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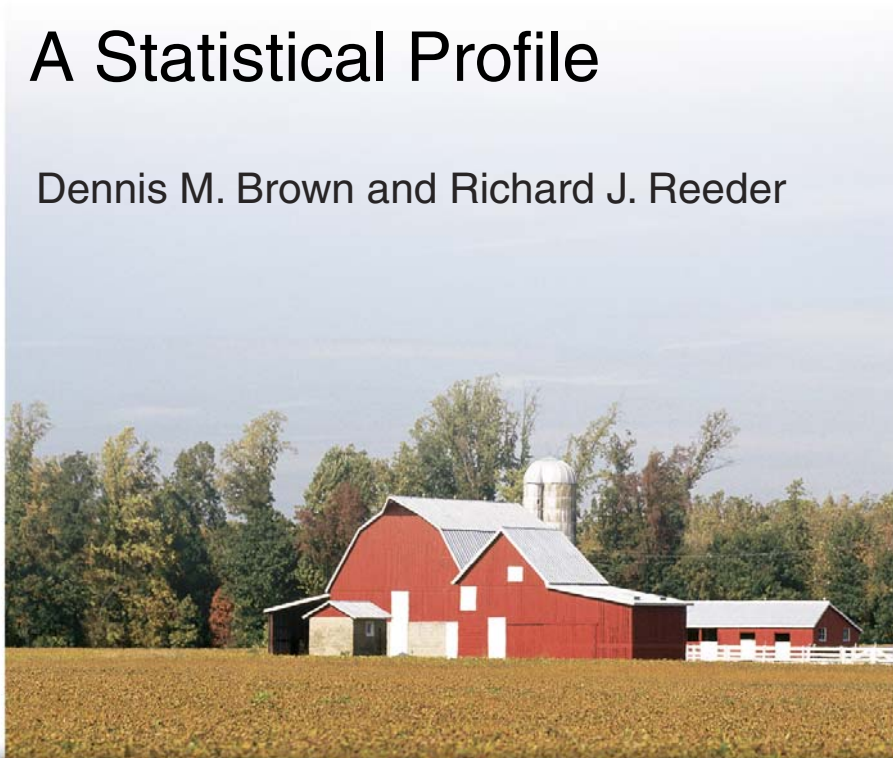
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# Farm-Based Recreation

## A Statistical Profile

Dennis M. Brown and Richard J. Reeder



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## A Statistical Profile

**Dennis M. Brown and Richard J. Reeder**

### Abstract

Farm-based recreation provides an important niche market for farmers, but limited empirical information is available on the topic. Access to two USDA databases, the 2004 Agricultural Resource Management Survey (ARMS) and the 2000 National Survey on Recreation and the Environment, provided researchers with a deeper understanding of who operates farm-based recreation enterprises, such as hunting and fishing operations, horseback riding businesses, on-farm rodeos, and petting zoos. Regression analysis identified the importance of various farmer and farm characteristics, as well as local and regional factors associated with farmer operation of, and income derived from, farm-based recreation.

Keywords: agritourism, recreation, ARMS, NSRE, rural development, tourism, farms

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## Contents

Summary .....	iii
Introduction .....	1
Why Agritourism? .....	1
Research on Agritourism .....	2
Agritourism and Farm-Based Recreation .....	4
The U.S. Market for Farm-Based Recreation .....	6
Supply .....	6
Demand .....	7
Identifying Key Factors Associated with Farm-Based Recreation .....	10
Who Provides Farm-Based Recreation? .....	10
Income from Farm-Based Recreation .....	11
Conclusions .....	13
References .....	15
Statistical Appendix .....	17
Farmer Involvement in On-Farm Recreation Businesses .....	17
Analysis of Recreation Income .....	20
Ideas for Further Analysis .....	21

## Summary

Farm-based recreation or agritourism, which includes hunting, fishing, horseback riding, and other on-farm activities, provided income to about 52,000 U.S. farms (2.5 percent of total U.S. farms) in 2004. Agritourism is more common in Europe and other parts of the world and might play a more important role in the U.S. economy in the future, both as an alternative source of farm income and as a way for rural communities to diversify and stimulate their economies.

### ***What Is the Issue?***

To diversify and increase returns on their farm investments, more American farmers may consider moving into farm-based recreation. What is it about today's farmers and their land that will provide the keys for success? This report provides a detailed view of the types of farmers and the types of places where farm recreation may have the greatest potential.

### ***What Did the Study Find?***

The study found the South accounts for more than half of all farms receiving recreational income, followed by the Midwest, which accounts for about a quarter. Recreational farm operations are also more likely to be in completely rural nonmetropolitan counties and in areas dependent on recreation in general. Farms involved in recreation require a steady stream of consumers and should be located near cities. Conversely, farms located farther from metropolitan areas have a greater potential for offering high-quality habitat as might be demanded by hunters, anglers, and trail riders.

Farm operators were more likely to run a farm-based recreation business if:

- They had a high net worth.
- They worked fewer hours off the farm during the summer.
- Their property was a greater distance from a city of at least 10,000 in population.
- Their county had an abundance of natural amenities (water, climate, and topography).

The amount of income earned from farm-based recreation is a function of net worth, but otherwise there is very little overlap between factors associated with a farmer's decision to provide on-farm recreational opportunities and the amount of money he or she can expect to earn from such activities. Earnings tend to be highest in more densely populated counties, in areas with low or negative growth rates, and in counties where the overall recreational activity (farm and nonfarm) is high.

### ***How Was the Study Conducted?***

This study used 2004 survey data collected from 20,579 U.S. farms to provide summary descriptive information about the extent of the farm recre-

ation industry, including information on farm size and type, farm operator characteristics, and community characteristics. Regression analysis identified the statistical significance of various factors thought to affect the likelihood of farmer involvement in an on-farm recreation business and the amount of income derived by farmers involved in a recreation enterprise. Data on farm-based factors came from the 2004 ARMS survey. Data on place-based factors reflected characteristics of the county in which a farm was located.



## Introduction

Rural America is a popular tourist destination. According to a recent survey, nearly two-thirds of all adults in the Nation, 87 million people, have taken a trip to a rural destination within the past 3 years (Travel Industry Association of America, 2001). Almost 9 out of 10 trips were for leisure purposes, with baby boomers more likely than younger or older travelers to visit nonmetro destinations for purposes other than seeing family and friends. Recognizing the potential economic benefits of tourism, some farm operators have developed agritourism operations.

