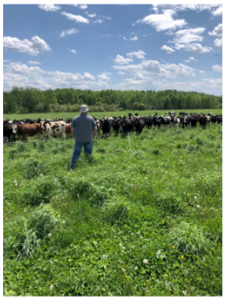
Understanding Limitations to Grass-based Agriculture in the Driftless Region of Illinois and Wisconsin



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WELCOME MESSAGE AND ACKNOWLEDGEMENTS

The Driftless Region of Illinois and Wisconsin is a unique agricultural region with a history of evolving farming practices that are economically and ecologically viable. This technical report is based on a four-year research project to understand barriers and limitations to grass-based agriculture. The research seeks to identify opportunities to reduce barriers to grass-based agriculture to enhance both the agricultural and ecological outcomes of farming. We used a placed-based approach that builds on insights from farmers and agricultural stakeholders living and working in the region.

Throughout our research, we have been aided by numerous local stakeholders. We are grateful to the local leaders, farmers, and residents who met with us and shared their insights. The information received from the residents we engaged is at the heart of our research. We also want to thank the local farmers who participated in our survey and the valuable information they shared about their decision-making related to farming practices. We hope this report will help improve the future of agriculture in the Driftless region.

1.0 PROJECT BACKGROUND

1.1 Changing Agrarian Landscapes in the Driftless Region

Our research on the adoption of sustainable agricultural practices has primarily occurred in two adjacent counties that straddle the state line between Illinois (IL) and Wisconsin (WI). Jo Daviess County, IL, and Grant County, WI, are distinctive because they have borders defined by the Mississippi River and are part of the Driftless region. The Driftless region is an area in the United States Midwest that was never glaciated during the past ice ages. With the landscape being missed by glaciers, the soil and topography of the region are unique. The distinct physical features of the Driftless region have significantly influenced farming practices over the years. The steep sloping landscape has historically been prohibitive for row crop farming. In response to the topography, farmers have taken a diversified approach incorporating dairy cows, beef cattle, and row crop production into their operations.

Figure 1 Animal Agriculture in a Confinement Dairy Barn

Agricultural practices in the Driftless Region have evolved. As farms have become larger, they have tended to specialize in row crop commodity production. The farm census has reported that today in these counties, there are 2,275 fewer farms, and the average size of farms has increased by 35% since the 1950 census (USDA Census). This local trend of fewer farms with more row crop acres is congruent with changes seen throughout North America[1]. Changes in agricultural practices have affected human and ecological communities[2,3].

1.2 Study Purpose

With much of the midwestern landscape committed to agricultural production, changes in farming practices can have significant implications for wildlife, soil health, and water quality. As row crop commodity acreage steadily increases, it is common to observe diminished soil health, water quality, and other ecosystem services[4–10]. The simplification of the landscape contributes to a dramatic decline in pollinators[11], and we have lost >700 million grassland birds across the United States since 1970; grassland birds have suffered the greatest losses of any bird guilds[12]. Most of the decline in grassland birds can be attributed to grasslands being converted into monoculture row crops[12].

Figure 2 Cattle on Wisconsin Pasture

Going forward, it is important to identify ways to increase the adoption of grass-based farming strategies. Well-managed rotational grazing is likely our best way to produce protein while stabilizing climate[13,14], enhancing water quality[15,16], reducing flooding[17,18], improving community vitality[19–21], and supporting biodiversity[22–24].

The researchers and the United States Fish and Wildlife Service are particularly interested in the role of well-managed grazing in providing habitat for grassland birds. Much of the Midwest grassland has been converted, and the remaining grasslands are typically privately owned and used to support animal agriculture. To reverse declines of Midwestern grassland bird populations, dramatic shifts in agricultural practices toward grass-based agriculture, including well-managed grazing with birds in mind, will be necessary in a privately owned landscape[25].

The study aims to identify barriers to establishing and sustaining grass-based agriculture in the Driftless Region of Illinois and Wisconsin using a mixed-methods design that includes personal interviews, focus groups, and a mixed-mode survey.

Our research objectives were to:

(1) Explore how Driftless Region farmers feel about grass-based agriculture
(2) Better understand the social, economic, and political context in which farmers make land use decisions.
(3) Understand the role regional watershed groups and farmer collectives have in shifting normative agricultural practices.
(4) Foster mutual learning opportunities where stakeholder groups can work collaboratively in developing a sustainable agricultural future.

2.0 RESEARCH TECHNIQUES

We employed a mixed methods design to understand issues related to agricultural landscape change in the Driftless Region. A mixed method approach is valuable because it allows researchers to gain insights from various data collection techniques and processes to enrich explanations and provide distinct angles for interpreting findings[26,27]. An overview of our mixed methods approach has been provided in figure 3.

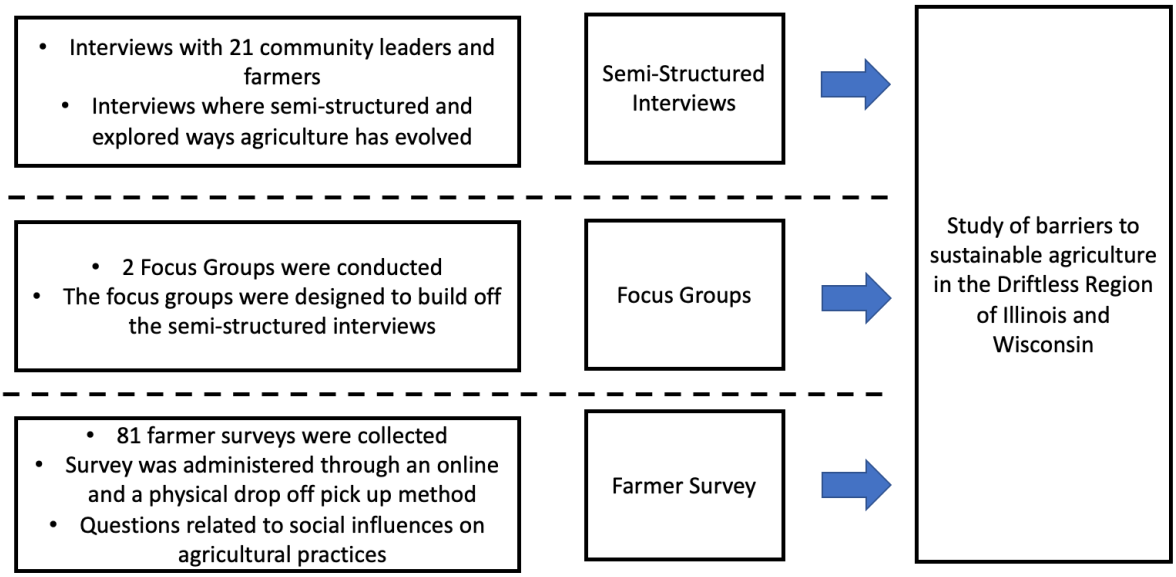


Figure 3 Mixed Methods Approach

The first phase involved **semi-structured interviews** with community leaders and farmers who have played active roles in the evolution of Grant and Jo Daviess County agricultural landscapes. We interviewed 21 farmers and community leaders. Our analysis of the semi-structured interviews identified social and physical barriers to adopting environmentally sustainable agricultural practices, specifically grass-based agricultural systems. The questions used in the semi-structured interviews were broadly-stated and open-ended to encourage engagement from the research participants. The semi-structured interviews were also part of a sequential mixed-method design where the interviews informed the development of the subsequent focus groups and questionnaire.

