmers with SCI's who have yet to fully benefit from the many advances in the fields of rehabilitation and assistive technology.
2. Developing strategies for early identification of, and intervention for persons with SCI's could substantially reduce the economic, social and emotional impact of SCI's in rural communities. The implementation of a SCI registry, a program currently being explored by some agencies, is encouraged.
3. Resources and training programs are needed in rural communities, or facilities serving these communities, for the primary care-givers of individuals with SCI's. In terms of the findings of this study, these care-givers would be the spouse and family members of the farmer or rancher.
4. Programs designed to encourage greater levels of peer support, or interaction between farmers/ranchers who have experienced serious injuries, are needed. There appears to be a real void of peer support from those who have successfully dealt with a similar injury, especially during the early stages of the rehabilitation process or upon returning home. The perception of "being alone" is one of the most significant barriers that must be overcome.

5. Training is needed for health care professionals, rehabilitation specialists and vocational rehabilitation counselors regarding the viability of returning an SCI individual to the farm/ranch following an injury. This group needs to become a more supportive influence in making this choice.
6. Information is needed to assist farmers/ranchers in making employment decisions following a SCI. This period of transition is a critical time with regards to the potential economic stability of the individual and his or her family. In some cases information is needed on evaluating alternative farm enterprises, altering the farmer's job responsibilities in the present operation or exploring off-farm employment.
7. Efforts are needed to identify alternative methods of accomplishing specific farm/ranch related tasks that may become difficult or impossible following a SCI. In many cases, the technology involved will be unique to a specific individual or operation, and may require custom design and fabrication. Alternative funding sources for these modifications will have to be found in some cases.
8. Information should be disseminated to all farmers/ranchers addressing the special risks of working in agricultural production with a SCI. Fires on agricultural equipment, and the risk of becoming stranded in inclimate conditions are just two of the potential problems which exist for farmers with SCI's.

Some of the most frequently repeated recommendations from those participating in the study are summarized as follows:

- More attention should be given to management of existing resources and less to physical labor. Hire someone to complete the more labor-intensive or hazardous tasks.
- Obtain good quality communication aids such as cellular phones or CB's.
- Get physical and emotional assistance, especially during the first year. Involve the whole family.
- Finding ways to share with others helps in overcoming some of the personal trauma.
- Be creative in developing worksite modifications. Assistive technology need not be expensive.
- Don't be afraid to ask for help when it is needed.

D. Summary

Farmers/ranchers are as diverse as any population and have a vast array of abilities and skills. Like all of us, they desire the public to look upon their abilities, not their disabilities. Self-determination, family support and assistive technology all play an important role in allowing the farmer with a SCI to continue his work. Farm safety, mobility, farm management skills and accessibility to community activities become key issues to the farmer after the SCI.

Farmers, who so desire will find a way to continue farming after a SCI. A farmer/rancher has acquired many talents, skills, and abilities and may need to be reminded of these skills immediately after the injury to help restore self-worth. Once his self-worth is restored, encouragement from other farmers who have overcome similar disabilities is very helpful. Finally, providing the necessary resources, such as a list of agricultural tools, equipment, machinery, and buildings adapted to help the farmer keep farming, is vital in the rehabilitation process. Self-worth, peer and family support, and assistive technology give the farmer hope and the practical tools to continue farming.

BNG will continue to research new areas, compile ideas, coordinate peer mentor programs, and provide resources and support to offer the most positive options for farmers with SCI's.

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