According to the Small Farm Center (University of California), agritourism refers to “a commercial enterprise at a working farm, ranch, or agricultural plant conducted for the enjoyment of visitors that generates supplemental income for the owner” (Small Farm Center, 1999). Agritourism is less well developed in the United States than in European countries. According to one estimate, a third of all farm operations in the United Kingdom support agritourism activities, with an even higher percentage in France and Italy (Bernardo et al., 2004). Moreover, in large parts of Western and, increasingly, Eastern Europe, agritourism represents a growth industry, bolstered by the well-established and growing (mainly domestic) market for people to spend their holidays and vacations on farms.

This report uses responses from a 2004 survey of U.S. farm operators and a 2000 survey of agricultural recreation customers to gain a better understanding of who is involved in farm-based recreation activities such as hunting, fishing, horseback riding, on-farm rodeos, and petting zoos. Regression analysis identified the importance of various farmer and farm characteristics, as well as local and regional factors associated with farmer involvement in, and income derived from, farm-based recreation enterprises.

## Why Agritourism?

Agritourism is, for several reasons, an attractive option for farm operators wishing to increase returns on their farm assets (Bernardo et al., 2004; Small Farm Center, 2006). First, it offers opportunities to supplement income from farm production activities. Second, it diversifies a farmer’s income stream, serving as a potential cushion against farm income fluctuations arising from variability in weather, prices, and government payments, which can vary from year to year. Third, agritourism can provide for a more complete use of farm household assets and expand employment opportunities for household members.

Agritourism can also benefit the surrounding local community. Visitors may purchase goods and services (including farm products) nearby, stimulating the local economy. Agritourism can provide economic incentives to farmers to preserve agricultural land and related natural amenities, such as forests, streams, and wildlife, which may be particularly important for quality of life in rapidly urbanizing suburban and exurban areas. Higher land values can add to local government tax revenues used to support local schools and other public services. In addition, agritourism may enhance the sense of



place for local residents, giving them a reason to stay and invest in their community.

Agritourism can have a negative side as well. In a survey of New Jersey farmers, Schilling et al. (2006) noted that some respondents were concerned about liability issues as the public took part in recreation activities on their property. The loss of privacy resulting from such visits was also cited as a problem by operators. Other farmers criticized the overemphasis on “amusement” aspects of farm-based tourism, which led entrepreneurs to lose touch with agricultural production.

The local community and its surrounding environment may also be negatively affected by agritourism. For example, local wildlife and natural amenities might be affected by “over-hunting” or “over-fishing.” Local roads might become congested at times (for example, during fall harvest festivals) and some community services could be strained in areas with significant agritourism activities (as in Lancaster County, Pennsylvania, with its large Amish-based agritourism industry). Conflicts may also arise from nontraditional land usage. For example, local residents who used to hunt or fish for free on private land may now be required to pay for these activities, while nonresident hunters and recreational fishing enthusiasts might be tempted to trespass on private property.

## Research on Agritourism

Research on agritourism tends to be anecdotal, consisting mostly of case studies and how-to guides.<sup>1</sup> The little empirical work conducted tends to deal with the reasons farmers initially become involved in operating agritourism businesses. Most such studies have tried to identify the various motivating characteristics of the operator, with a key goal focused on identifying specific operator characteristics associated with involvement in agritourism. For example, McGehee and Kim (2004) developed a framework to explain operator involvement in the industry and found that both economic (or formal) and socio-cultural (or substantive) factors are important.<sup>2</sup> Their study surveyed small family farms in Virginia and found that, for operators, the number of acres owned, their economic dependence on farming, and the perceived popularity of agritourism are important motivating factors for involvement in the industry. The most popular agritourism activities included pick-your-own operations, Christmas tree sales, hayrides, children’s educational programs, petting zoos, and on-farm festivals.

Some researchers have tried to identify entrepreneurial characteristics that defined success in the industry. For example, Rilla (1998) notes that most successful agritourism entrepreneurs have outgoing personalities, attractive properties, an in-demand product, and an established customer base. Her study, based on a survey of farms in the Northeastern United States and the United Kingdom, also identifies the critical importance of community support. Hilchey (1993), in a brief discussion piece, argues that an entrepreneur’s social skills are an important factor, as are the farm’s aesthetics and its proximity to urban centers (which increased the agritourism operator’s ability to make money). Likewise, other important considerations for

<sup>1</sup>For a good example of this approach, see Small Farm Center (2006).

<sup>2</sup>However, no clear consensus currently exists on whether economic factors or social factors (or perhaps some combination of the two) are more important in determining farmer involvement in agritourism businesses (Mace, 2005; Nickerson et al., 2001).

success include the entrepreneur's liability insurance coverage, government regulations, existing safeguards for animal welfare, and sanitation issues.

While these studies may offer insights into agritourism, they suffer from being overly anecdotal and may have limited applicability. Moreover, no clear measures exist for farmer characteristics associated with agritourism. For example, measuring the degree to which someone has an engaging personality or has an attractive property is subjective and difficult to assess accurately.

Bernardo et al. (2004) suggest that at least two types of factors are important in determining who is likely to operate an agritourism business. One set of factors refers to farm-specific characteristics, including the operator's farming experience, his or her access to capital, and the size of the farm operation. A second set of factors, which describes the farming community, includes characteristics such as proximity of the farm to consumers (which can provide an available market), availability of other recreational facilities, and access to different modes of transportation.

According to Carter (1998), characteristics describing attributes relating to the farm and operator—that is, farm-specific variables—play an important role because they help us understand why farm operators became involved in the agritourism business. In this sense, agritourism represents an entrepreneurial diversification strategy. The degree of involvement varies depending on a variety of operator and farm characteristics, such as the desire to exploit product demand (like recreation), the need to generate income, or the expectation of creating employment opportunities (for the operator or family members).