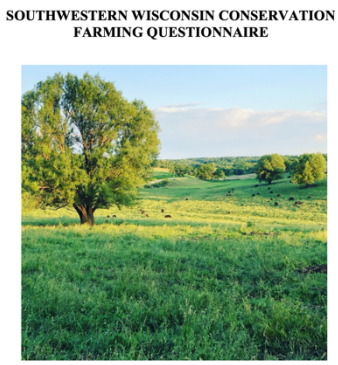

SOUTHWESTERN WISCONSIN CONSERVATION FARMING QUESTIONNAIRE

Figure 4 Cover page for questionnaire

In the second phase, we conducted two **focus groups,** one for each respective county. Focus groups had 3-5 participants which is accepted as an appropriate size to encourage a diversity of ideas to come forward in a participatory dialogue. A research team member served as a moderator to guide discussion among the participants. Focus groups offer a way to evaluate the generalizability of information gathered during the interviews.

Figure 5 Farmers gathering for a focus group

The third phase was a **farmer survey** examining how farmers conveyed social meaning and interpreted landscape features through the management of their farming operations. The questionnaire had six distinct sections (1. Farm information, 2. Sense of place of your farm, 3. Farming practices, 4. Conservation efforts with others, 5. Demonstrating good farming practices, and 6. Socio-demographic characteristics). The questionnaire had a series of open and close-ended questions that were informed by preliminary findings from the semi-structured interviews and focus groups.

The questionnaire was distributed from October 2020 through November 2021. The online version of the questionnaire was distributed using Qualtrics software. The Qualtrics link was broadcast on the email list that the Grant County Farm Bureau, Wisconsin Farmers Union, and Jo Daviess Soil and Water Health Coalition provided. A link to the questionnaire was published in the online version of the Warren Flash, a local newspaper. The questionnaire was also distributed using a "drop-off pick-up" and a "drop-off mail-back" method. By sharing the questionnaire face-to-face, researchers hoped to bolster response rates of the questionnaire due to the personalized contact (see Appendix: Phase 3).

3.0 FINDINGS

3.1 Interview and focus group themes

Our research explored interconnections between agricultural practices, ecological outcomes, and community well-being through contexts of understanding barriers to grass-based agricultural practices. From the semi-structured interviews, three themes were identified that are: (1) external events influencing farming communities, (2) collective action, and (3) a move to regenerative farming. The survey findings also supported these themes.

<u>External events influencing farming communities</u>

Farmers were aware of corporations' and governments' influence on farming operations. Without modern technology, it would not be possible for farmers to grow the amount of corn and soybeans that they currently do. With an increase in high-input corn and soybean systems, low-input grass-based systems have been plowed under. A Grant County farmer explained how Glyphosate was one of the most significant factors in changing the agricultural landscape. The importance of agricultural chemicals to the simplification of agricultural landscapes was a sentiment shared by numerous farmers.

"Roundup™ that made a huge difference. When the chemicals come into play, that made a big difference… When Roundup™ came along you could go out and plant and plant, and if the corn field got ugly with grass and weeds, you still had a window because Roundup™, you could spray it right over the field with a lot of weeds in there. So, you could run more acres… Roundup™ probably changed the landscape as much as anything."

-Grant County Farmer

In rural agricultural communities, farm decisions are essential not only to agricultural success but also impact other facets of life. Evolutions in farm size and agricultural practices have led to subsequent changes in communities. Technological advances have made it much easier for farmers to plant large fields of corn and soybeans. Such technological shifts help explain why acres of pasture are being replaced with acres of corn. Farmers still viewed animal agriculture as being labor intensive because the same level of technological advances has not been enjoyed by farmers who manage pastures. A farmer from Jo Daviess County, IL, highlights how technological improvements impacted the rate at which crops get planted.

"In 1960 I do remember… I would have been 6 years old… If you got up early, the field below my house, you could plant that in a day… Now I plant it in 20 minutes. So that's, but the tractor my dad bought new, I found the receipt for it… had been a John Deere 2 row planter, a 2 row cultivator and a 2 bottom plow… It was $840. My corn planter with all the bells and whistles on it's over a half a million."

-Jo Daviess County Farmer

The transition to bigger tractors and more chemicals to grow high-input crops has been fueled by government subsidies. The government has subsidized farming for many years to reduce farmers' risk and produce cheaper food for US consumers[28]. Many farmers, including this Jo Daviess County farmer, explained how this subsidy program contributed to developing a phenomenon known as the "agricultural treadmill." The "agricultural treadmill" pertains to how farmers are rewarded for expanding their operation; once someone starts growing, they often have to keep expanding to meet their increasing expenses[29].

"The government's a big part of this. No countries ever survived with high price food, and they know that. They'll (the government) do everything they can for overproduction, 'cuz overproduction is cheap food.' How they do that, how they achieve it, is they put a floor underneath here. That sounds real noble, say oh, I'm gonna get so much money. You know what that does? That puts a ceiling up here. So, they keep that carrot about 2 inches in front of our nose, and we follow, I'll be the first to admit it. And that's back to the economics of scale, too. Do I want to get a $5,000 government check or a $50,000 government check."

-Jo Daviess County Farmer

With the agricultural treadmill in full effect, the farms in the Driftless Region have consistently gotten larger since the 1950s. Farmers expressed that increasing farm sizes and new technology has allowed for a consolidation of farm labor. With that, there are fewer family farms resulting in fewer school-aged children. In the study region, some towns are experiencing reductions in population,

losing local businesses, and merging school districts. Interviewees repeatedly expressed concern about the social and community impacts of increasing farm size and its role as a factor that exacerbates school and business closures.

> *"I was just talking with a guy who used to be assistant principle with the public-school system in Platteville. When Matthew (the farmer's son) graduated from the high school in Platteville there were about 140 kids in a class now there isn't even a hundred. And he graduated in the late 90's… it got that way because of the larger farms coming in and the farm families being gone and it is affecting the rural situation. And then in these towns the real estate value like Benton you can't get any money out of a house. I don't know why anyone would build a house in Benton."*
>
> -Grant County Farmer

In recent years fewer children who grew-up on farms are returning to the farm as adults—leading to a dramatic decline in the number of people living in rural farming communities[2]. As more farm children grow up and move to urbanized communities, the average age of the farmer has steadily increased[30]. The farmers who we spoke to expressed it was harder to maintain livestock as they grew older. With an aging farmer population, there was a decline in animal agriculture. Farmers also touched on the knowledge of animal husbandry skills needed to run a livestock operation. One emerging concern is that the capacity to mentor young livestock farmers will quickly diminish as older livestock operators move away from farming.

