PERSPECTIVES ON DIGITAL FARM DATA OWNERSHIP

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Acknowledgements: The financial support of the Purdue Center for Commercial Agriculture, the Purdue University Agricultural Experiment Station and the CME Group are gratefully acknowledged.

Abstract

This study provides information about current farm data ownership practices, perceptions among producers' regarding the value of farm data, their willingness to pay for access to farm data, and the degree to which farmland leases specify ownership of farm data. Results indicate farmers are not generally willing to pay higher premiums to acquire historical farming data on rented farmland and operator-landlords are not generally interested in charging their tenants for farm data. This is likely driven by the rarity of farm data use agreements in farmland lease contracts since only 6% of renters report having a lease that clearly specified farm data ownership. However, farmers who rent a large portion of the land they operate express a higher willingness-to-pay, which may reflect their exposure to information asymmetries in farmland markets. Farmers largely believe that farm data collected on rented farmland is the legal property of the operator collecting the data, although farmers who rent land out to other operators are less inclined to agree that tenant-farmers own the data. As farm data collection continues to grow, data sharing agreements between landowners and tenants may become more popular.

Key Words: Farm data ownership, value, sharing agreements

Introduction

The agricultural production sector is increasingly awash in data. Examples of commonly collected data include that from farm machinery equipped with sensors that collect production and/or application data continuously, imagery captured by drones and satellites, and grid-based soil test data. Farm specific data collected by agricultural producers is then employed in a variety of ways to improve productivity via better informed and more timely decision making. Growth in data collection has been quite rapid. For example, Schimmelpfennig and Lowenberg-DeBoer (2020) report that yield mapping using GPS yield monitors grew from approximately 5% of United States corn acreage in 1998 to almost 45% of acreage in 2016.

Despite its growth in recent years, agricultural "big data" has yet to be incorporated into farmland markets. Farm data has the potential to address information asymmetries that often exist between landowners and tenants. A landowner may know more about the true productivity of farmland than potential tenant-operators. Conversely, an operator may accumulate more information about a parcel than an absentee landlord. These differences in knowledge may lead to bargaining power in the setting of rental rates. Precision farming data can bridge these informational divides. Data can also make land more productive by providing better information to use when making management decisions. New occupants may then benefit from farm data transferred from a previous operator.

The extent to which farm data can add value to farmland depends on its ownership status. In cases where the farm operator owns the farmland, data ownership is clear. However, when a farm operator farms leased land, questions can arise concerning who owns the data. Do farm operators responsible for collecting the data retain sole ownership of the data? Or do landowners have a specific property right claim to data collected by farm tenants as an attribute of the land they own? Furthermore, how do farmland owners and farm operators view this issue? What is the perceived value of farm data and are producers willing to pay to obtain access to historical farm data records on rented farmland? Without answers to these important questions, producers and landowners may not realize the full economic value of farm data.

The purpose of this study is to learn more about farm data ownership, perceptions regarding the value of farm data, willingness to pay for access to farm data, and the degree to which farmland leases specify ownership of farm data.

Methods

A series of questions regarding farmers' perceptions of farm data ownership and valuation were posed to a random sample of United States corn, soybean, wheat, and cotton producers in December 2021. The survey questions were included in the December 2021 *Purdue University-CME Group Ag Economy Barometer* survey. The *Ag Economy Barometer* survey is a monthly telephone survey of United States agricultural producers used to calculate the *Ag Economy Barometer* sentiment index and related sub-indices. The survey is focused on United States producers of corn, soybeans, wheat, cotton, beef, pork and dairy and all producers in the survey sample have an estimated gross farm income of $500,000 or more suggesting that they are commercial scale producers.[1] Since the objective was to learn more about crop producers' perceptions, the sample for this study was further stratified to only include respondents who indicated that they planted corn, soybeans, wheat, or cotton in 2021. A total of 404 respondents completed the December 2021 *Purdue University–CME Group Ag Economy Barometer* survey and of those 404 respondents, 304 indicated that they planted corn, soybeans, wheat, or cotton in 2021. Responses to questions about farm data were collected from those 304 crop producers. Questions regarding values per unit of land were posed using acre measurements with results translated to metric (e.g., per hectare) measurements in the manuscript's text.

Results

Almost two-thirds (63%) of crop producers in the survey indicated that they collect digital data such as yield monitor data, as-applied input rates, satellite imagery, or grid soil samples. Focusing solely on those producers who said they collect digital data, 13% of respondents said they have been doing so for over 20 years while 26% of respondents said they have been doing so for less than 5 years.

[1] More details regarding the survey procedure are available at Purdue University-CME Group Ag Economy Barometer (2021).