However, as noted by Evans and Ilbery (1992), the motivations of farm operators will vary, with small farms' involvement in agritourism activities (for example, providing on-farm accommodation services) reflecting a "survival strategy," while operators of larger farms are motivated more by an "accumulation strategy." Farms pursuing a survival strategy are often more economically marginal and tend to be more concerned with maintaining their viability as a business concern. In contrast, farms engaged in an accumulation strategy are usually more prosperous and are likely more interested in accumulating long-term wealth. Farm operators, regardless of size, often combine production activities with nonproduction activities, something referred to as "pluriactivity" (Fuller, 1990). This strategy has the potential to generate income while reducing risk, since it often combines on-farm work with off-farm activities. This can make the farm household less dependent on factors (such as the weather) beyond their control.

Community characteristics provide the context in which on-farm recreation activity occurs. As noted by Bernardo et al. (2004), farms located near cities benefit from urban and suburban residents who take part in nearby recreational activities. Nonhuman factors also play a role, with recent research suggesting that natural amenities not only can provide consumers of on-farm recreation with a greater diversity of natural resources and more opportunities for recreation, but also can enhance farmland values (Henderson and Moore, 2005). Recognizing this potential, development specialists have become increasingly interested in the nature-based tourism sector (Reeder

and Brown, 2005), even in parts of the country (such as the Northern Plains) often considered relatively poor in terms of natural amenities (Hodur et al., 2006).

## **Agritourism and Farm-Based Recreation**

Agritourism includes a wide array of farm and farm-related activities, including:

- Outdoor recreation (fishing, hunting, wildlife study, horseback riding);
- Educational experiences (cannery tours, cooking classes, wine tasting, on-farm museums);
- Entertainment (harvest festivals, barn dances, “petting” farms);
- Hospitality services (overnight farm or ranch stays, guided tours); and
- On-farm direct sales (“pick-your-own” operations, roadside stands, farmers’ markets).

The 2004 Agricultural Resource Management Survey (ARMS) (see box below) provides data on farm operator income received for farm-based recreation and related entertainment activity, one of the main components of

### **About the Agricultural Resource Management Survey**

ARMS is the annual Agricultural Resource Management Survey conducted by the Economic Research Service and the National Agricultural Statistics Service, agencies of the U.S. Department of Agriculture (USDA, 2004). This report uses Phase III (version 1 CRR) of the survey, which collects operational data for U.S. farms, farm operators, and their households. Its target population is all farming units in the United States (excluding Alaska and Hawaii) with annual sales of at least \$1,000 of agricultural products (during the year of the survey). Approximately 20,500 farm operators responded to the 2004 ARMS survey, which represented about 1 percent of all farms in the Nation. Phase I of ARMS screens potential respondents eligible for sampling in future survey phases. Phase II collects data on production practices and the costs related to specific commodities.

ARMS (2004) does not distinguish between different types of recreation. This is a limitation since, in theory, the geographic characteristics with respect to both supply of and demand for hunting and fishing will be different from those for horseback riding or petting zoos. However, refinements made to the 2006 survey will allow differentiation among specific activities, enabling future analysis to make important distinctions among various forms of recreation.

For more detailed information on ARMS, refer to Banker and MacDonald (2005) or the ERS Briefing Room at <http://www.ers.usda.gov/Briefing/ARMS>.

agritourism. ARMS asked participants: “In 2004, what was the total income received by you (the operator) and all partners for recreation such as hunting, fishing, petting zoos, horseback riding, on-farm rodeos, etc?”<sup>3</sup> The question refers only to recreation income that comes directly from the farm business, and excludes activities, such as operating an off-farm bed and breakfast. It also excludes direct sales from roadside stands, since income from such activity is counted elsewhere in the survey.

Because ARMS data on farm-based recreation do not describe hospitality services and direct sales, as well as off-farm activities associated with local hotels, motels, and restaurants, we provide conservative estimates of the extent to which farmers benefit from agritourism.

<sup>3</sup>The total number of respondents for this survey was 20,579, with 635 of these operators reporting earned recreational income, representing roughly 52,000 farms nationwide.

## The U.S. Market for Farm-Based Recreation

To get a better idea of the size and nature of the U.S. farm-based recreation market, we used data from two different surveys, one provided information on the supply side and the other on the demand side.

### Supply

ARMS (2004) indicates that 52,000 farms nationally received income from recreation, representing 2.5 percent of all farms. These farms earned approximately \$955 million in income from recreation activities.<sup>4</sup> Significant variation exists in terms of where on-farm recreation takes place, with the South accounting for more than half of all farms receiving recreational income, followed by the Midwest, which accounts for about a quarter of such farms.<sup>5</sup> A greater proportion of recreational farm operations are also located in completely rural nonmetropolitan counties<sup>6</sup> and, perhaps not surprisingly, in counties more dependent on recreation in general.<sup>7</sup>

ARMS (2004) indicates that nearly 60 percent of recreation farms specialize in raising either cattle and calves or horses, ponies, and mules—possibly reflecting the popularity of horseback riding and dude ranches. However, upon closer inspection, cattle and calf operations account for a smaller share of farms with recreation income than their share of all farms (fig. 1). In contrast, farms specializing in horses, ponies, and mules are disproportionately represented among those with recreation activities, accounting for more than a fourth of all operations with recreation income, but representing only about 10 percent of all farms. Other farm types with significant involvement in recreation include grains, oilseeds, dry beans, and dry peas,

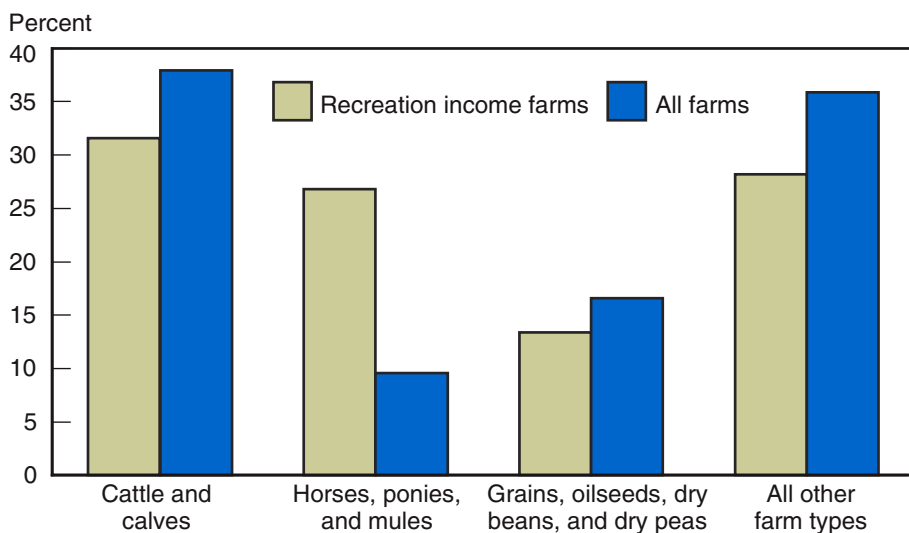
<sup>4</sup>The national estimate of recreation income across all U.S. farms has a coefficient of variation of 26.9; regional estimates reported here are less than 25. This statistical measure of the dispersion of data points around the mean indicates the precision of estimates based on the survey.

