Farmer Perspectives on Data 2021

Actionable insights to empowering businesses and farmers to scale farm-level production data activities

Original research prepared by Trust In Food, a Farm Journal Initiative in collaboration with The Sustainability Consortium

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The authors especially wish to thank all the farmers, ranchers and growers who took time out of their schedules to generously share their unique perceptions and experiences related to data by completing this survey.

Research Partners

Trust In Food is a purpose-driven division of Farm Journal dedicated to mainstreaming and accelerating the transition to more sustainable and regenerative ag practices, making every dollar invested in conservation agriculture more impactful. We bring business intelligence to agricultural production behavior change: helping farmers understand, want and feel capable of undertaking practice change through data science, social research and strategic communications deployed through the omnichannel Farm Journal platform in collaboration with our partners.

Visit trustinfood.com & farmjournal.com to learn more.

The Sustainability Consortium (TSC) is a global organization transforming the consumer goods industry to deliver more sustainable consumer products. We are dedicated to improving the sustainability of consumer products. Our members and partners include manufacturers, retailers, suppliers, service providers, NGOs, civil society organizations, governmental agencies and academics. TSC convenes our diverse stakeholders to work collaboratively to build science-based decision tools and solutions that address sustainability issues that are materially important throughout a product's supply chain and life cycle. TSC also offers a portfolio of services to help drive effective implementation.

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About This Report
How Farmers View Data

The lack of a robust, integrated data ecosystem that starts on the farm presents a major challenge for efforts to increase supply chain transparency, sustainability and resiliency. Not to mention, the threat of this lack of integrated data poses to the sustainability and resiliency of farm operations themselves.

Nearly half of food companies and retailers, using TSC's Food, Beverage, and Agriculture (FBA) assessments to track their supply chain sustainability Key Performance Indicators (KPIs), could not determine the upstream farm-level management practices for their agricultural inputs, according to research produced by The Sustainability Consortium (TSC).

To address this, TSC and Trust In Food, a Farm Journal initiative, have collaborated to undertake an annual survey of U.S. row crop farmers to identify emerging trends around digital agriculture and learn more about farmer perspectives on data collection and sharing.

The purpose of this report is to equip organizations with an improved understanding of the realities farmers face related to production-level data collection and sharing by providing actionable intelligence and a roadmap for change. This is an annual report, published each spring. The 2020 report, based on the 2019 cropping year, can be viewed here.

About This Report

Methodology Notes

We provide descriptive statistics pertaining to survey responses as well as breakout comparisons between those answering in specific ways across multiple questions. All statistics presented throughout this report are rounded to their nearest whole number and a 5% margin of error should be considered. Questions were phrased to reference the 2020 growing season. This research is not meant to be representative of all American agriculture; rather, it is a snapshot in time of row-crop and specialty-crop growers. Completed surveys were received from 610 farmers; the (N)-value should always be considered to be 610 unless otherwise stated. A full breakdown of the survey sample's demographic trends can be viewed in the Appendix at the end of this document.

Year-Over-Year Differences

Direct comparison to previous years' reports should be handled carefully; the survey sample size, respondents and makeup are different between years, and we continuously refine our survey questions/answer choices and analysis methodology. There may be significant differences year-over-year in certain statistics. While this may be a reflection of a changing world, it is also surely a reflection of differences in survey methodologies. This should be kept in mind while comparing reports.

COVID-19 Considerations

The effects of the coronavirus pandemic over the last year can be felt and seen across every sector of business and society—and agriculture is no different. This survey was fielded in early 2021. Please note the potential impact the ongoing pandemic had on those who responded, their answer selections and their farm management decisions.

About This Report

Terminology

This survey centers around digital farm management tools and farm-level production data. While there are many different definitions and classifications across the sector for what qualifies as this, as well as much overlap in categories, for the purposes of this report:

- **Farm Management Information Systems**, or **FMIS**, refers to any commercially available farm management software suite designed to help farmers collect, store and use their production data.

- **Digital Sustainability/Conservation Tools** refers to any software suite designed to help farmers collect, store, use and report data specifically related to conservation and sustainability.