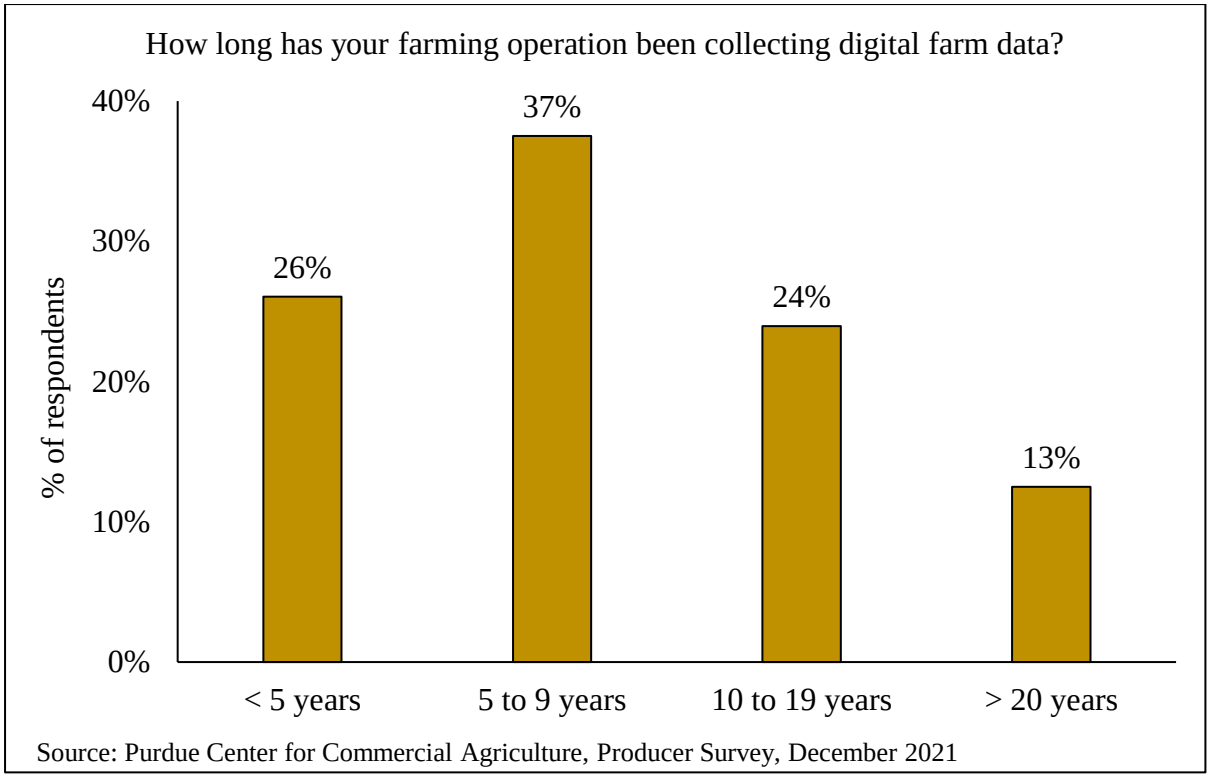


Figure 1. Length of Time Farm Operators Who Report Collecting Digital Data Have Been Collecting Digital Data, 2021.

To learn more about farm data governance within farmland lease agreements, participants were asked about their farmland lease agreements. A majority (74%) of crop producers in the survey sample said they rent farmland from someone who is not a family member. Among those respondents who said they rent farmland from non-family members, there was a lot of variability regarding the percentage of their total cropland that is rented. Nearly one-fourth of respondents said they rent less than 25% of their total cropland while, on the other end of the spectrum, 17% of those who rent farmland said they rent three-fourths or more of their cropland.

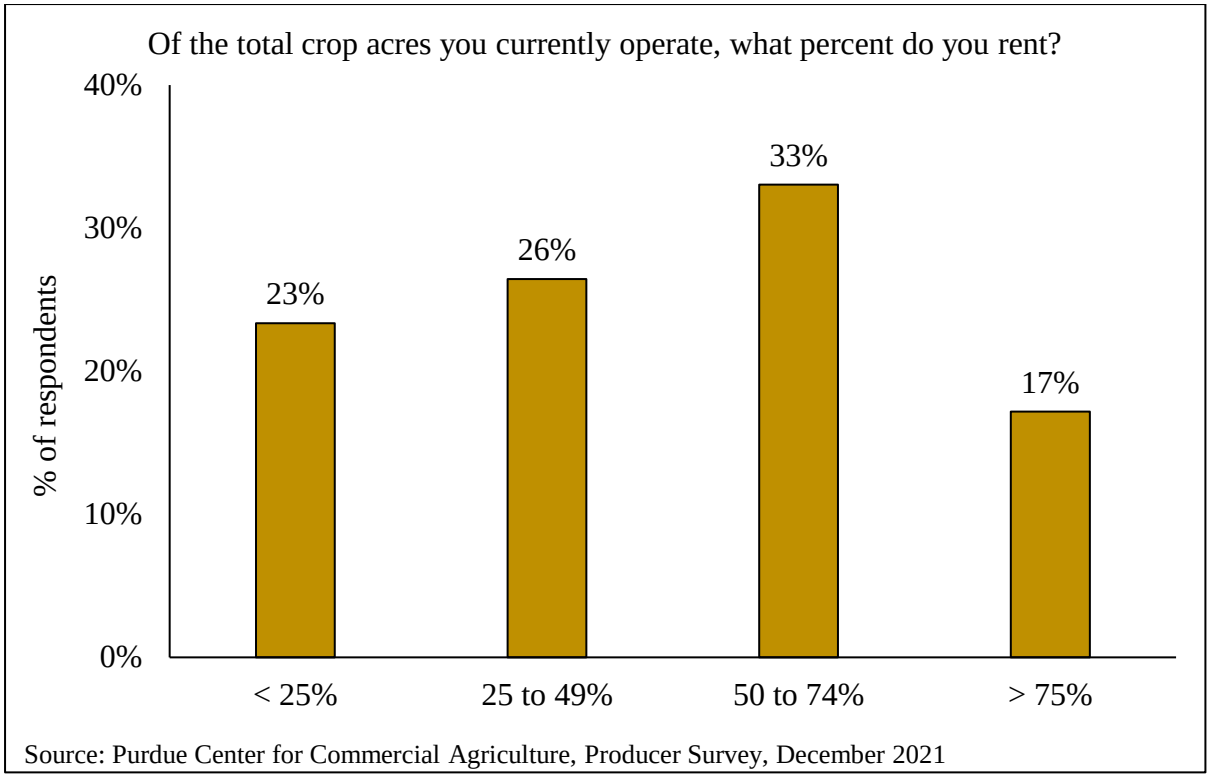


Figure 2. Percentage of Total Cropland Rented from Non-Family Members, 2021.