<sup>5</sup>Data limitations preclude us from providing a more detailed breakdown of the regional distribution of farm recreational income.

<sup>6</sup>As determined using the 2003 Economic Research Service Rural-Urban Continuum Code classification scheme.

<sup>7</sup>As determined by the Economic Research Service's county recreation score.

Figure 1  
Percent distribution for top three farm types with recreation income

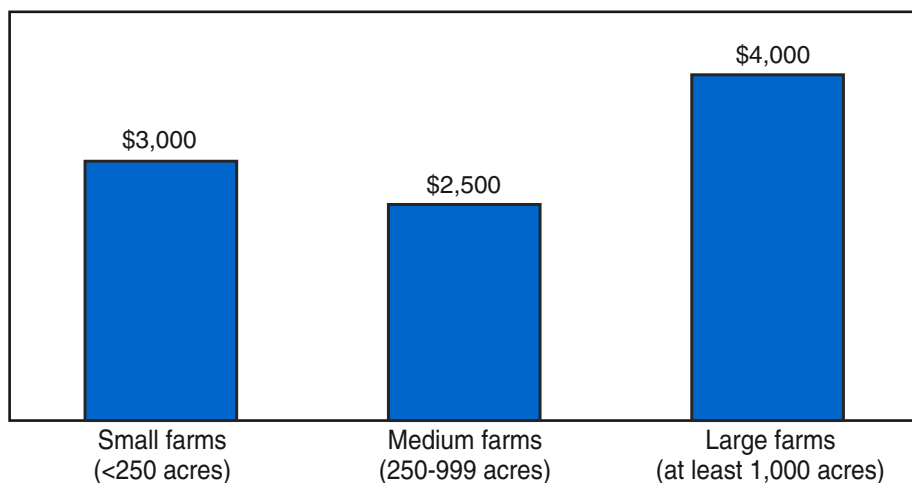


Note: The coefficients of variation for ARMS estimates of cattle and calves; horses, ponies, and mules; and grains, oilseeds, dry beans, and dry peas for recreation farms are 13, 27, and 23, respectively.

Source: U.S. Department of Agriculture. 2004. *Agricultural Resource Management Survey*. Economic Research Service.

Figure 2

**Average (median) per-farm recreational income for farms reporting recreational income by farm size<sup>1</sup>**



<sup>1</sup>Excludes farms reporting no recreation income.

Source: U.S. Department of Agriculture. 2004. *Agricultural Resource Management Survey*. Economic Research Service.

accounting for about 13 percent of farms with recreation income and 17 percent of all farms.

Of farms involved in recreation, the largest farms—those with at least 1,000 acres—have the highest per farm median recreational income at \$4,000 (fig. 2). Medium size farms—those with 250-999 acres—report the smallest recreational income at \$2,500 per farm. Among all farms reporting recreational income, the median farm size is quite large—about 3,100 acres. The household net worth of farm operators with recreational income is higher than average, with a median net worth of about \$794,000 versus \$457,000 for farm operators as a whole.

Farm operators receiving recreation income are slightly older than operators as a whole—60 years on average versus 56 years for all farmers. However, they tend to have about the same number of years of experience farming. They have higher levels of education, with 95 percent of recreation farmers having at least a high school education, compared with 89 percent for all farm operators. Further, 44 percent of those with recreation income have at least a college degree, compared with 24 percent for operators as a whole.

## Demand

According to the 2000 National Survey on Recreation and the Environment (NSRE2000) (see box “About the National Survey on Recreation and the Environment”), the average agricultural recreation customer is in his or her early forties and has a median family size of 3. These farm recreationists typically work 40 hours per week, and their family income level of about \$50,000 is similar to the national average.<sup>8</sup> They tend to have higher levels of education than the general U.S. population, with 93 percent of respondents having at least a high school degree, compared with 76 percent nationwide. And, overall, more than a third of respondents hold a bachelor’s degree or higher, compared with just 1 in 5 for the Nation as a whole.<sup>9</sup>

<sup>8</sup>According to the Census Bureau, median household income was \$50,046 in 1999. More information on Census Bureau data is available at [www.census.gov](http://www.census.gov).

<sup>9</sup>These statistics are based on a simple descriptive analysis of NSRE2000. Tests for statistical differences among subgroups of the population were not performed.

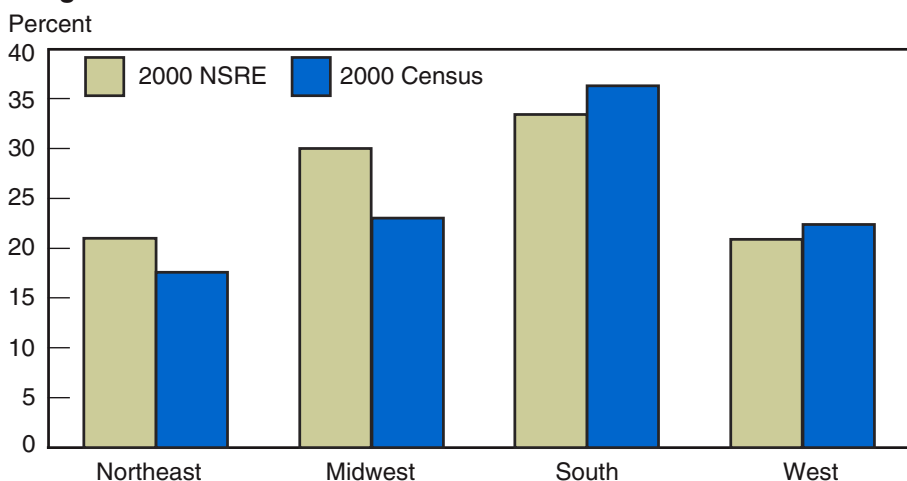
## About the National Survey on Recreation and the Environment

NSRE2000 is a national survey of recreationists, incorporating the experiences of approximately 20,000 respondents (USDA, 2000). The survey is comprised of five different recreation modules: agriculture, sightseeing, fresh water, salt water, and wildlife. The agriculture module is based on the responses of about 6,400 individuals and is currently the only national database of on-farm recreation users (Bernardo et al., 2004).