Figure 6 Farmer implementing regenerative approach

> *"One main barrier to grazing is the average age of the farmer. As we get older you can eliminate chores everyday with milking or beef cattle or whatever. We are not as quick and agile as we ust to be… plain and simple it is easier to sit in the seat of a tractor then it is to pull a calf. Then it is to do just about anything that has to deal with livestock. You have to have a certain amount of patients. You have to actually have an idea of what husbandry is."*
>
> -Jo Daviess County Farmer

Collective action

To advance agricultural practices, farmers discussed a need to work together. The ability to collaborate on improving agriculture and conservation has been a mainstay in the Driftless Region since the 1930's Coon Valley Conservation Corp Project. In our interviews, we had numerous farmers point toward watershed groups as a way to share information. Watershed groups have the potential to allow farmers to share pertinent information and reshape what is seen as an ideal form of agriculture within the region.

> *"We do have a county (watershed) group now… it is kind of a unique relationship we have… We are all in here to learn and we are more than willing to give information. I have no secrets and that is the neat part about this."*
>
> -Jo Daviess County Farmer

"We implement a lot of no till. We've ramped that up the last five years. Because we've been getting a lot more of these big rain events… Maybe it's cause of global warming I hope not cause it is not good and we don't benefit anything from a four-inch downpour… Once we get that (watershed group) rolling, I think that it is gonna be popular to see new practices."

-Grant County Farmer

In both quotes, we see how sharing information with one another allows for the adoption of innovative agricultural practices. In the second quote from the Grant County farmer, he expresses how agricultural practices will have to become more resilient to the impacts of global climate change. It is evident that adaptations to agricultural approaches are necessary to remain resilient as farmers experience various social, ecological, and economic challenges.

Figure 7 Field Day where farmers share information with one another

A move to regenerative farming

Regenerative approaches notably highlight how farmers can embrace rather than battle ecosystem functions to improve agricultural outcomes. We found that many farmers attempted to get off the agricultural treadmill by reducing the number of inputs (e.g., fertilizer, herbicide, insecticide) and instead implemented a regenerative approach. These farmers knew that regenerative farming took advantage of natural processes to help improve agricultural outcomes.

"There are so many other benefits when my farming practices changed to a more regenerative type farming and you know we are not using insecticides we are going to cut back on herbicides and on fertilizer. We stopped using seed treatment. All of these things go together. And I am just amazed at how everything flows."

-Jo Daviess County Farmer

The Jo Daviess County farmer explained how moving to a regenerative approach allowed things on his farm to flow together. He was notably amazed at how well such an approach turned out. Because of his success with his regenerative system, he has been outspoken toward other farmers that reducing the application of fertilizer and insecticides is a viable way to farm.

"As a grass farmer, we've never re-plowed something. If we wanna introduce a new grass or another legume, I frost seed it and put it on, and we've got a tremendous mix, I think, of clover and grass down here… We don't have a lot of equipment."

-Grant County Farmer

The Grant County farmer underscores a similar point by emphasizing that they can run a productive agricultural operation with minimal farm equipment. This farmer avoids the agricultural treadmill by

not having a lot of equipment; rather than plowing hay ground, the Grant County farmer inter-seeded and has had great success.

3.2 Survey findings

Important factors when managing land

Farmers reported what they perceived to be important factors when managing farmland (Table 1). The primary focus of farm management centered on limiting soil erosion. The importance of mitigating the impacts of soil erosion is not surprising. Due to the rolling topography, soil health is a major element of agriculture and is a primary concern in the Driftless region. The worries around soil erosion have only been amplified in recent years due to major precipitation events.

Table 1: Importance of factors in managing one's farmland

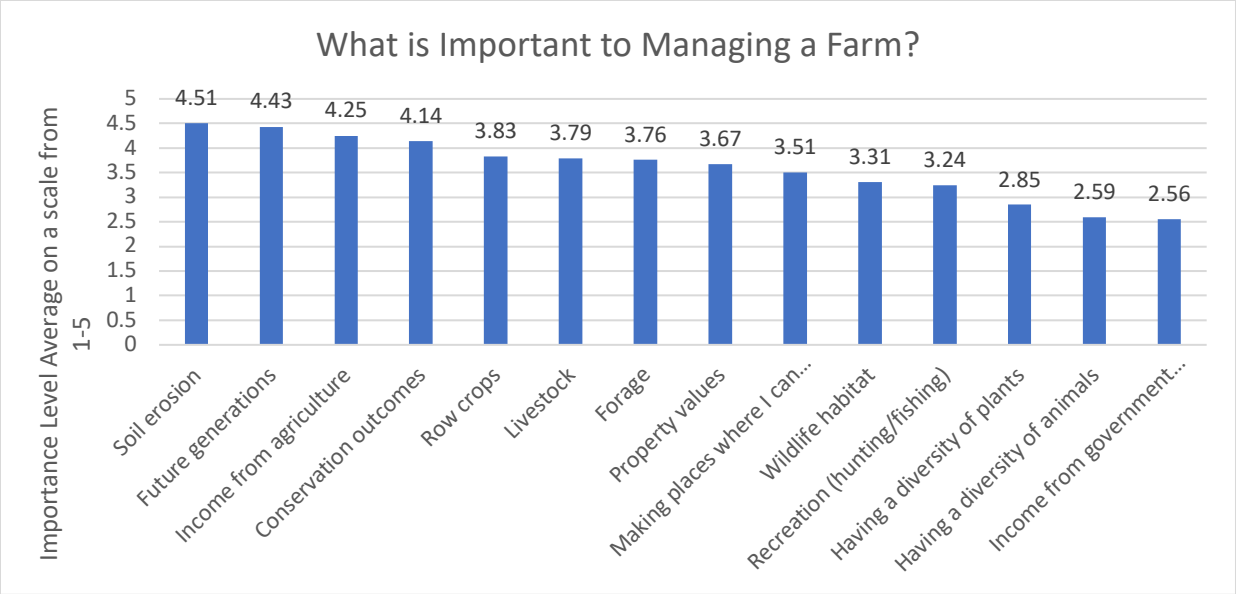


Table note: On a scale from 1-5. 1 is "not important," and 5 is "extremely important"
n=82

These responses indicate that farmers consider much more than profit margins in their management decisions. The evidence shows that farmers are focused on maintaining farms in a way that keeps them viable over the long term. For agricultural land to remain viable, there are numerous factors that farmers consider. Farmers who responded indicated maintaining soil health and conservation efforts were necessary so that the land continues to produce year after year. Conservation efforts were seen as a way to create a more resilient agriculture system better suited to hold up to extreme weather events. Farmers also expressed that maintaining viability depended on a certain profit level to sustain the farming operation for a future generation. While both popular discourse and research on farming practices often focus on increasing profits, our results suggest that farmers know that having viable farms over the long term requires a comprehensive approach. Farmers were well-aware that if any of these elements were ignored, farms would not be viable over an extended time frame.