Farmland renters were asked whether they have ever had a lease agreement that clearly defined who owned digital farm data collected from the farmland they rented. Unsurprisingly, very few producers responded in the affirmative. Just 6% of producers who rent farmland reported ever having a lease that included terms defining data ownership. In a follow-up question, producers who reported that they rent farmland were asked how much more they would be willing to pay to rent farmland where historical digital farm data is transferred to the new tenant. The most common response (53% of respondents) was $0 indicating that they placed no value on digital farm data collected by a previous farm operator. Twenty percent of respondents said they would only be willing to pay a range of $1 to $4 per acre ($2.47 to $9.88 per hectare) with 17% of respondents willing to pay a range of $5 to $9 per acre ($12.35 to $22.35 per hectare) more to rent farmland that came with a digital farm data history. Just 10% of survey respondents indicated that they would be willing to pay an additional $10 per acre ($24.70 per hectare) or more to rent farmland with a farm data history vs. the same farmland without a farm data history.

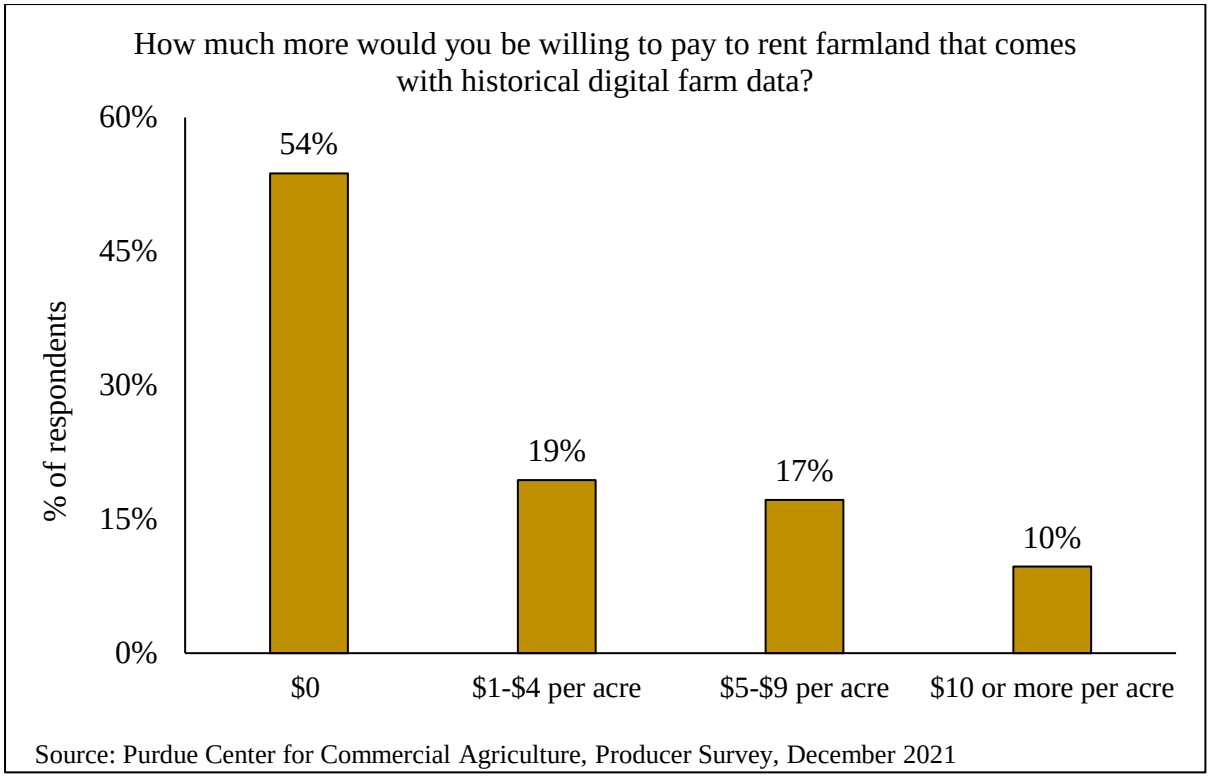


Figure 3. Premium Producers Would Pay to Rent Farmland with a Digital Farm Data History, 2021.

To obtain the landowner perspective regarding farm data ownership, we identified those producers in the survey sample who also rent out farmland they own. Thirteen percent of the crop producers in the survey sample said they rent some farmland to a farm operator who is not a family member. The percentage of farmland owned that is rented to other operators is typically small, consistent with official estimates (Bigelow, Borchers, and Hubbs, 2016). Sixty-two percent of respondents who rent farmland to others rent less than 25% of their owned cropland to other producers. Note that the survey sample did not include absentee landowners. As a result, we were not able to compare responses from landowners who farm cropland from those who are absentee landowners.