NSRE2000 indicates that nearly two-thirds of all agricultural recreation customers live in either the Midwest or the South, while about 1 in 5 live in the Northeast (fig. 3). Agricultural recreation customers are mostly urban, with nearly two-thirds living in metro counties. However, an even higher percentage of the U.S. population lives in metro areas (82.6 percent, according to the most recent Census Bureau data available). Thus, nonmetro residents make up a larger part of the customer base relative to their population size. Most farm recreation participants lived relatively close to the farms they visited. The average distance traveled round trip was about 80 miles. Their average cost per trip was roughly \$36.

The most popular activities on the farm were petting farm animals (67 percent of NSRE2000 respondents in the agricultural recreation module participated), taking hay rides and/or exploring corn mazes (24 percent participation), going horseback riding (15 percent participation), and milking cows (10 percent participation). According to the survey, 70 percent of respondents were “not at all interested” in hunting or fishing, while 81 percent of agricultural recreation customers visited farms independently and not as part of an organized group.

Figure 3  
**Percent distribution of NSRE respondents, by Census region, in Agricultural Recreation module**



Source: U.S. Department of Agriculture. *2000 National Survey on Recreation and the Environment*. Economic Research Service.



Scenery is also important to participants, with about 90 percent of respondents indicating they enjoyed the rural scenery around the farm. Roughly 60 percent stressed an interest in seeing less residential development and nonfarm businesses on the way to the farm. Sceneries with woodlands, orchards, and grazing animals were of greatest interest.

## Identifying Key Factors Associated with Farm-Based Recreation

Researchers performed a series of regression analyses to identify what key factors could be associated with farm-based recreation, including who is currently providing farm-based recreation and the income level of those providing farm-based recreation.

### Who Provides Farm-Based Recreation?

Regression analysis explained the likelihood that a farmer will operate an on-farm recreation business (see Statistical Appendix).<sup>10</sup> Four variables had a statistically significant relationship with farmer participation in the recreation enterprise:

- 1) Operator's household net worth;
- 2) Average number of weekly hours worked by the operator doing nonfarm work during July – September;
- 3) Miles between farm and a city of at least 10,000 in population; and
- 4) Natural amenities score (a USDA-derived index that assigns an amenities score to each county based on its climate, topography, and water area) (see box below).

All variables, except average weekly summer hours worked, were positively linked to the likelihood of a farmer operating an on-farm recreation business.

The farm operator's household net worth can be directly linked to the operation of a recreation business. Entrepreneurial activity, such as on-farm recreation, often requires start-up capital. Greater assets may also provide a financial cushion if the recreation business faces difficulties, allowing the operator to overcome short-term losses.<sup>11</sup> Entrepreneurial farm households—

<sup>10</sup>A complete set of independent variables is listed in appendix table 1 and is discussed in the Statistical Appendix.

<sup>11</sup>Our model did not find farm size (total acreage) to be a significant variable. Hence, farm economies of scale do not appear to be related to operator participation in a recreation business.

### What Is the Natural Amenities Score?

The natural amenities score is a measure of the physical characteristics of a county that enhance its location as a place to live. The index was constructed by combining six measures of climate, topography, and water area thought to reflect the environmental qualities most people prefer. These measures include mild winter, winter sun, temperate summer, low summer humidity, topographic variation, and water area. The index ranges from -6.40 to 11.17, with higher numbers representing higher levels of amenities.

For more detailed information on how the index was constructed, see McGranahan (1999) available online at <http://www.ers.usda.gov/Publications/AER781/>.

those making full use of their asset base to generate returns—may, over time, acquire more net worth as well.

The number of weekly hours farmers worked off-farm during the summer is negatively related to their involvement in a recreation business. If operators spend more time working away from the farm, fewer hours are available to devote to entrepreneurial recreation activities, especially during the summer months when demand for recreation is likely to be high.<sup>12</sup> More hours worked off-farm could also indicate a greater availability of off-farm employment opportunities, which would reduce the need for operators to supplement their income through recreational activities.<sup>13</sup>

As the distance between the farm and a city of at least 10,000 in population increases, there is a greater likelihood of a farmer operating an on-farm recreation business. This finding runs counter to expectations from previous research. For example, as noted by Bernardo et al. (2004), farms involved in recreation often require a steady source of consumers and should therefore benefit from being located near cities. However, farms located farther from cities may have a greater potential for offering high-quality habitat, such as might be demanded by the fee-hunting business. These areas may also attract urban residents who want to travel some distance to “get away” from the city. Additionally, people farther from cities may make better farm recreation customers because they are more inclined to be involved with hunting and fishing and may have fewer alternative forms of recreation available. Also, land located farther from a city tends to be cheaper and may encourage greater farmer participation in a recreation business. More isolated locations generally offer farmers fewer off-farm economic opportunities than those located closer to cities, so farmers in these areas may be more interested in participating in an on-farm recreation enterprise because they have more limited options for generating revenue.

Finally, the greater the amount of natural amenities (favorable climate, favorable topography, and water resources) in a county, the greater the likelihood a local farm will be involved in a recreation business. This is to be expected, given that recreation activity is often associated with natural amenities. For example, you must have water to go fishing; a favorable climate makes hunting and fishing more enjoyable.<sup>14</sup>

## Income from Farm-Based Recreation

Assuming that a farmer becomes involved in running an on-farm recreation business, is it possible to identify a set of factors associated with the amount of income he or she will earn from it? To help answer this question, another regression analysis was conducted to analyze variations in farm recreation income among the 635 farms that responded to ARMS (2004) and indicated they had positive income from recreation.