One perplexing finding from table 1 is that while farmers are concerned about soil health and conservation, they report low on a need for a diversity of plants and animals. Researchers have

found that increasing the diversity of plants and animals on agricultural lands is a way to improve conservation outcomes and soil health. A possible explanation for this discrepancy is that systemic social and economic pressures are exerted on farmers to use monoculture cropping systems such as corn and soybeans.

3.3 Sense of Place

We also asked farmers to identify what makes their farm in the Driftless region unique and distinct. These measures are referred to as sense of place and were put into 6 categories (Table 2). The findings further underscore that it is not a single aspect that makes a farm special. These results provide additional support for a holistic approach that recognizes the complexity of farm decisions and the multiple goals that influence farming practices. The senses of place reported by farmers for their farm and communities were the following:

Caring Community: Distinctiveness comes from strong schools. Having local governments that serve the needs of the citizenry. And community members who display ethical character and are resilient to hardships.

Family: Distinctiveness comes from connections with multi-generation farms. It is a quality place to raise a family and leave a legacy.

Conservation: Distinctiveness comes from the compatibility between conservation and agriculture. Has areas for agriculture, conservation, and wildlife habitat.

Agricultural Production: Distinctiveness comes from farmland that yields high quality and quantity crops and livestock. Soils are fertile. And producers are willing to innovate to remain cutting-edge in their agricultural approaches.

Outdoor Opportunities: Distinctiveness comes from opportunities to encounter wildlife and experience outdoor recreational opportunities. These opportunities provide balance to one's life.

Small Town Feel: Distinctiveness comes from a tight community where people know and support each other. Those connections provide numerous close personal relationships. Communities have distinct locations such as a café or high schools that serve as a gathering point for people to come together as a community.

Table 2 Sense of place of farm and community	
	Mean
Outdoor Opportunities	4.00
Ag Production	3.98
Family	3.92
Small Town Feel	3.82
Conservation	3.57
Caring Community	3.52

Measured on a five-point response scale from "1" equals "Strongly Disagree" to "5" equals "Strongly Agree"
n=82

3.4 Conveying and Interpreting Good Farming Practices

As part of the research process, the authors appreciated that many farmers provided them with personal tours of their farms, and at times, the first author was able to travel around the countryside with farmers as part of the fieldwork. It became apparent that farmers interpreted their neighbors' farmland and realized that neighboring farmers gave their farm the same interpretation. Farmers we interacted with referred to this as "road farming," which involves observing and evaluating farm practices as one views them while driving down the road. Road farming is noteworthy because it could indicate the social processes that inform what is seen as ideal ways to maintain a farm. Simply put, it would be reasonable for farmers to want to be known as good farmers and competent in their profession, so they seek to maintain their farms in a way that neighbors see as aligning with an ideal. From our experiences meeting with farmers, our research team was interested in how farmers conveyed or expressed they were good at farming and how farmers interpreted or made sense of neighboring farming practices. In our survey, we asked farmers if they did anything on their farmland to represent to others that they were good farmer, and then we asked them if they read or interpreted the farmland of their neighbors to evaluate the extent of good farming practices being used. In this section, we broke up agricultural land into three sections (1. Crop areas, 2. Buffer areas, 3. Living areas). Crop areas would be the part of the farm where corn and soybeans are grown, or cattle might be out on pasture. Buffer areas would be sections that break up a field or property boundaries, such as fence lines or waterways. Then finally, living areas would be structures and areas such as a barn, houses, and front yards. The point of this analysis was to see if farmers conveyed and interpreted good farming in the same fashion.

Figure 8 Farming can be viewed and interpreted from public areas such as roadways