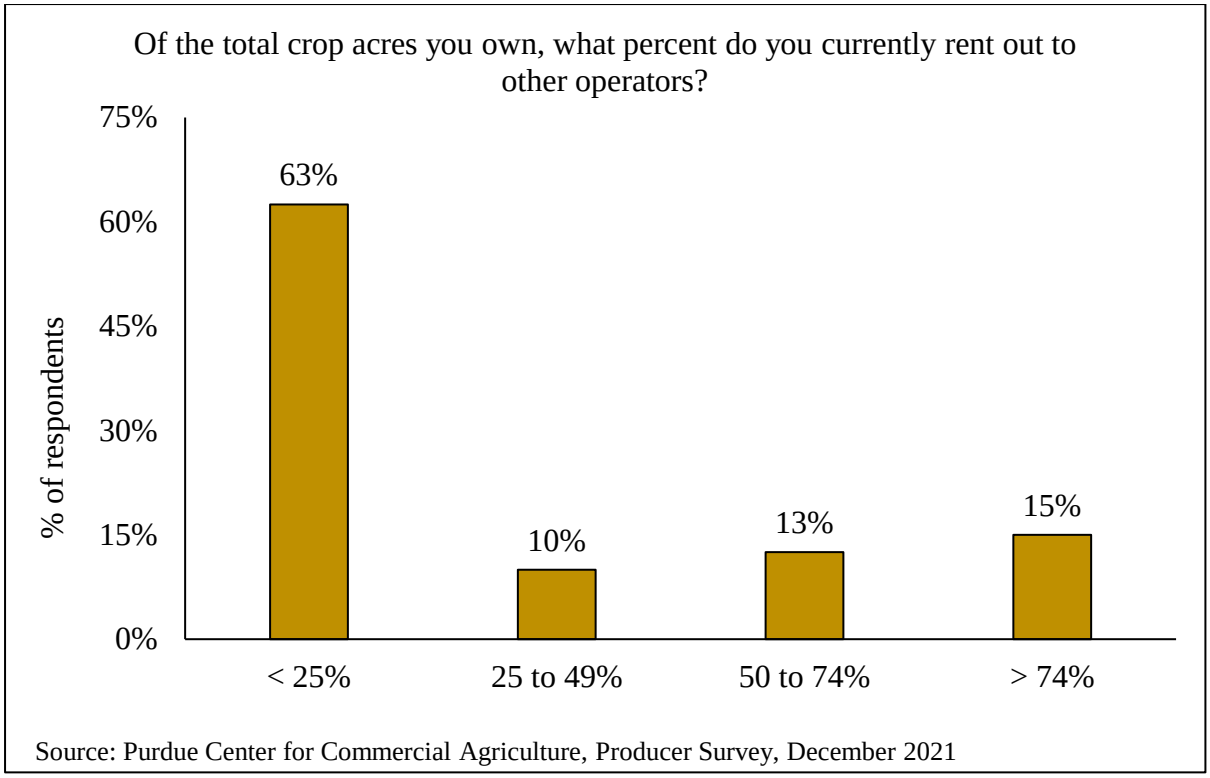


Figure 4. Percentage of Owned Farmland Leased to Other Farm Operators, 2021.

Among those farmers who choose to rent a portion of their owned farmland to other producers, nearly one-fifth of them (18%) indicated that they have had a lease agreement with a tenant which clearly defines who owns digital data collected on the leased farmland. When asked how much more they would charge when renting farmland with historical digital farm data compared to farmland without a farm data history, nearly eight out of ten respondents (79%) said they would not charge a premium.

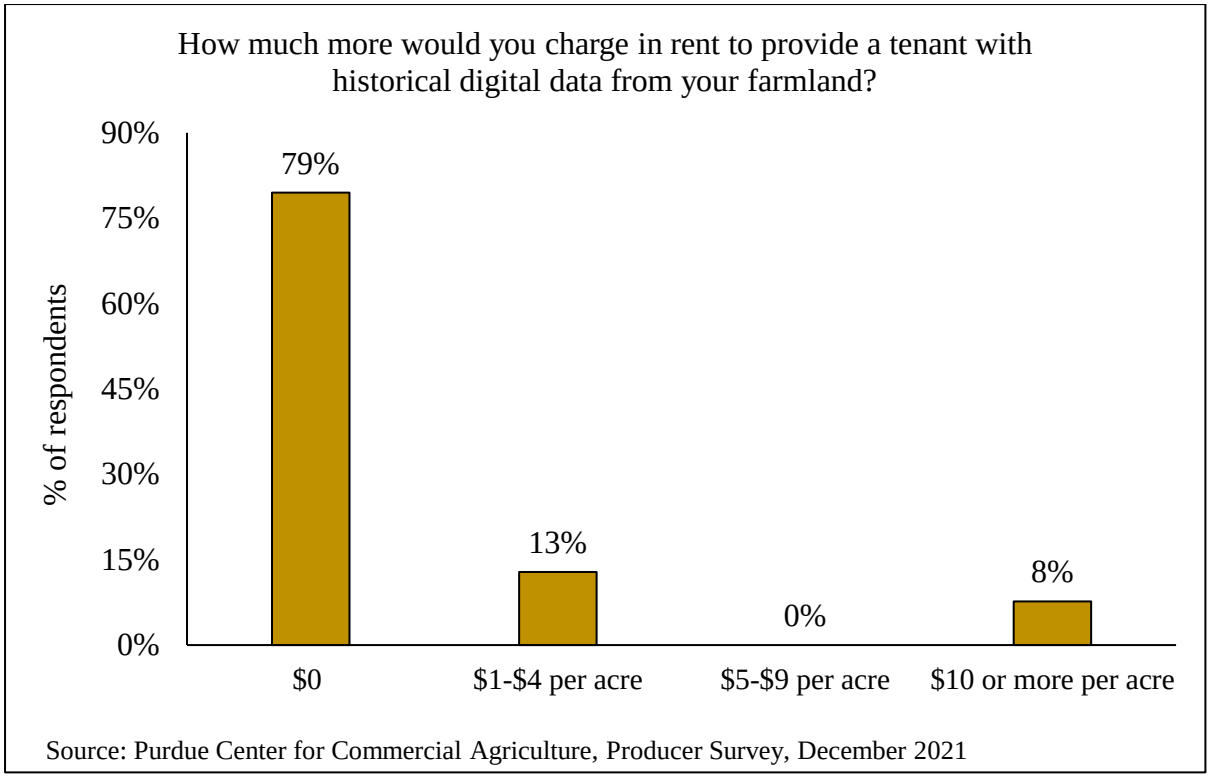


Figure 5. Rent Premium Farmland Owners Would Charge When Renting Farmland with Farm Data History, 2021.

