

# Pepin County farmer nitrogen-use survey

## Project Report

In 2020, University of Wisconsin-Madison researchers and Pepin County staff studied farmer attitudes about nitrogen use, as part of a UniverCity Alliance partnership to research key issues facing the community.

Nitrogen is needed and used on cropland to support agriculture within Pepin County and throughout the state. However, nitrate contamination of groundwater and associated health impacts are a growing concern. For this study, farmers were asked about nutrient management to help local land managers communicate more effectively.

### About the Survey



Jimmy Emerson, Flickr Creative Commons

To guide survey development, researchers reviewed literature and interviewed ten Pepin County farmers by phone between February and April.

In December, the Pepin County Land Conservation and Planning Department mailed the survey with a \$2 cash incentive to 91 farm operations identified by public records, followed by a postcard and reminder mailing. This report reflects 61 returned questionnaires and a 67% overall response rate.

### Highlights from Responses

The project team consulted with partners to select a set of research questions:

#### What practices are farmers receptive to that reduce nitrate contamination in groundwater?

Researchers asked farmers to assess a set of practices that were chosen for their potential to reduce nitrogen use or loss, including whether they had used a practice in the past three years and how likely they were to use it in

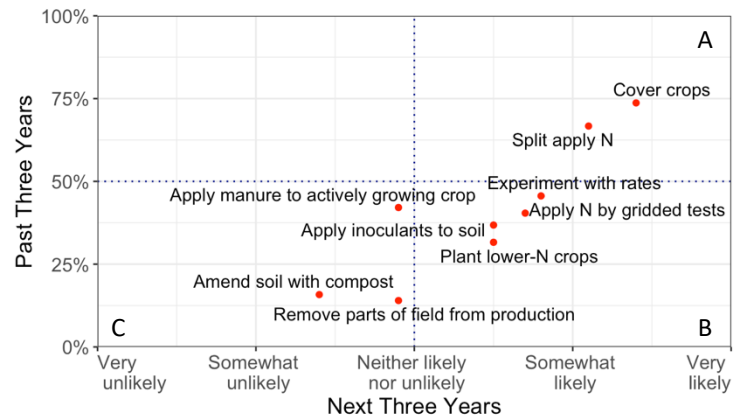


Figure 1. Farmer self-reported past and future use of practices

the next three years. Researchers plotted practices by current use and likelihood for future use (Figure 1).

Messages about practices in the top right (A) quadrant, for already-favored strategies like cover crops and split application of nitrogen, can focus more on how to perform these practices compared the bottom left (C) quadrant, where more work is needed to understand attitudes and address barriers. The bottom right (B) quadrant shows practices with lower existing use but potential for increased future use.

#### What are incentives to adopting these practices?

Farmers rated the attractiveness of an operation benefit when adopting a new practice (Table 1).

Protecting water quality	4.6	Improving soil microbes	4.3
Increasing soil organic matter	4.6	Improving pollination	4.3
Reducing erosion by water	4.6	Reducing pest pressure	4.3
Reducing weed pressure	4.6	Reducing flooding	4.2
Improving soil structure	4.5	Reducing erosion by wind	4.2
Reducing nutrient losses	4.4	Improving germination	4.1
Reducing compaction	4.4	Increasing infiltration	4.1
Increasing nutrient availability	4.3	Increasing soil moisture	4.0
Reducing drought stress	4.3		

Table 1. Benefit attractiveness (4 = "very" and 5 = "extremely")

All benefits were rated highly: between "very" and "extremely" attractive on average. This is not surprising since these factors often affect the success of a crop.



Erin, Flickr Creative Commons

Factors related to water and soil quality, erosion, weeds, compaction, and nutrients were rated most highly. Lower-rated benefits are still attractive to many but may not appeal to all operations, such as in sandy soil that does not flood and fields protected from wind or that are already too wet.

Farmers were also asked to rate their satisfaction with existing financial incentives and technical support for nitrate-reducing practices (Figure 2).