Table 3 Conveying and interpreting good farming

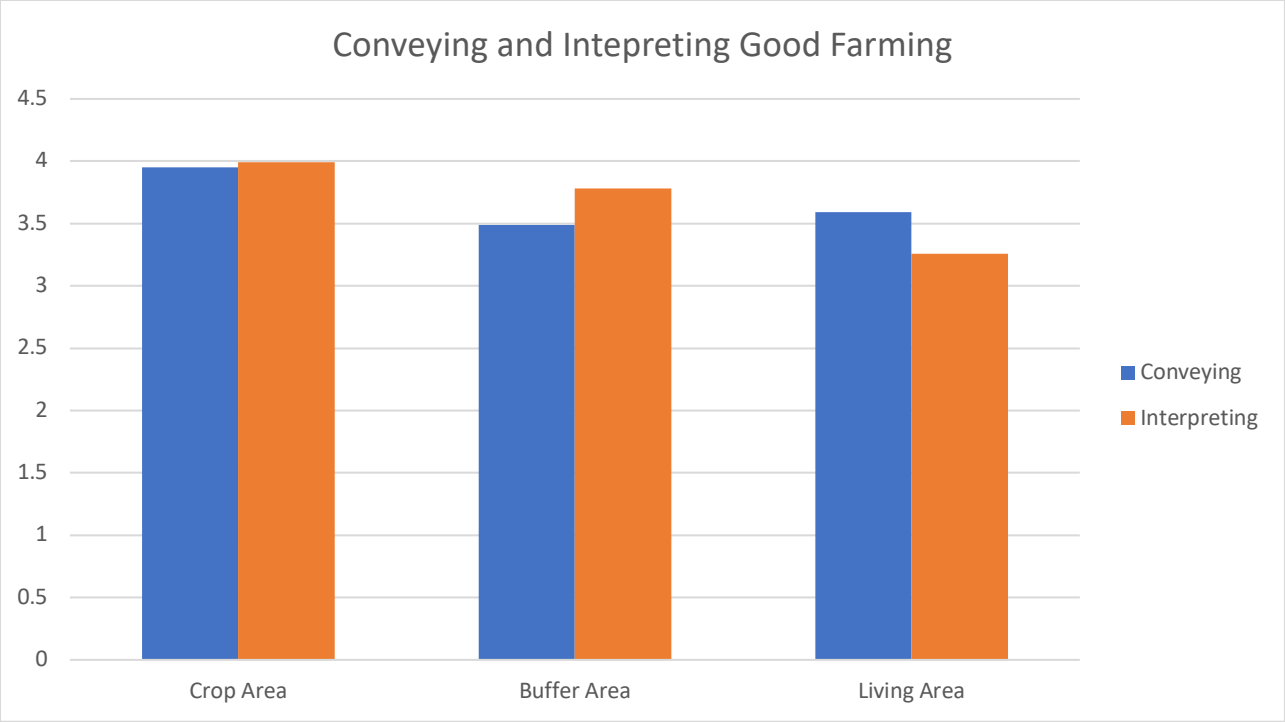


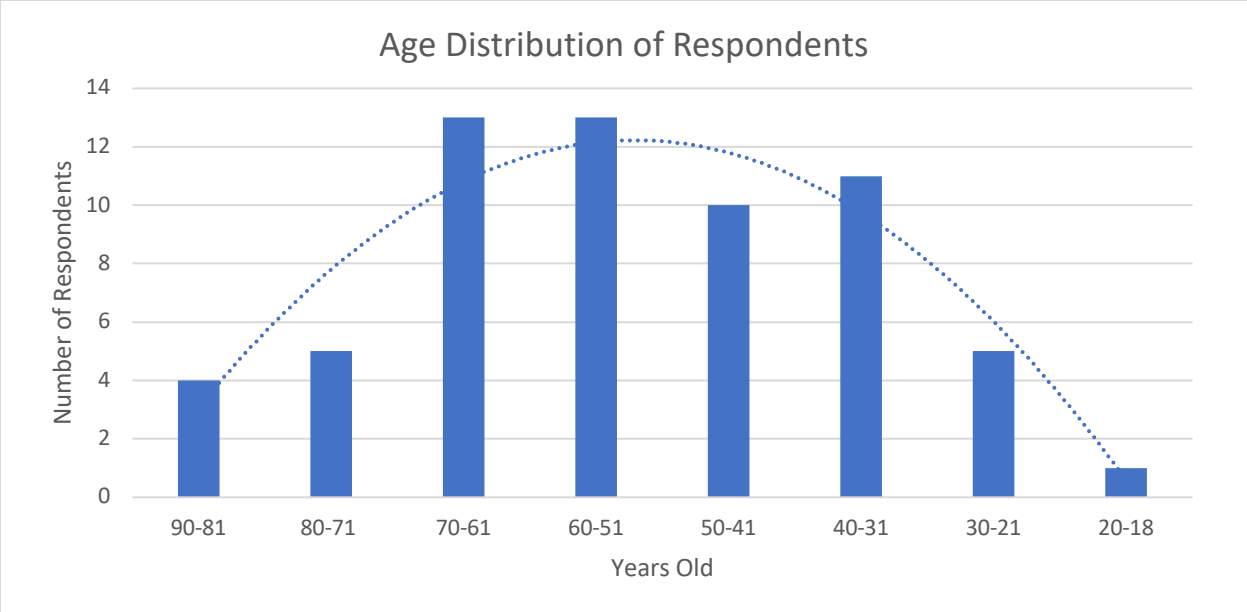
Figure 3 Conveying is the way farmers show they are good farmers; Interpreting is the way farmers evaluate neighbors

Data shows that farmers use a comprehensive approach for conveying and interpreting good farming. Crop areas edge out both buffer and living areas as the most consequential in conveying and interpreting good farming techniques. It is also noteworthy that for buffer and living areas, there is a pronounced difference between the way farmers convey versus interpret good farming. The difference in buffer areas is particularly interesting because farmers we interacted with expressed that it was important to have clean field borders, road ditches, and waterways.

3.5 Survey Demographic Characteristics

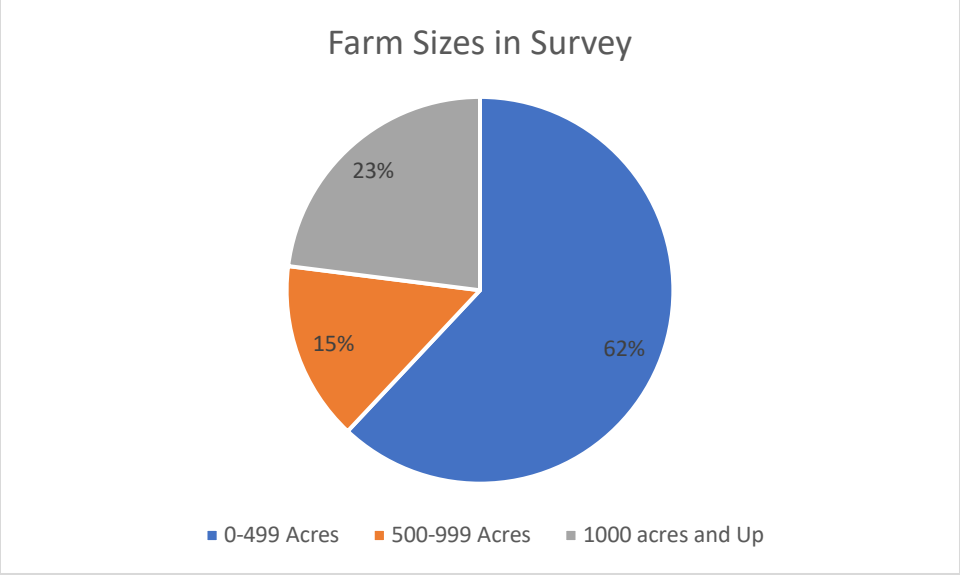
With our focus on changes in agricultural practices, we targeted the survey toward farmers and the way that they manage farmlands. To do this, our survey was completed by people who farmed across seven counties in Southwestern Wisconsin and Northwestern Illinois. The wide range of age distribution of survey respondents varied from young to more experienced farmers and offers the potential to gain further insights into the future of agriculture.

Table 4 Age distribution of respondents



The Driftless region is known for having farms of different sizes and types. Respondents to our survey reflected that diversity by having farms of varying sizes that participated in crop, beef, and dairy production. A large amount of the farms in the survey were below 499 acres which is expected since the US Agriculture Census suggests that the mean farm size within the region is 274 Acres (2017 US Agricultural Census Data).

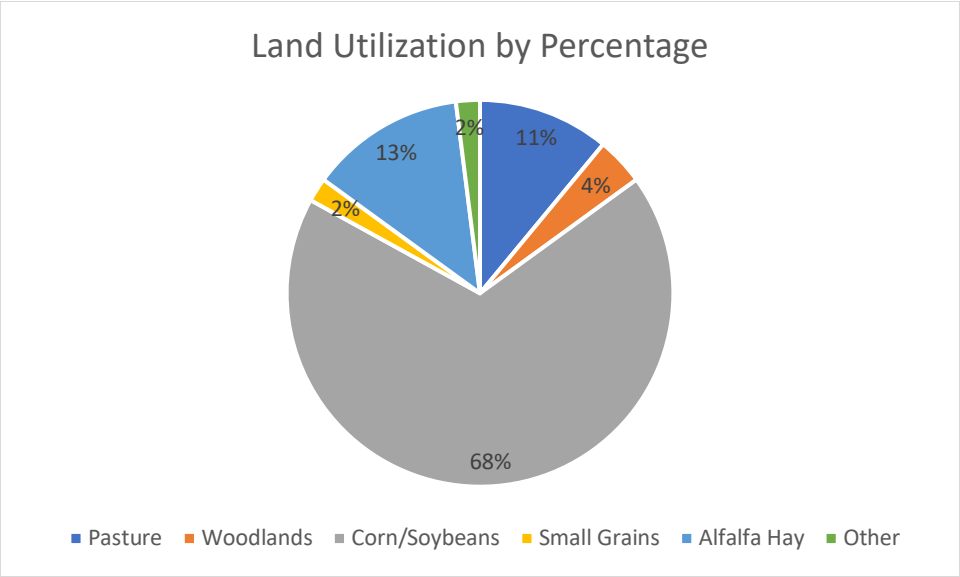
Table 5 Farm Sizes



Farmers self-reported how they utilized their agricultural land. The survey provided insights on management decisions for 62,068 acres of agricultural land, and those reported acres were

predominately in corn and soybean production. The other two predominant land uses were for alfalfa hay and pasture.