Finally, to ascertain agricultural producers' perspective on farm data ownership, the survey asked respondents their level of agreement or disagreement with the following statement: *Digital farm data collected by a tenant operator on rented farmland is the legal property of the tenant operator and not the landowner*? Sixty-three percent of respondents either strongly or somewhat agree that farm data collected by a tenant operator is the legal property of the operator and not the landowner. Just 17% of respondents said they either somewhat or strongly disagree that farm tenants, not landowners, own farm data collected by the tenant.

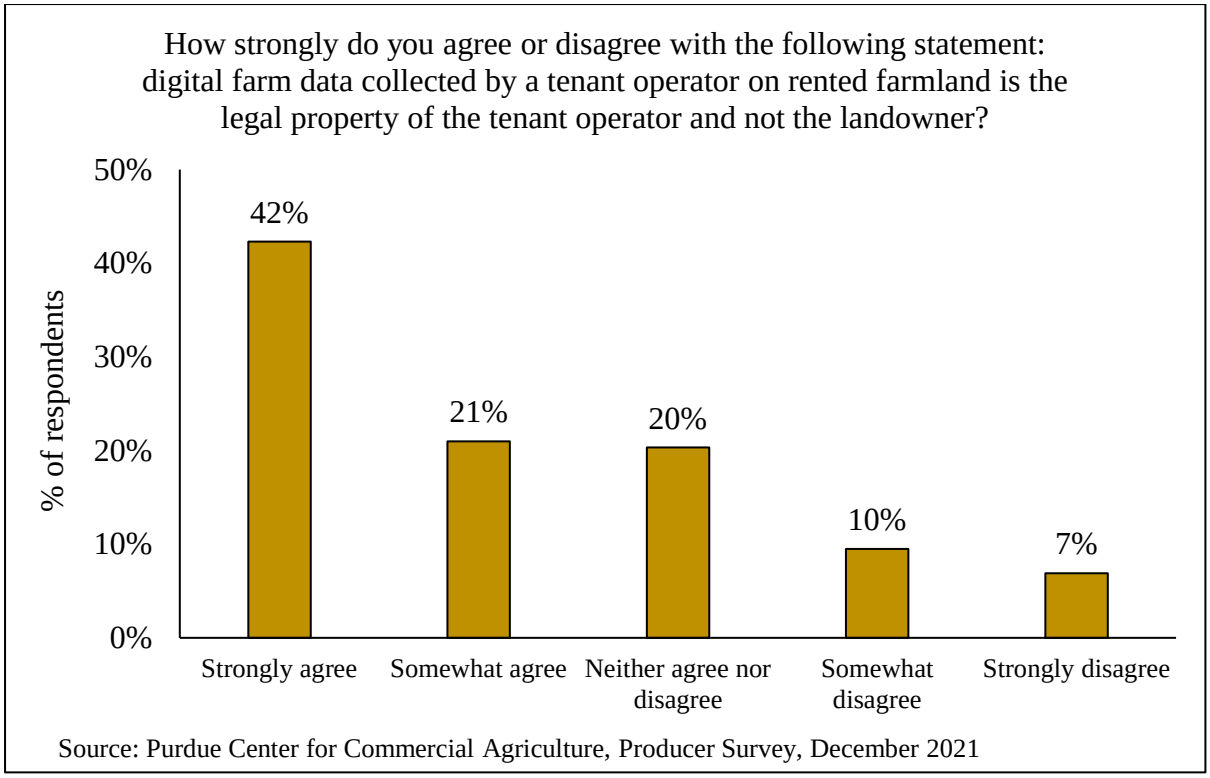


Figure 6. Agreement/Disagreement with "Digital farm data collected by a tenant operator on rented farmland is the legal property of the tenant operator and not the landowner", 2021.

Discussion

The survey results indicate that over half of crop producers would not be willing to pay a premium to obtain farming data from a previous operator. Notably, willingness-to-pay results are not largely different when comparing data collectors—those who collect some type of digital farm data—to non-data collectors. Fifty-two percent of data collectors would not pay a premium to obtain historical farm data vs. 58% of non-data collectors. Even more striking is the low share of operator-landlords (21%) who would charge a premium to share historical farm data with a tenant.