Our results indicate four variables were statistically significant:

- 1) Operator’s household net worth;
- 2) 2000 county population density;
- 3) 1990-2000 county population growth rate; and

<sup>12</sup>However, activities such as hunting or pick-your-own operations may be more popular during the fall.

<sup>13</sup>In economic terms, more hours worked off-farm may reflect higher opportunity costs for working in a recreation enterprise on the farm.

<sup>14</sup>The natural amenities score and recreation score were tested for collinearity using the COLLIN function in SAS. Collinearity was not detected. (See Statistical Appendix.)

- 4) County recreation score—a measure of overall recreation activity in the county (see box below).

All variables, except the county growth rate, were positively linked to the amount of income an operator earned from on-farm recreation.<sup>15</sup>

Household net worth was positively related with recreation income, indicating wealthier operators make more money in recreation than those with fewer resources. However, the effects are attenuated at higher levels of net worth. A positive relationship exists between a county's population density and recreation income, which suggests that a nearby supply of consumers helps to increase recreational income. Once again, the effects are attenuated at higher population densities. A negative relationship exists for percent population change, indicating slower growth counties have greater potential for recreation earnings than areas growing more rapidly. This may indicate a greater need for recreational income or employment by farmers in depopulating areas.<sup>16</sup> Alternatively, it may reflect lower land costs in these locations. Finally, the county's recreation score (reflecting both farm and nonfarm recreation activity) is positively related to the amount of earned recreation income, which is intuitive given that farm recreation consumers will likely be drawn to areas abundant in recreation.

Altogether, the place-based results suggest farms located in counties with greater population density but low population growth will offer more potential for earning money from farm-based recreation, especially if the county has more overall recreation activity attracting tourists.

<sup>15</sup>The net worth and density variables were in log form, meaning that their relationship is nonlinear, with the effects attenuated at higher values. (See Statistical Appendix.)

<sup>16</sup>According to the 2004 ARMS survey, respondents located in population-loss counties (as defined by the 2004 ERS county typology) had a slightly lower household income than other respondents.

### How Was the County Recreation Score Constructed?

The county recreation score, which was developed by Johnson and Beale (2002), is a measure of overall recreation activity in nonmetropolitan counties (using the 1993 Office of Management and Budget definitions of metropolitan areas). It ranges from 0.12 to 8.60, with higher numbers representing higher levels of recreation.

Johnson and Beale constructed the county recreation score by first examining a sample of well-known recreation areas to determine which economic indicators were most appropriate for identifying other such counties. They then computed the percentage share of wage and salary employment in recreation-related industries (that is, entertainment and recreation, accommodations, eating and drinking establishments, and real estate) using the Commerce Department's 1999 County Business Patterns data and the percentage share of income or recreation-related industries using Bureau of Economic Analysis personal income data. They also computed a third measure: the percentage share of housing units of seasonal or occasional use, from 2000 Census data. A weighted average of the standardized Z-scores based on these three main indicators (0.3 employment + 0.3 income + 0.4 seasonal homes) was calculated and serves as the recreation score used in this report's models.

## Conclusions

Recent surveys suggest the potential market for agritourism in the United States could expand since most Americans were found to have visited rural areas in the previous 3 years (from when the 2001 survey was conducted). Two-thirds of the visitors who participated in farm-based recreation lived in metropolitan areas. The average distance farm recreation customers travel is 80 miles round trip. Most of these trips do not involve overnight stays. The typical visitor has an income level similar to the national average. However, relatively few U.S. farms benefit from this form of agritourism.

Descriptive analysis of data obtained from a survey of 20,579 farms in 2004 revealed that only 2.5 percent of farms operated farm-based recreation businesses. Farm involvement in recreation activities varied across the country; 3 out of 4 farms that received recreational income were located in either the South or the Midwest. Farm operators involved in this industry had relatively high levels of education (over 40 percent have at least a college degree), a high net worth (about \$800,000, on average), and their farms were relatively large in size (a median size of about 3,100 acres).

Among farm-based factors, our analysis found that net worth, rather than farm acreage, was statistically significant in relation to variation in farm recreation business involvement, as well as the amount of income received by the farmer involved in recreation. This suggests that access to capital, rather than economies of scale, is linked to participation in this business and how much income is earned from it. Additionally, farmers who worked more hours in nonfarm activities during the summer were less likely to be involved in on-farm recreation businesses than other farmers; they would be less available to oversee on-farm recreation activities.

Among place-based factors, we found, contrary to expectations, that distance to the nearest city of 10,000 or more was negatively related to farmer involvement in farm-recreation businesses. Use of recreation as a survival strategy may explain this finding, as remote rural areas often face difficulty finding off-farm employment for farmers and their families. Hunters may also prefer higher quality hunting areas which tend to be located farther from cities, while city residents may prefer to travel longer distances to farm recreation destinations in order to “get away from the city.”

Natural amenities were associated with farmer involvement in a recreation business. This may indicate that having some natural amenities is important for specific kinds of farm recreation. For example, to fish, water is required, and a mild climate can lengthen the season for hunting, fishing, horseback riding, and other outdoor activities.

The local county’s population density and overall recreation activity level were statistically significant in relation to variation in recreation income. The county growth rate was negatively related to recreation income. Other place-based measures, such as county highway mileage, availability of a public airport in the county, and adjacency to metropolitan areas, were not found to be statistically significant. Taken together, these place- and transportation-based factors imply that close and easy access to a metropolitan

customer base is not essential to operate farm recreation operations (as measured by ARMS).

While our descriptive analysis found that farmers involved in a recreation enterprise tended to be more educated and older than the average farmer, our regression analysis—counter to expectations—did not find education or age to be statistically significant in relation to farmer participation in recreation businesses.

Farmer characteristics, however, were not as strongly linked with variations in the amount of income received by the farmer involved in recreation as they were with the likelihood that they were involved in a recreation business. Of the farmer characteristics we examined, only net worth was statistically significant in relation to variations in recreation income. In addition, net worth effects were not linear. In other words, at higher levels of wealth, adding more to wealth produces smaller and smaller increments in recreation income.