It is possible that, in this context, FMIS and Digital Sustainability/Conservation Tools may be the same software in certain cases and different software in other cases.

Additionally, the term **digital transition** is used throughout this report to denote the transition of farm management from analog, hard copy (such as taking measurements by hand and recording them in paper record books) to digital and FMIS solutions.

This report and the findings presented here represent those individual authors and do not reflect the views of the U.S. government, any federal or state agency, research institution, or any funding source or business partner of either Farm Journal or The Sustainability Consortium.

Table of Contents

Foreword

The on-farm digital transition is critical; and it needs our help.

Since our ancestors planted their first seeds, observations and data have continuously played a central role in enabling the sustainability, resilience and indeed, the survival of agricultural systems.

This remains true in 2021. In fact, agricultural data is now more important than ever. As we race to reshape agricultural production to provide for a growing world in the shadows of disruptive crises, like climate change and the COVID-19 pandemic, the need for ag data is urgent. Detailed farm-level production data is one of the single greatest tools we have to mitigate climate change, improve supply chain sustainability and build a resilient, equitable production system.

Farmers have had a close and powerful relationship with their production and management data for millennia. But the breakneck pace of technological change in today's world is complicating this relationship. This report illuminates a farming sector broadly leaning into the opportunities that digital ag can provide, but being hindered by significant challenges that hold many back, preventing their full digital transitions.

This is one of the most immediate opportunities in front of agriculture—the transition to increased data collection and digital management will empower farms to reduce their environmental impact while providing more efficiently grown crops through thriving business operations.

Additionally, data collection enables the transparency consumers are demanding in regards to the food they eat and provide to their families. The rise of the "connected farm" is very much upon us and not a moment too soon.

Through this research, we present the case for helping farmers better understand the digital transition, find value in making the transition and feel capable and equipped to make the transition. We also make the case for food, feed and biofuel companies to better understand the barriers that farmers in their supply chains are facing related to collecting and sharing data, as well as the incentives (financial and otherwise) that are necessary for growers to make the transition to improve resiliency and sustainability in agricultural systems in the U.S.

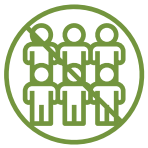
At Trust In Food, we hope that people working with farmers across the country can use the findings of this report to evolve their work around digital ag to more effectively and efficiently empower and support farmers in their digital transitions.

– Amy Skoczlas Cole
Executive Vice President, Trust In Food

USDA Photo by Lance Cheung

Key Findings
Farmer Perspectives on Data Collection and Sharing

There is a significant digital gap.



More than half of all respondents (62%) said they don't rely on Farm Management Information Systems (FMIS) exclusively. Almost a third of respondents (28%) said their primary data storage method is paper or other non-digitized method. Of those that don't use digital, only half have ever considered transitioning to digital.

Satisfaction with FMIS outputs is mediocre.

Less than half of all respondents who use FMIS (47%) report being entirely satisfied with its outputs while 6% report being entirely dissatisfied.

Trusted advisors play a critical role, but those supporting the digital transition are sparse.

Only 52% of all respondents said they have a trusted advisor who could answer questions related to FMIS and digital ag; those who do have a trusted advisor for digital ag are 24% more likely to use FMIS than those who do not.

Strong relationship exists between total acreage and FMIS use, but it's not universal.

FMIS use rates reliably increase with overall operation size, but usage rates for smaller operations are still significant, and this group should not be ignored.

Key Findings
Farmer Perspectives on Data Collection and Sharing

With cost barriers addressed, precision technology use could increase significantly.

79% responded that they would start or increase their use of precision farm management technologies if they could acquire the equipment needed (software, sensors, etc.) at no charge or incentivized discount.

Trust issues are significant, but lenders are the most trusted data holders.

73% of respondents don't trust private companies with their data, and 58% don't trust the government with it; conversely, 71% do trust their financial institutions with their data.

Farmers have transparency concerns.

65% said their customers do not have a right to know how the crop was produced; this sentiment is shared equally among FMIS users and non-users.