Table 6 Land Utilization



4.0 CONCLUSIONS

4.1 Farming Occurs Within a Place-Based Context

Currently, societal forces encourage farmers to expand their operations by predominantly focusing on corn and soybean production acres. Farmers we heard from suggested that farm practices are influenced by government policies, global events (i.e., COVID-19 and tariffs), and large agricultural businesses. Most farmers were aware of the impacts of such forces on rural vitality, individual farming operations, and ecological health. When considering a shift to grass-based agriculture, it is noteworthy that societal, political, and economic contexts impact the autonomy that farmers have to change their style of agricultural operation. The narrowed decision-making frame has been referred to as the agricultural treadmill. During our study, it was apparent that farmers had first-hand experience and were aware of how regional, state, national, and international events influenced their decisions and, in turn, the subsequent impacts on community, ecological, and economic conditions.

Figure 9 Farmers in Illinois hosting on farm field day to learn from one another

Efforts that seek to increase the adoption of grass-based agriculture need to take a comprehensive approach that recognizes farmers' holistic context for their farming decisions. While farmer decision-making needs to consider farm finances and crop yields, our research indicates that farmers have a diverse set of goals for maintaining a viable agrarian lifestyle. Farmers expressed that farm consolidation occurs because they perceive consolidation as an important way to remain economically competitive. Engaging in efforts perpetuating farm consolidation bothered farmers because they knew the associations between increasing farm sizes, adverse ecological outcomes, and diminished rural vitality. The dissonance that farmers feel around farm consolidation is illustrative of why systemic changes are needed in the way that food is grown and consumed in the United States.

Based on the interactions with farmers in this study, grass-based agriculture would increase if farmers were provided a greater amount of influence in state and federal agricultural policy and were allowed to have a stronger voice in the development of agricultural innovations. Engaging in systemic changes will be difficult because agribusiness profits considerably from an agricultural structure that is hyper-focused on row crop commodity production[28]. That means the high input and output corn and soybean rotation is advantageous to agribusiness firms such as Cargill, John Deere, ADM, Bayer, Corteva, and Syngenta [1,2,28,29,31]. A large-scale transition to a low-input system is a potential threat to the socially acceptable (and expected) high-input form of agriculture.

Farmers also shared that the aging farmer population partly drove the reduction in animal agriculture. Over the years, it is becoming increasingly unlikely that children who grew up on a farm stay on the farm[30,32]. Farmers expressed that when their children go off to college or pursue a trade, they seldom see any reason to return to the farm. To make ends meet financially, young farmers often have to work the farm and also have off farm employment[33]. We also found that finding quality off farm employment is becoming more difficult as once-vibrant rural towns have experienced the closure of local restaurants, hardware stores, and boutiques[33]. The cumulative impact is that more young adults who grow up on a farm either head off to college or find a trade in urbanized areas and never return to the rural community where they were raised. For well-managed grazing operations, the departure of these young adults is unfortunate because they are also taking their knowledge of animal agriculture with them.

If it were left up to farmers, it would seem likely that they would seek to redesign the agricultural system in ways that promote ecological sustainability, food production, and improved community health. Based on our study findings to fix our broken food production system, we think it paramount that there be concerted efforts to work with farmers to develop a new agricultural vision. A comprehensive approach to farm decisions is necessary to improve the viability of farming. Researchers should move attention away from focusing on individual farmer decisions and instead take a place-based approach that considers the social, political, economic, and bio-physical context in which farming decisions are made. The promising news is that many community members we interacted with saw the need for a comprehensive approach to improve agricultural practices. Local organizations such as watershed groups and farmer coalitions offer opportunities to redefine what is seen to be the ideal farm and farm practices in the Driftless Region. Those redefined farms in the Driftless region will seek to promote ecological health, profitability, and community well-being.

4.2 Implications of Study Findings

A recurrent pattern of discussion among our participants and various farmers we engaged, was the need to redesign an agricultural system to promote ecological sustainability, food production, and

improved community health. A generalized voice across our participants was a keen awareness of linkages between ecological functioning, farm profits and vibrant rural community, and needs to make these linkages sustainable and attractive to future farmers. A multipronged strategy needs development that would support the concerns of farmers, that includes the following: (1) Federal and state policy processes should engage farmers to frame them as distinct from the agribusiness industry and advocacy groups tied to commercial production. (2) Researchers should focus attention on farming as a place-based activity that considers the social, political, economic, and bio-physical contexts of farming decisions; rather than emphasizing farming as an individual and person-based set of factors. (3) Local organizations, such as watershed groups and farmer coalitions, should be further empowered with resources and political visibility to redefine what is seen as a "good farmer" and farm practices, such as those in the Driftless Region. Fortunately, we already have seen evidence that the above three recommendations may be gaining traction. Many farmers with whom we interacted, already saw the need for a comprehensive approach to improve agricultural practices and were initiating strategies to move forward.

There are several implications suggested by the findings that are difficult to disentangle from the evidence provided, our conversations with farmers and other stakeholders, and our own opinions. A primary finding that we were pleased to learn, and contrasts with the majority of farm-based decision-making research, was that farmers were well-aware and concerned about the problems with contemporary farming practices. There needs to be more focus on how to implement sustainable farming rather than an emphasis on convincing farmers why conservation farming is important. The farmers we interacted with understood the impacts of their farming decisions on the vitality of their communities, ecological conditions near and far, and the legacy of their farm. The implications of this study include the following:

1. Financial incentives alone are not enough. While financial incentives – through insurance or federal subsidy programs – can be helpful, they need to be focused on practices that will enhance the influence of farmers in place-making processes. Financial incentives when not accompanied by efforts for systemic change, likely exacerbate the agricultural treadmill and often only lead to short-term behavior changes that go away once the incentives have been fully distributed. Rather than concentrating efforts on payment schemes for short-term behaviors, society would be a lot better served by engaging in programs and community efforts that seek to build the collective agency of farmers.
2. Build collective farmer agency through entities such as farmer-led watershed groups. Farmers are influenced by many factors that reach well beyond the site of their farm. Currently, in the United States, our economic, social, and political context disadvantages farmers and exploits the efforts that they engage in daily. By gaining collective power farmers would be better positioned to exert their vision for a rural lifestyle.
3. Retain and recruit young farmers through policies and community-building efforts. Farmers expressed that the aging farmer population is a barrier to grass-based animal agriculture. By enhancing farmers' agency in place-making processes, the hope is that these highly vested community members will collectively work to shape vibrant rural communities that attract and retain young farmers. There is also hope that federal investments such as those made around rural internet service will help retain younger generations that depend on the internet for social and professional activities. Steps to retain and bring in younger farmers must be

acted upon soon because the available mentors will quickly diminish as more farmers retire from animal agriculture.