It is important to note that this is only an exploratory study. Additional research is needed to experiment with alternative econometric specifications of the model. And it would be helpful to see if similar results occur in subsequent years to ensure that the findings are not unduly sensitive to the choice of the year examined. More also needs to be known about the relationships we have examined. For example, how do these relationships differ for small and large farms, and rich and poor farmers? How do they vary for specific types of farm recreation and different types of farming? And how do they differ across regions?

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## Statistical Appendix

This section describes the models used, the expected research findings, and the regression results of the study.

### Farmer Involvement in On-Farm Recreation Businesses

A categorical (0, 1) dependent variable indicates whether or not an operator obtains income from a farm-based recreation business: 1 = has income from recreation, 0 = does not have income from recreation. A logistic regression determined which factors are associated with the likelihood that a farmer is involved in farm-based recreation, using data from the ARMS (2004) database.<sup>1</sup> While ARMS collected information on 20,579 farms in 2004, the total “n” for this logistic regression was 6,451, due to nonresponse for ARMS questions covering some of the regression’s explanatory variables.

The estimated one-equation model has a reduced form and incorporates both supply and demand variables. Both farm-related and county-based independent variables were used (app. table 1). The final version of the model contained the following farm-related variables:

1. Operator’s household net worth;
2. Years of experience operator has running a farm;
3. Average number of weekly hours worked by the operator doing non-farm work (excluding commuting time) during July - September; and
4. Distance in miles between the farm and a city of at least 10,000 in population.

While all four variables are supply-related, the fourth reflects the supply of and demand for agritourism. Researchers expected the net worth and experience variables would be directly related to recreation participation; an inverse relationship was expected for the weekly hours worked and distance variables.

Five county-based variables were included to measure the degree of access to consumers. All refer to the county in which the farm operation is located. These variables were:

1. 2003 remoteness status (whether or not a nonmetro county with agritourism is remote, defined as being not adjacent to a metro county);
2. 2000 county population density (population per square mile);
3. Availability of a local public airport (whether or not the county has a public airport);
4. County highway mileage (total mileage of Interstate and non-Interstate highways and other principal arterials); and
5. 1990-2000 county population growth rate.

<sup>1</sup>ARMS is a stratified (nonrandom) sample, so we employed the Delete-A-Group Jackknife variance estimator, which applies weights to the observations to reflect the sample’s stratification. This method of variance/mean squared error estimation for large groups is used to determine which variable coefficients were statistically significant. For more information on this estimator, including its technical specification, see Kott (1998).

The expectation was that, other than for the remoteness variable, involvement in a recreation business would be directly related to each of these demand factors.

Because demand for farm-based recreation might be directly related to the amount of recreation generally available in the local community, two variables identified recreation-related characteristics. These variables were:

1. Natural amenities score — a USDA-derived index that assigns an amenities score to each county based on its climate, topography, and water area (described in box, “What is the Natural Amenities Score?”); and
2. Recreation score — a USDA-derived index that assigns a score to each county based on the relative importance of recreation-related income, employment, and housing to each county (described in box, “How Was the County Recreation Score Constructed?”).

Appendix table 1

**List of independent variables**

Variable	Definition
HHNetWorth	Operator’s household net worth
Experience	Years experience operator has running a farm
HoursWorkedSummer	Average number of weekly hours worked by the operator doing nonfarm work (excluding time spent commuting) during July - September
MilesCity10K	Miles between farm and a city of at least 10,000 in population
Remote03	Remoteness status (2003) (whether or not a nonmetro county with agritourism is remote, defined as being not adjacent to a metro county) (remote=1; all other counties=0)
Density2000	County population density (2000) (population per square mile)
PublicAirport03	Availability of a public airport (2003) (whether or not the county has a public airport) (yes=1; no=0)
HwyMile03	County highway mileage (2003) (total mileage of Interstate and non-Interstate highways, and other principal arterials)
PctPopChge90-00	County population growth rate (1990-2000)
Amenities	Natural amenities score (see “What is the Natural Amenities Score?”) (a USDA-derived index that assigns an amenities score to each county based on its climate, topography, and water area) Ranges from -6.40 to 11.17, with higher numbers representing higher levels of amenities
RecScore	Recreation score (see “How Was the County Recreation Score Constructed?”) (a USDA-derived index that assigns a recreation score to 334 nonmetro “recreation counties” based on the extent of recreation-related income, employment, and seasonal housing) Ranges from 0.12 to 8.60, with higher numbers representing higher levels of recreation

Data sources: 2004 ARMS database (Phase III), USDA (Economic Research Service), U.S. Census Bureau, U.S. Department of Transportation.

The expectation was that farm-based recreation business activity would be directly related to both of these variables (the greater the amount of recreation and/or natural amenities in a county, the greater the likelihood that a local farm will be involved in a recreation business).<sup>2</sup>

Also included in the analysis were several variables expected to be associated with either the supply of or demand for farm-based recreation activity, including total farm acreage; market value of farmland per acre; total acres enrolled in the Conservation Reserve Program; total acres enrolled in the Wetlands Reserve Program; operator's age; whether the respondent worked at an off-farm job prior to becoming a farm operator; whether the operator perceived a problem in the availability of off-farm employment opportunities; why the operator became a farm operator; distance between the farm and the nearest town; county population (2000); and a county-based, population-weighted interaction index to measure the effect of the farm's accessibility to nearby populations. A quadratic form of the distance variable was also tested. However, including these variables tended to weaken the model, so they were excluded from the final version of the model.<sup>3</sup>

The logistic regression performed well in fitting the data, as measured by the Cox and Snell R-Square statistic, 0.975 (1.0 is a perfect fit).<sup>4</sup> However, this statistic could be misleading in the accuracy of our model's prediction of which farmers participated in recreation. Hence, another measure of model fit was used—the percent concordance—which pairs up all 0 and 1 observations and calculates how many of such pairs were concordant with the model's estimated probabilities for these observations (that is, how many had probability estimates higher for the 1 observation than for the 0 observation). In this model, 62 percent of the pairs were concordant. (Fifty percent would result from a model with randomly assigned probabilities; 100 percent would result from a model with assigned probabilities that perfectly matched the observed values of the variable.) Based on these results, it could be argued there is some room for improvement in the model's predictive power.