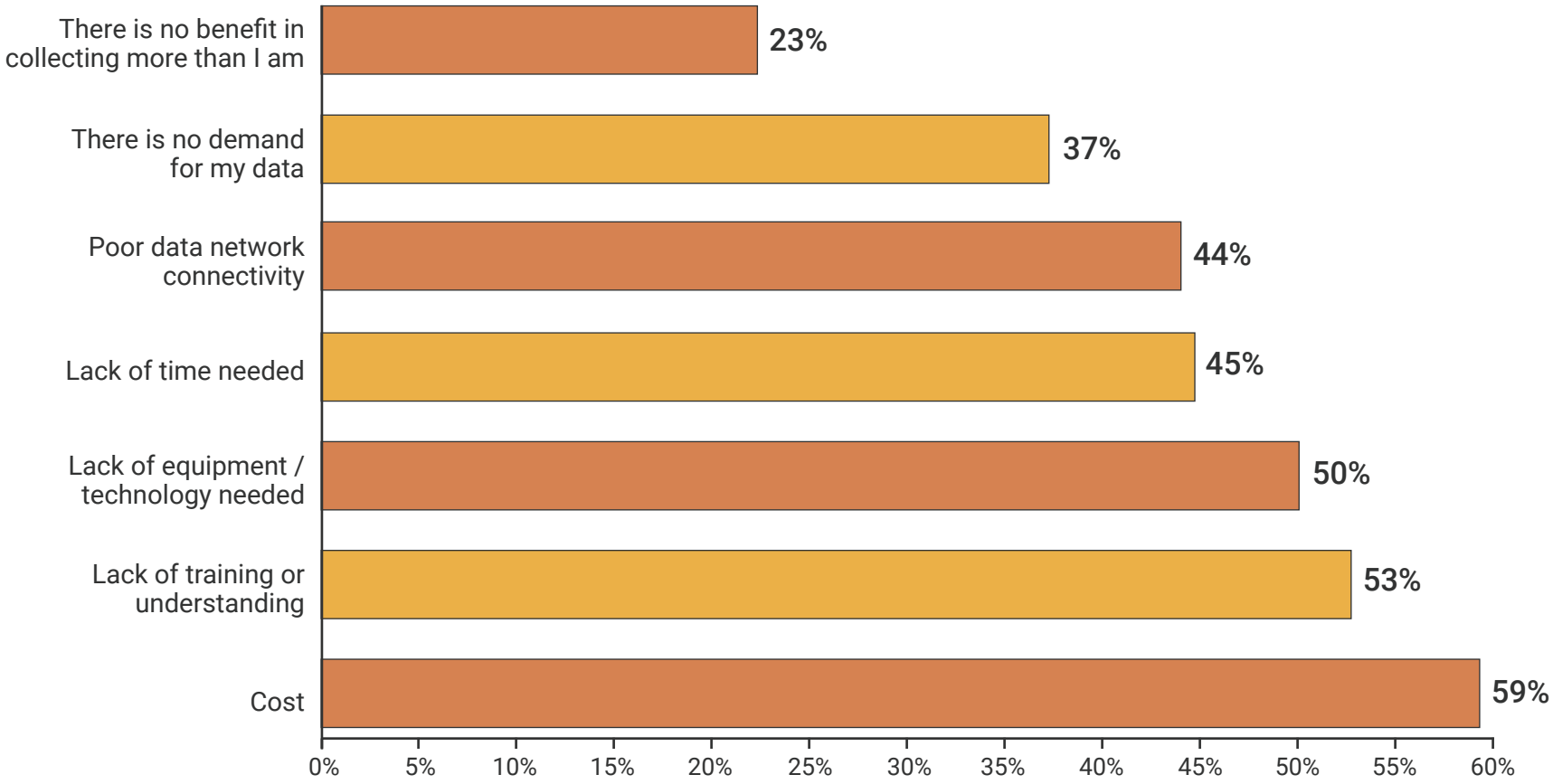
Significant differences in FMIS usage exist across crop marketing outlets.

The respondents who primarily market their harvest to a food or fuel company are more likely to use FMIS as compared to respondents who market to other outlets, especially those who use their harvest for animal feed on their own operations.