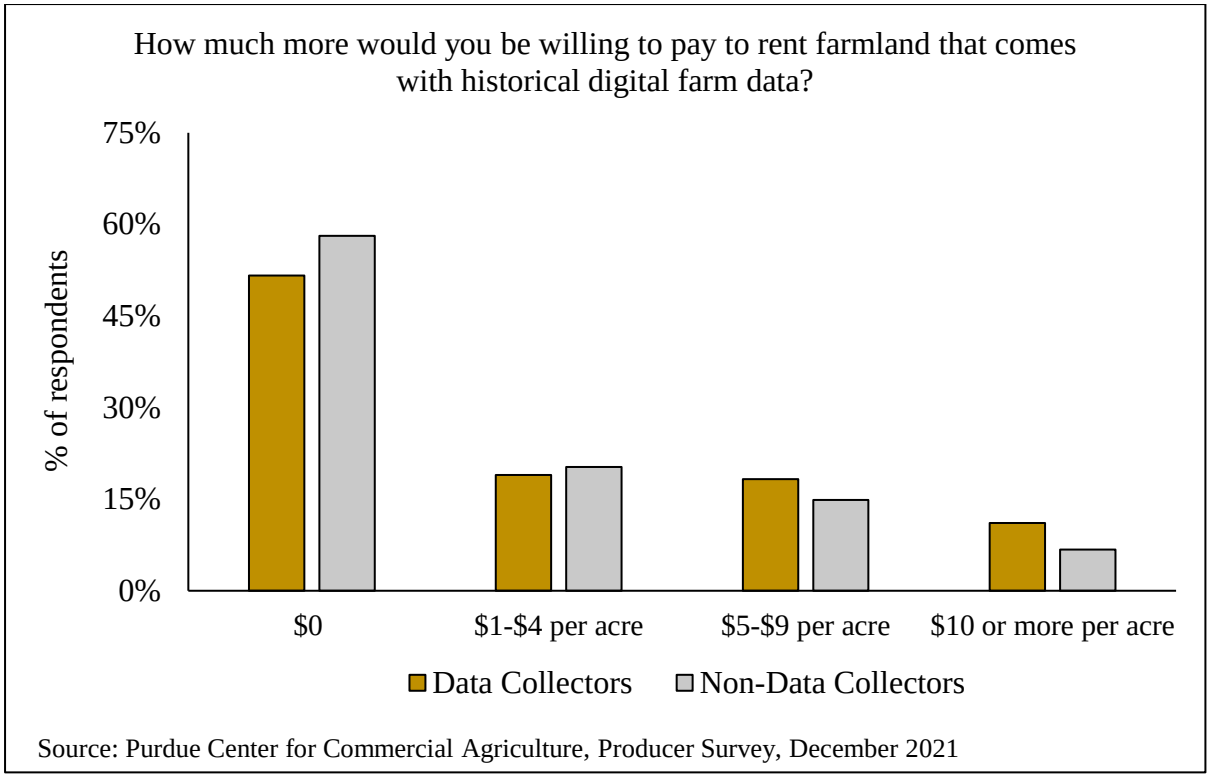


Figure 7. Premium Producers Would Pay to Rent Farmland with a Digital Farm Data History by Data Collection, 2021.

The low valuations observed in our sample are surprising given the promise of precision farming data as a management tool. Two factors could explain this result. One, low rental premiums highlight how uncommon this practice is currently (Griffin et al., 2016). Because data use agreements are rare in farmland lease contracts, landowners do not expect operators to share data with them and new tenants do not expect to inherit data. However, these practices may grow over time as data collection becomes more common. Data sharing practices may also differ across types of landowners. The survey only sampled farm operators who also rent out farmland. It did not include non-operator landlords such as corporations, real estate investment companies or professional farm managers who may have more interest in retaining digital farm records collected from land they own or manage.

A second possible explanation is a degree of skepticism about farm data not directly collected by the operators themselves. There are large differences in the types of data farms collect (e.g. zone soil sampling, satellite imagery, equipment telematics) which farmers may perceive as having different values. Data collected by another operator may also be seen as low-quality. For example, skepticism about how often farm operators calibrate yield monitors leading to measurement error in gridded yield maps brings into question the value of some data.

Yet many producers are willing to pay a premium to acquire digital farm data on rented land. Over a quarter of surveyed tenant-operators report a willingness-to-pay of $5 per acre or more. This may be correlated with the amount of land rented. Farmers that rent 25% or more of the farmland they operate report a higher willingness-to-pay for farm data. Sixty-six percent of farmers who rent less than 25% of their farmland would not pay anything to acquire farm data records vs. between 48 and 52% of farms who rent 25% or more of their cropland. This indicates that farmers who rely most on leased farmland are more motivated to access historical data on rented farmland. Farmers who rent a large portion of their cropland are more exposed to information asymmetries that exist in farmland markets (Bigelow and Kuethe, 2018). Farm data may help alleviate these information problems when landowners possess bargaining power.