The parameter estimates from the model indicated that four variables were statistically significant (app. table 2):

1. Operator's household net worth;
2. Average number of weekly hours worked by the operator doing nonfarm work during July – September;
3. Miles between farm and a city of at least 10,000 in population; and
4. Natural amenities score.

Average nonfarm weekly hours and the distance variable were statistically significant at the 5 percent level, the other two variables were statistically significant at the 10 percent level. All of these variables, other than hours worked, had positive signs.<sup>5</sup>

<sup>2</sup>See Bernardo et al. (2004) for more on the relationship between amenities, recreation, and agritourism.

<sup>3</sup>We considered testing for spatial autocorrelation, but determined the results would not be meaningful due to the complexity of the design survey for the data set (ARMS), which relies on replicated weights to represent non-sampled farms at the State and national levels.

<sup>4</sup>This high R-Square may reflect the fact that 97 percent of farms were not involved in recreation. However, this skewed distribution of observations should not present any statistical problems for the logistic regression approach, and it did not prevent our finding statistically significant explanatory variables.

<sup>5</sup>The variables in our logistic regression were tested for multicollinearity using the COLLIN function and variance inflation factor in SAS. Multicollinearity was not detected.

**Logistic regression results measuring the effect of farm and community characteristics on farmer participation in on-farm recreation business**

Variable	Regression coefficient	Variable mean
Intercept	-3.2971***	—
HHNetWorth	0.0001*	1,271.21
Experience	-0.0147	25.21
HoursWorkedSummer	-0.0196**	12.76
MilesCity10K	0.0080**	23.71
Remote03	-0.2433	0.25
Density2000	0.0018	122.58
PublicAirport03	0.1668	0.89
HwyMile03	-0.0038	91.29
PctPopChge90-00	-0.0085	12.55
Amenities	0.1973*	0.24
RecScore	-0.1254	0.06

\*\*\* The regression coefficient is statistically different from zero at the 0.01 level.

\*\* The regression coefficient is statistically different from zero at the 0.05 level.

\* The regression coefficient is statistically different from zero at the 0.10 level.

Sources: ERS calculations, based on data from U.S. Department of Agriculture, U.S. Census Bureau, U.S. Department of Transportation.

## Analysis of Recreation Income

To measure the effect of specific factors on the amount of recreation income earned by the farm operation, a weighted least squares multiple regression analysis incorporated many of the same variables included in the previously described logistic regression.<sup>6</sup> Some of the variables were transformed to logarithmic form to deal with issues of nonlinearity. The analysis explained variations in recreation income among the 635 farms reporting such income in the ARMS survey in 2004. However, due to nonresponse for some of the independent variables, the total number of observations in the analysis was 518.

Several regressions were run using different specifications, but included the following variables in the final regression:

1. Log of operator's household net worth;
2. Years of experience operating a farm;
3. 2003 remoteness status (whether or not the farm's county is remote, defined as not being adjacent to a metro county);
4. Log of 2000 county population density (population per square mile);
5. Availability of a public airport (whether or not the county has a public airport);
6. Log of county highway mileage (total mileage of Interstate and non-Interstate highways and other principal arterials);
7. 1990-2000 county population growth rate;
8. County natural amenities score; and
9. County recreation score.<sup>7</sup>

<sup>6</sup>Because our sample was stratified, the Delete-A-Group Jackknife variance estimator was used, as before, to determine which variable coefficients were statistically significant.

<sup>7</sup>Natural logs were used for the log-transformed variables, allowing us to identify the relationship in which effects are attenuated as the variable increases in size.

### Regression results measuring the effect of farm and community characteristics on farm-based recreation income

Variable	Regression coefficient	Variable mean
Intercept	-108,915.60	—
LogHHNetWorth	7,482.89**	7.14
Experience	222.12	27.67
Remote03	2,656.15	0.40
LogDensity2000	9,317.47*	2.96
PublicAirport03	-16,121.39	0.87
LogHwyMile03	14,042.07	4.02
PctPopChge90-00	-535.57***	10.90
Amenities	-1,446.15	0.65
RecScore	13,026.29**	0.13

\*\*\* The regression coefficient is statistically different from zero at the 0.01 level.

\*\* The regression coefficient is statistically different from zero at the 0.05 level.

\* The regression coefficient is statistically different from zero at the 0.10 level.

Sources: ERS calculations, based on data from U.S. Department of Agriculture, U.S. Census Bureau, U.S. Department of Transportation.

This regression, which explained 16.9 percent of the variation in on-farm recreation income, found four statistically significant variables (app. table 3):

1. Log of operator's household net worth;
2. Log of 2000 county population density;
3. 1990-2000 county population growth rate; and
4. County recreation score.

The county population growth rate variable was statistically significant at the 1 percent level; the log of household net worth and the county recreation score were both statistically significant at the 5 percent level; and the log of county population density was statistically significant at the 10 percent level. All variables, other than the population growth rate, had positive signs.<sup>8</sup>

The final model excluded a number of other variables that did not perform well in the model. This included the farm's distance to a city of at least 10,000 in population; a quadratic version of this distance variable; a county-based, population-weighted interaction index (to measure the effect of accessibility); and farm size in acres.

## Ideas for Further Analysis

The analysis presented in this report should be viewed as only a first step in assessing the effects of various factors on farm-based recreation. In particular, assumptions have been made in the model that each factor has the same effect everywhere in the Nation and for all types of farm recreation, though it seems likely that some significant variations might be expected if separate regressions were run for different places and for different types of recreation.<sup>9</sup> In addition, nonlinear effects were discovered in the data. Further analysis might experiment with more transformations to test for nonlinearity, while other variables might be included to reflect both demand

<sup>8</sup>The variables in the least squares regression were tested for multicollinearity using the COLLIN function and variance inflation factor in SAS. Multicollinearity was not detected.

<sup>9</sup>Future ARMS data will allow for differentiation among various types of recreation.

and supply factors. We could also assess the robustness of research findings by running the regressions with another year's worth of data.

Future research might focus on a number of questions, including:

- What is the relationship between net worth and farm-based recreation over time?
- How does farm-based recreation affect the well-being of the farm?
- What are the time trends in farm recreation income? Does it fluctuate independently of other farm revenue sources?
- Does farm recreation boost local community well-being?