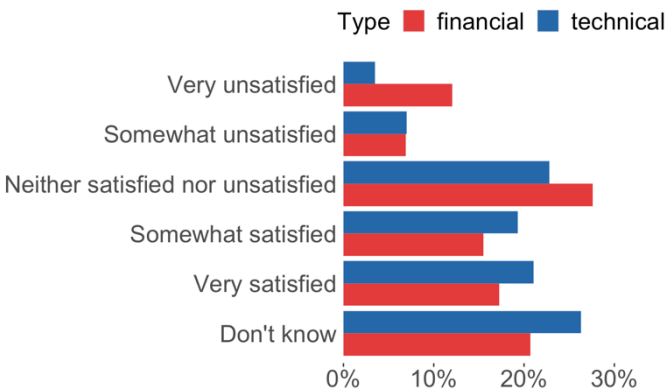


Figure 2. Average satisfaction with financial vs. technical support

Besides the 20-25% of farmers who responded “don’t know,” most respondents reported neutral or positive satisfaction, especially with technical support. Attitudes towards financial incentives were more negative or neutral. In space for comments, there was a split between farmers who say financial support is needed and those who believe government should not intervene.

This is a clear example of how different people have different motivators: for some, cost-sharing may be a turn-off. Messages should also consider other values and motivators, such as preserving land and the tradition of farming, self-reliance and independence, and even the aesthetics of a well-tended operation.

### What are barriers to adopting these practices?

Effective communication should address barriers to changing behavior as well as the benefits. This study focused on a few potential hurdles.

For example, while not sufficient to change behavior, relevant knowledge can be important. The survey asked farmers to identify health impacts associated with nitrates (Figure 3) from a list of potential risks.

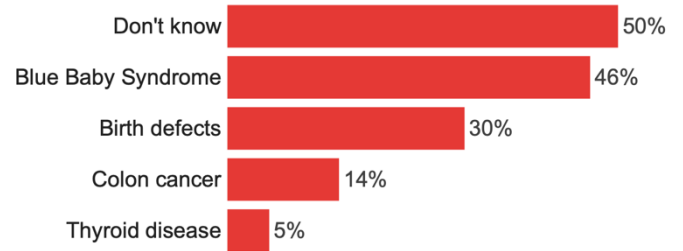


Figure 3. Farmer awareness of health risks associated with nitrates

About half selected “don’t know.” More respondents identified risks to fetuses and infants, like birth defects and Blue Baby Syndrome, than risks that can concern adults, such as colon cancer and thyroid disease. Most farmers were concerned about the impact of nitrates on human health. However, comparatively lower concern for their own health suggests some optimism bias: the belief that negative events are less likely to happen to oneself.

In this section, some respondents expressed concern for future generations and the “pocketbook” impacts of high nitrate levels, such as the cost to treat contaminated water for use on livestock operations. Discussions about nitrate contamination should address a broader scope of risk to encompass issues of concern for farmers.

When respondents without a Nutrient Management Plan (NMP), n=19, were asked why they did not have one, most specified “other” rather than choosing from listed reasons (too expensive, too much time/labor, don’t see benefit, too complicated). Many believed their operation is not compatible with nutrient management planning, such as due to the type of nutrient application, a too small or diverse operation, or already low or appropriate rates.



Pepin County, WI in red. Wikimedia Commons

Interestingly, both using and not using synthetic fertilizer were cited as rationale for not having a NMP. These contradictory beliefs suggest that both NMP tools and messaging can be better tailored to operation and nutrient type.

**Who do farmers want to hear from?**

Trust in the messenger can matter as much as the message content. In Pepin County, most farmers value the opinions of farm advisors (such as crop advisors and agronomists) and agencies (Figure 4) when making decisions about nutrient management. These groups should be key partners in providing relevant information and discussing challenges. Opinions of outside groups, like consumers and elected officials, are valued much lower and are likely to influence farmers’ decisions much less.