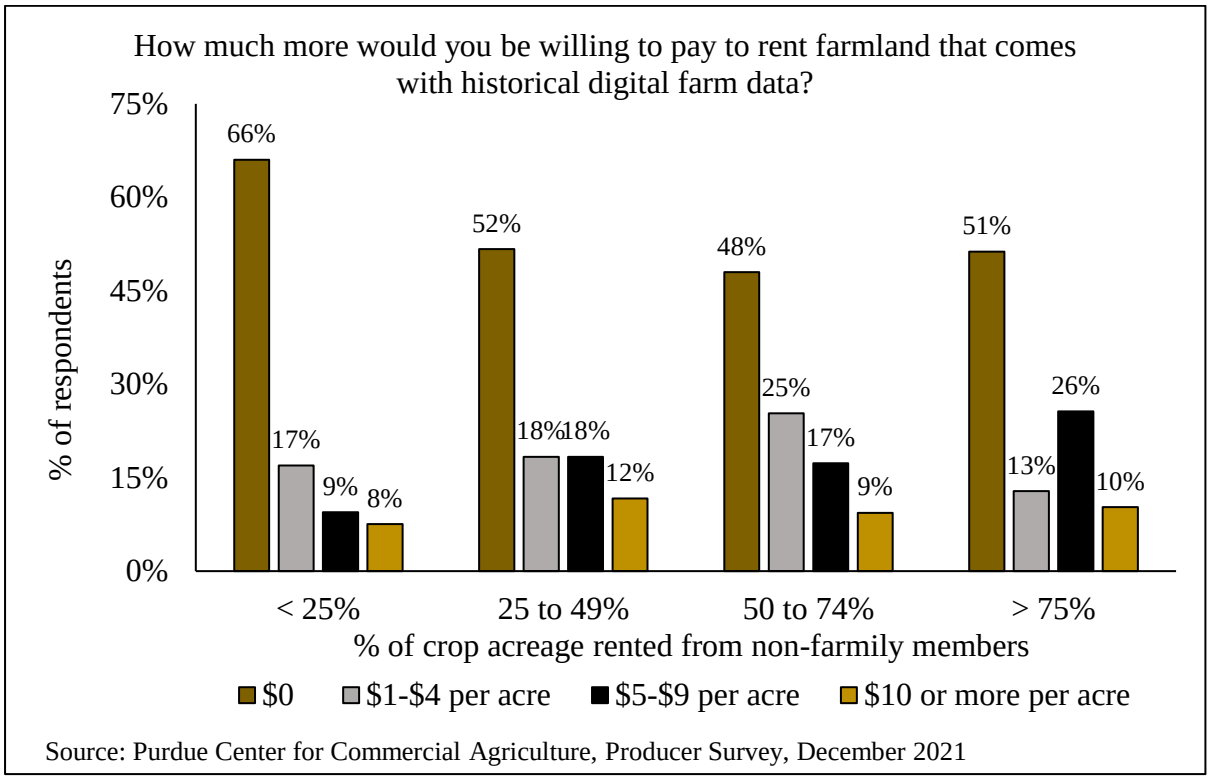


Figure 8. Premium Producers Would Pay to Rent Farmland with a Digital Farm Data History by Percentage of Cropland Rented from Non-Family Members, 2021.

Despite the generally low perceived value of farm data in farmland transactions, most agree that farm operators are the legal owners of data collected from rented farmland. As expected, farmers who collect digital farm data are more likely to agree with this statement than non-data collectors. Sixty-nine percent of data-collecting farmers either strongly or somewhat agree that operators retain the legal property right to data they collect vs. 54% of non-data-collecting

farmers. The proportion of farmers who strongly disagree with the statement is also three times higher among respondents who do not collect farm data than among those who collect data (12% vs. 4%). These results imply that farmland owners wishing to impose a data sharing clause into their farmland lease agreements may be met with resistance from their tenants.