5.0 APPENDIX: METHODS AND ANALYSES

Phase 1: Semi-Structured Interviews

For convening the semi-structured interviews at the beginning of our study, we reached stakeholders across a wide range of roles related to agriculture in the counties. We started by interviewing individuals we identified as having leadership roles in agriculture in the respective counties. We then implemented a referral strategy where these leaders advised and provided us with contact information for other people who would be relevant to talk with. Ultimately, we interviewed 21 individuals who were either farms or involved with the agricultural industry.

The interviews were intended to understand influencing factors on the adoption of sustainable agricultural practices. Discussions centered on how farmers, community leaders, and researchers are working together to advance farming. The interviewers used various question formats to encourage engagement from the interview participants. One strategy was to ask the interviewee to consider how farming has changed over time. These questions prime respondents to consider what might have driven those agricultural changes. The interviewer also used presupposition questions early in the interview process. Presupposition questions are open-ended questions that foster reflection on the part of the interviewee and help build follow-up questions to explore an issue related to their decision-making. An example of presupposition questions used during the semi-structured interviews was, "*Would you explain your farming operations?"*

The interviews were audio recorded, typed into a transcript, and analyzed using NVIVO 12, a state-of-the-practice software for analyzing text and other unstructured data. Thematic areas were identified based on inter-subjective agreement amongst interview participants. The recurring themes across numerous interviews provide evidence that the identified meaning is developed through social rather than individual processes.

Phase 2: Focus-Group

In each study county, a focus group was conducted that brought together 3-5 participants. The participants for the focus group were selected from the list of semi-structured interview participants. In the focus group, additional insights and perspectives can be uncovered as participants feed off their peers' responses.

The focus groups were audio recorded, typed into a transcript, and analyzed using similar NVIVO 12 software. During the analysis phase, researchers sought to explore if there is congruence between the themes brought out in both the semi-structured interviews and focus groups. Researchers examined the extent of agreement and difference across focus group participants for reoccurring themes. While analyzing the focus groups, researchers also analyzed if participants collectively identified any additional thematic areas of interest.

Phase 3: Questionnaire

The questionnaire had a series of open and close-ended questions that were informed by preliminary findings from the focus groups and semi-structured interviews. The questionnaire was divided into 6 sections (1. Farm Information, 2. Sense of place for your farm, 3. Farming practices, 4. Conservation efforts with others, 5. Demonstrating good farming practices, 6. Socio-demographic characteristics). The questionnaire was administered to farmers within the study site starting in October 2020 and was completed in November 2021. Over that time frame, the questionnaire was distributed in both online and paper formats.

The online questionnaire was distributed using Qualtrics software. With the help of local contacts, we obtained sampling frames for the online format from the following organizations: Grant County Farm Bureau, Wisconsin Farmers Union, and Jo Daviess Soil and Water Health Coalition. A link to the online questionnaire was also published in the Warren Flash, a local online-only newspaper.

The paper format of the questionnaire was distributed using a drop-off pick-up and a drop-off mail back approach. Increasing in-person contact by dropping off questionnaires has been shown to improve response rates. For dropping off questionnaires, multiple strategies were utilized. We attended events such as farmer-run field days and the 2021 Grant County Dairy Breakfast. Following these events, one researcher resided on a farm with a local contact for a week in the summer of 2021. During this time, the researcher distributed surveys at various formal and informal social events and work functions in these communities.

The following are the items from the questionnaire with frequency distributions inserted.

CONSERVATION FARMING QUESTIONNAIRE

SURVEY INSTRUCTIONS: Cattle grazing and dairy-cow pasturing create desirable habitat conditions for various grassland birds. Yet, habitat used for grazing and pasturing has been declining. This project engages with farmers in southwestern Wisconsin to identify and understand barriers facing grass-based agriculture.

We are asking a small number of farmers for their opinions on connecting conservation practices with farming. All information you provide will be kept strictly confidential and your response is voluntary. This questionnaire will take about 15 minutes to complete. If you have any questions or comments please contact John Strauser with the University of Illinois at johnrs2@illinois.edu.

Farm Background

	0-20 Years	21-40 Years	41-60 Years	61-80 Years	81-100 Years	101+ Years
For how long have you/your family-owned land in Southwestern, WI/Northwestern, IL	22%	20%	17%	6%	12%	22%

	0-499 Acres	500-999Acres	1000 Acres and Up
How many acres do you manage?	62%	15%	23%

	Corn/ Soybeans	Alfalfa Hay	Pasture	Woodlands	Small Grains	Other
Of the land you manage, what percentage of acres are dedicated to the following cover types?	68%	13%	11%	4%	2%	2%

n=82

When managing your land, how important is each of the following…

	Not Important				Extremely Important
Conservation Outcomes	0%	1%	19%	44%	36%
Forage	9%	8%	13%	33%	37%
Income from agriculture	5%	10%	14%	25%	46%
Income from government programs	18%	36%	21%	19%	6%
Livestock	22%	5%	8%	23%	42%
Property values	2%	13%	26%	41%	17%
Making places where I can quietly enjoy my land	6%	15%	21%	34%	21%
Recreation (hunting/fishing)	13%	24%	32%	18%	14%
Row crops	16%	10%	13%	29%	33%
Future generations	1%	2%	12%	23%	60%
Soil erosion	0%	1%	5%	38%	56%
Having a diversity of animals	24%	23%	28%	13%	12%
Having a diversity of plants	10%	14%	27%	29%	19%
Wildlife habitat	4%	19%	30%	25%	23%

n=82

How important is it to have the following animals/insects on your land?

	Not Important				Extremely Important
Huntable game (pheasants, white-tailed deer, wild turkeys, ducks)	15%	16%	26%	24%	20%
Nongame grassland birds (Bobolinks, Eastern Meadowlarks, Henslow's Sparrow)	19%	22%	23%	21%	15%
Pollinators (bees, butterflies)	5%	6%	25%	28%	36%