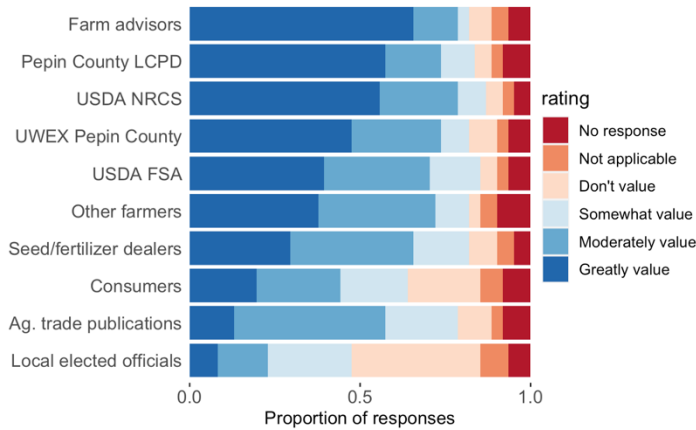


Figure 4. Valuation of opinions re: nutrient management decisions

**What are the social norms?**

Social norms (Figure 5) are the unwritten rules that guide how people behave. This survey looked at how much pressure farmers feel to behave in a certain way themselves (A) and whether they trust other farmers to do the same (B). These components have been theorized to be important in agriculture, where farmers desire fairness in expectations to conform to voluntary changes.

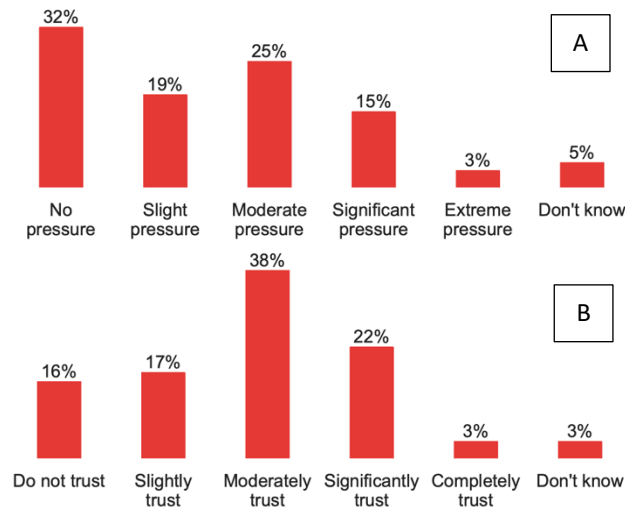


Figure 5A. “How much social pressure do you feel to adopt...” and 5B. “How much do you trust that other farmers are adopting...” practices that reduce nitrate leaching to groundwater

Based on these responses, there is not a clear social norm for adopting nitrogen-reducing practices. However, responses do indicate moderate trust that other farmers are adopting these practices. Trust among peers provides a good foundation for future farmer-led efforts.

**About the Respondents**

Most (67%) respondents reported that they are 50-59 or 60-69 years of age, consistent with farmer demographics in the state, though younger respondents are also represented in the sample. While a few operations reported net annual incomes of \$250,000, \$500,000 or more, 45% of respondents reported \$50,000 or less net income in the past year (2019).

**Operation Characteristics**

The majority (63%) of respondents reported farming both flat and sloped/hilly cropland, while 20% of respondents farm mostly slopes or hills and 17% farm mostly on flat ground. Farmers work with a variety of soils, from sandy loam to clay.

For nutrient applications, about 75% of respondents use synthetic fertilizer and 68% use surface-applied manure. Fewer respondents use injected (21%) or composted (19%) manure. More smaller and fewer larger animal operations were reported (Table 2), whereas crop operations had more even representation (Table 3).

1-50 animals	46%	Table 2 (top) and Table 3 (bottom)
51-250 animals	25%	
251-500 animals	11%	
501-1000 animals	16%	
1001+ animals	2%	

1-50 acres	14%
51-250 acres	32%
251-500 acres	17%
501-1000 acres	20%
1001+ acres	17%

**Conclusion**

This survey represents a snapshot of farmer perspectives on nutrient management in a small, Northwestern Wisconsin county. Insights can be applied to efforts to organize effective community responses to nitrate issues locally. With modifications, the survey could be adapted to other or broader contexts, including statewide efforts.

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