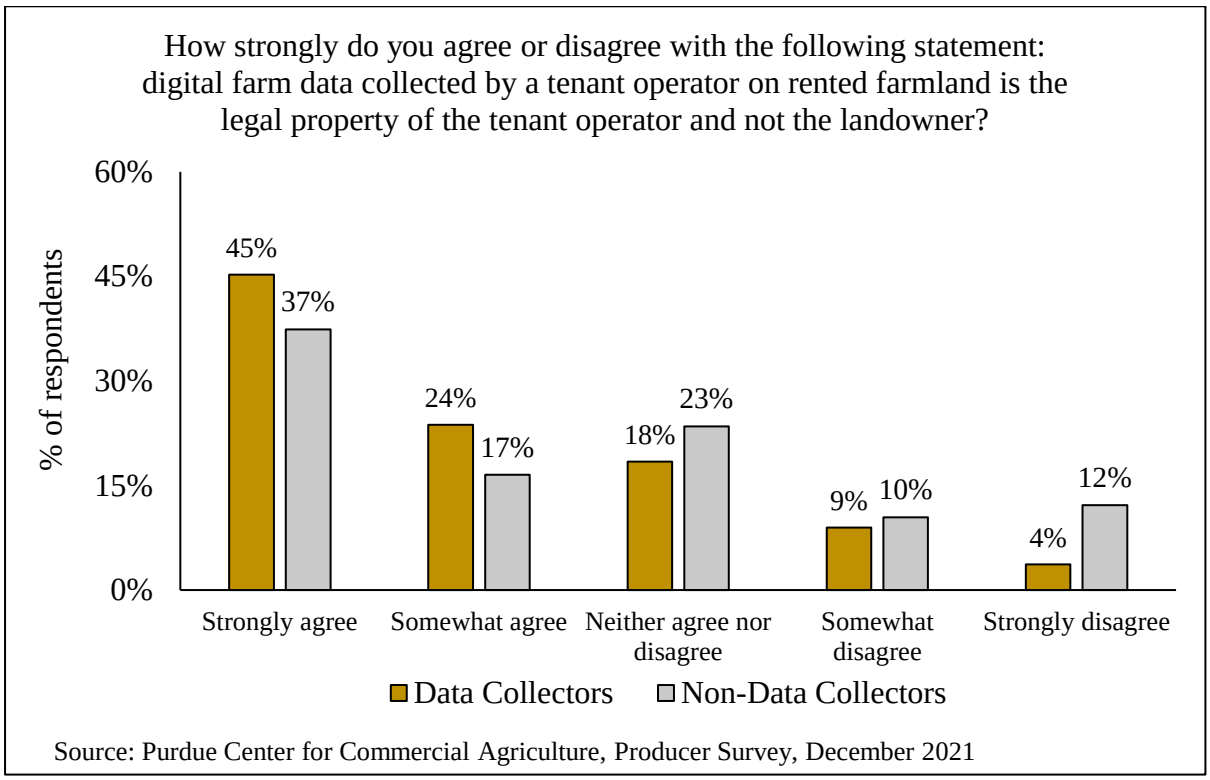
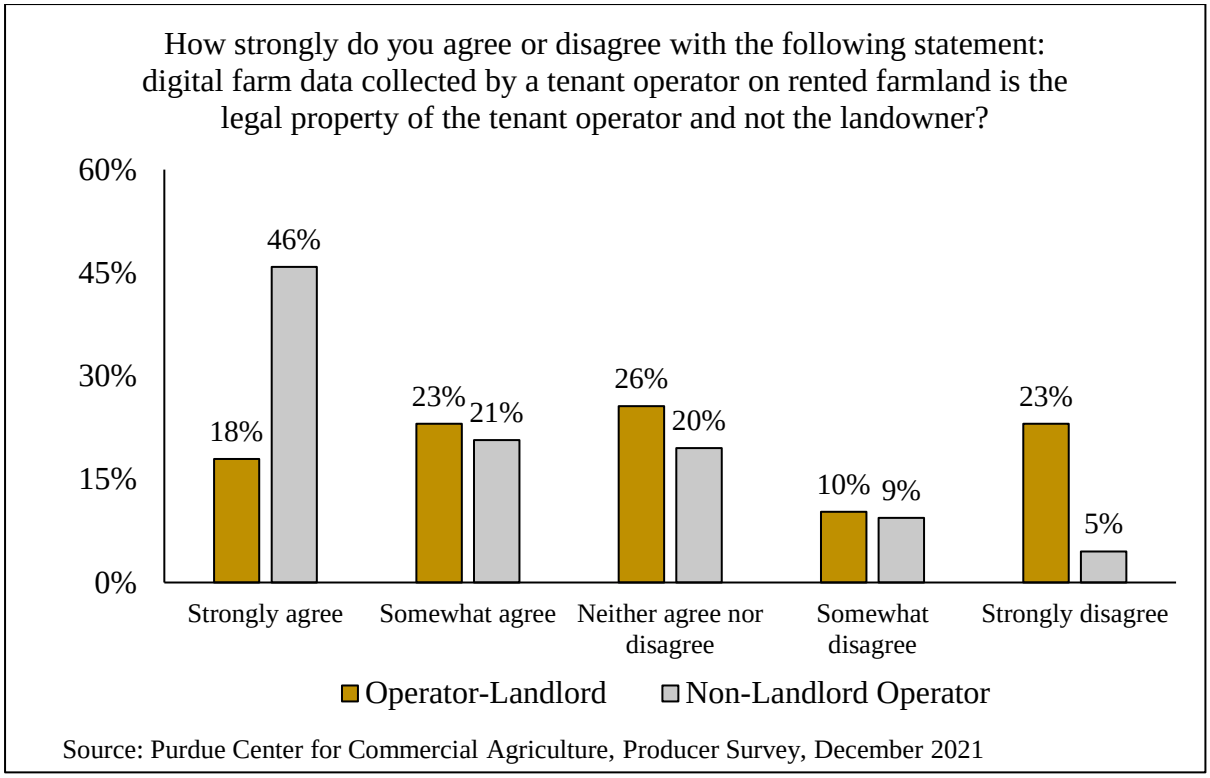


Figure 9. Agreement/Disagreement with "Digital farm data collected by a tenant operator on rented farmland is the legal property of the tenant operator and not the landowner" by data collection practice, 2021.

Farm data ownership perceptions also differ between tenants and operator-landlords. Nearly 70% of non-landlord farmers agree that data collected by an operator is their legal property vs. only 41% of farmers who rent farmland to other operators, and one-third of landlords either somewhat or strongly disagree with the statement as compared to 14% of non-landlord operators. Landowners (at least those who have active farming operations) appear much more likely to consider farming data an attribute of their farmland that should be retained with the landowner. Yet these same landlords report very little interest in capitalizing the data into the value of their farmland as indicated by the low valuations shown in Figure 5. The difference suggests that operator-landlords perceive farm data as having value within the lease agreement (e.g. to monitor their tenants or to ensure their rental rates are appropriate) but not as a means of enhancing the land's value beyond the existing lease.



Source: Purdue Center for Commercial Agriculture, Producer Survey, December 2021

Conclusions

Precision farming data will likely impact farmland markets in the future. But without clearly defined property rights regarding farm data, its value cannot be fully captured by tenants or landowners. Yet little is known about current data sharing practices between farmland owners and renters. Several questions related to farm data value and ownership were posed to farmers responding to the *Purdue University-CME Group's Ag Economy Barometer* December 2021 survey. Results indicate that farmers are not generally willing to pay higher premiums to acquire historical farming data on rented farmland and operator-landlords are not generally interested in charging their tenants for farm data. This is likely driven by the rarity of farm data use agreements in farmland lease contracts; only 6% of renters report having a lease that clearly specified farm data ownership. However, farmers who rent a large portion of the land they operate express a higher willingness-to-pay, which may reflect their exposure to information asymmetries in farmland markets. Farmers largely believe that farm data collected on rented farmland is the legal property of the operator collecting the data, although farmers who rent land out to other operators are less inclined to agree that tenant-farmers own the data. Future research should try and assess whether absentee landowners have a different perspective on data ownership than landowners who have active farming operations. As farm data collection continues to grow, data sharing agreements between landowners and tenants may become more

popular. Currently, these practices are uncommon. Establishing property rights over farm data collected from leased farmland will be important in facilitating this sharing.

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