n=82

My farm is special because it…

	Strongly Disagree				Strongly Agree
Has neighbors that support one another	1%	7%	30%	26%	31%
Has special local places nearby	1%	9%	37%	32%	16%
Connects me with my family roots	10%	1%	10%	37%	39%
Has compatibility between conservation and farming	1%	4%	16%	42%	34%
Is productive farmland	4%	8%	13%	33%	43%
Is part of a rural landscape	1%	0%	18%	34%	47%
Has opportunities to encounter wildlife	4%	4%	16%	46%	30%
Has lots of activities that bring balance to my life	3%	3%	23%	39%	33%
Contains some distinct features that reflect my approach to farming	3%	5%	26%	33%	33%
Has outdoor recreation opportunities	5%	5%	16%	48%	26%
Has fertile soils for growing crops	3%	4%	12%	46%	36%
Allows for agricultural innovation	4%	4%	24%	38%	29%
Has native prairie landscaping	5%	18%	46%	22%	9%
Is part of a local community where families know each other	1%	4%	11%	42%	42%
Provides a natural area for conservation	1%	4%	34%	35%	25%
Provides close personal relationships in the community	3%	4%	38%	33%	22%
Provides grassland bird habitat	8%	15%	36%	26%	17%
Reflects generations of family	11%	6%	25%	27%	30%
Has a unique legacy	6%	6%	27%	32%	28%
Is a good place to raise a family	1%	0%	14%	27%	58%
Is in a strong school district	4%	10%	18%	35%	33%
Has local governments that listen to residents	6%	16%	30%	41%	6%
Has communities that reflects the character of its citizens	5%	5%	35%	49%	6%
Has a history of overcoming hardships	5%	8%	34%	37%	15%

n=82

In your opinion, a good farmer is one who…

	Not Important				Extremely Important
Keep fence rows clear of brush	5%	13%	33%	37%	12%
Minimizes tillage	0%	7%	29%	39%	25%
Helps friends and neighbors	0%	3%	12%	39%	47%
Is a community leader	1%	9%	30%	44%	16%
Shares knowledge	0%	1%	25%	44%	30%
Keeps their fields looking clean	3%	10%	23%	40%	24%
Minimizes nutrient runoff	0%	0%	5%	36%	58%
Minimizes soil erosion	0%	0%	4%	35%	62%
Maintains organic matter	0%	0%	9%	43%	47%
Considers stream health	0%	0%	13%	42%	45%
Prioritizes soil conservation over profit	1%	4%	26%	43%	26%
Considers the health of the watershed	0%	0%	18%	48%	34%
Has up to date equipment	19%	31%	29%	18%	3%
Is active in the community	0%	12%	37%	37%	14%
Has the highest profit per acre	13%	30%	31%	22%	4%
Plays a role in farm organizations	4%	17%	36%	34%	8%
Shares equipment	9%	22%	36%	27%	5%
Has the highest yield per acre	18%	23%	38%	18%	3%
Protects watersheds	1%	7%	22%	44%	25%
Has their crops planted first	43%	24%	30%	3%	0%
Uses cover crops	3%	12%	23%	42%	21%
Maintains wildlife habitat	4%	16%	32%	29%	19%
Avoids fall tillage	12%	21%	37%	12%	18%
Minimizes pesticide use	7%	16%	38%	16%	24%
Uses chemical technology	16%	13%	41%	26%	5%

n=82

To what extent do you agree with the following statements?

	Strongly Disagree				Strongly Agree
I am aware of the decline in grassland bird populations	9%	8%	36%	23%	24%
I am concerned about the decline in grassland bird populations	6%	8%	36%	25%	25%
I would like to learn more about how to improve habitat for grassland birds	8%	11%	32%	32%	18%
I would be willing to establish and maintain grassland bird habitat on 10% of my land if I receive 100% of the cost of planting and management	16%	21%	25%	20%	17%
I would be willing to establish and maintain grassland bird habitat on 10% of my land if I could receive 50% cost share for planting and management	23%	23%	32%	21%	1%
I would be willing to establish and maintain grassland bird habitat on 10% of my land using my own money	33%	29%	26%	8%	4%

n=82

How likely are you to…

	Very Unlikely				Very Likely
Attend a public meeting focusing on the future of the county	8%	11%	19%	36%	25%
Participate in an informal meeting of community members that discusses the future of my community	7%	11%	21%	36%	26%
Join an organization that works to preserve the character of the community	10%	14%	24%	35%	18%
Recruit friends to participate in an activity that benefits the community	7%	16%	23%	41%	14%
Volunteer at a field day involving farmers	4%	10%	24%	37%	25%
Participate in long term land use planning with other members of your community	6%	10%	25%	38%	21%

n=82

To what extent do you agree with the following statements?

	Strongly Disagree				Strongly Agree
I feel that I am an important part of my community	1%	8%	31%	39%	20%
If a problem arises, I am willing to work together with other community members to solve it	0%	6%	21%	44%	30%
If a problem arises, people in my community work together to reach a solution	3%	6%	19%	57%	15%
People in my community work together to solve differences about community issues	1%	14%	32%	44%	8%
Local officials in my community represent the resident's views	4%	21%	35%	33%	6%

n=82

I demonstrate good farming practices to my neighbors by…

	Strongly Disagree				Strongly Agree
Raising a uniform crop	6%	4%	28%	49%	13%
Managing crop residue	1%	3%	17%	57%	21%
Maintaining grass waterways	0%	3%	8%	41%	48%
Minimizing erosion on slopes	0%	0%	8%	38%	53%
Utilizing cover crops	4%	6%	24%	38%	28%
Maintaining clean fence rows	4%	7%	34%	41%	14%
Having limited weed growth	3%	3%	14%	55%	25%
Providing habitat for wildlife	0%	8%	30%	37%	25%
Reducing overgrowth of brush	1%	3%	26%	46%	24%
Using a farm pond to retain storm water	23%	14%	35%	20%	8%
Have fresh paint on buildings	11%	13%	39%	29%	9%
Mow around the farmhouse and other structures	4%	3%	13%	39%	41%
Plant flowers around the farmhouse	3%	7%	30%	39%	20%
Have a driveway free of potholes	3%	7%	21%	41%	28%
Show a yard sign with farm and/or family name	14%	9%	29%	27%	21%

n=82

I can tell someone is a good farmer by seeing how they…

	Strongly Disagree				Strongly Agree
Raising a uniform crop	3%	6%	26%	51%	14%
Managing crop residue	0%	1%	19%	60%	20%
Maintaining grass waterways	0%	0%	9%	51%	40%
Minimizing erosion on slopes	0	0	9%	51%	40%
Utilizing cover crops	1%	1%	22%	51%	25%
Maintaining clean fence rows	3%	3%	23%	56%	16%
Having limited weed growth	0%	4%	13%	61%	21%
Providing habitat for wildlife	0%	10%	33%	34%	23%
Reducing overgrowth of brush	0%	6%	25%	51%	19%
Using a farm pond to retain storm water	7%	15%	33%	33%	12%
Have fresh paint on buildings	10%	13%	40%	31%	6%
Mow around the farmhouse and other structures	6%	4%	24%	56%	12%
Plant flowers around the farmhouse	7%	12%	41%	36%	4%
Have a driveway free of potholes	9%	13%	37%	33%	9%
Show a yard sign with farm and/or family name	7%	10%	28%	41%	4%

n=82

Farmer Demographics

Years old	18-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90
	2%	8%	18%	16%	21%	21%	8%	6%

Sex	Male	Female	Other
	74%	26%	0%

Education	No Schooling	Grade 1-11	High School Grad/GED	Some College	Bachelor's Degree	Graduate Degree
	0%	0%	20%	21%	39%	20%

n=82

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