Key Findings

Barriers and Pathways to Farm-Level Data Efforts

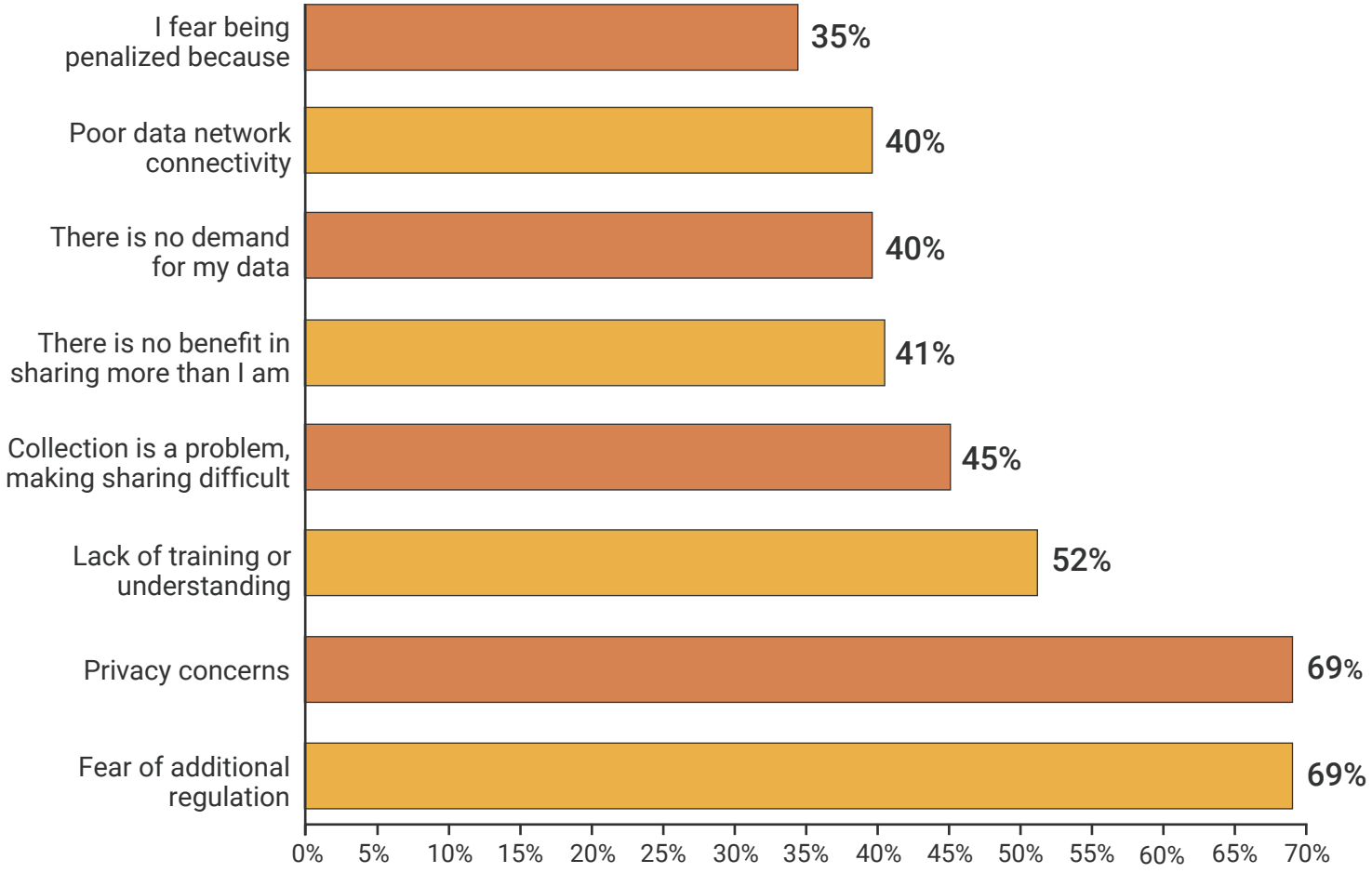
Barriers farmers face collecting data *(N=610)*



Key Findings

Barriers and Pathways to Farm-Level Data Efforts

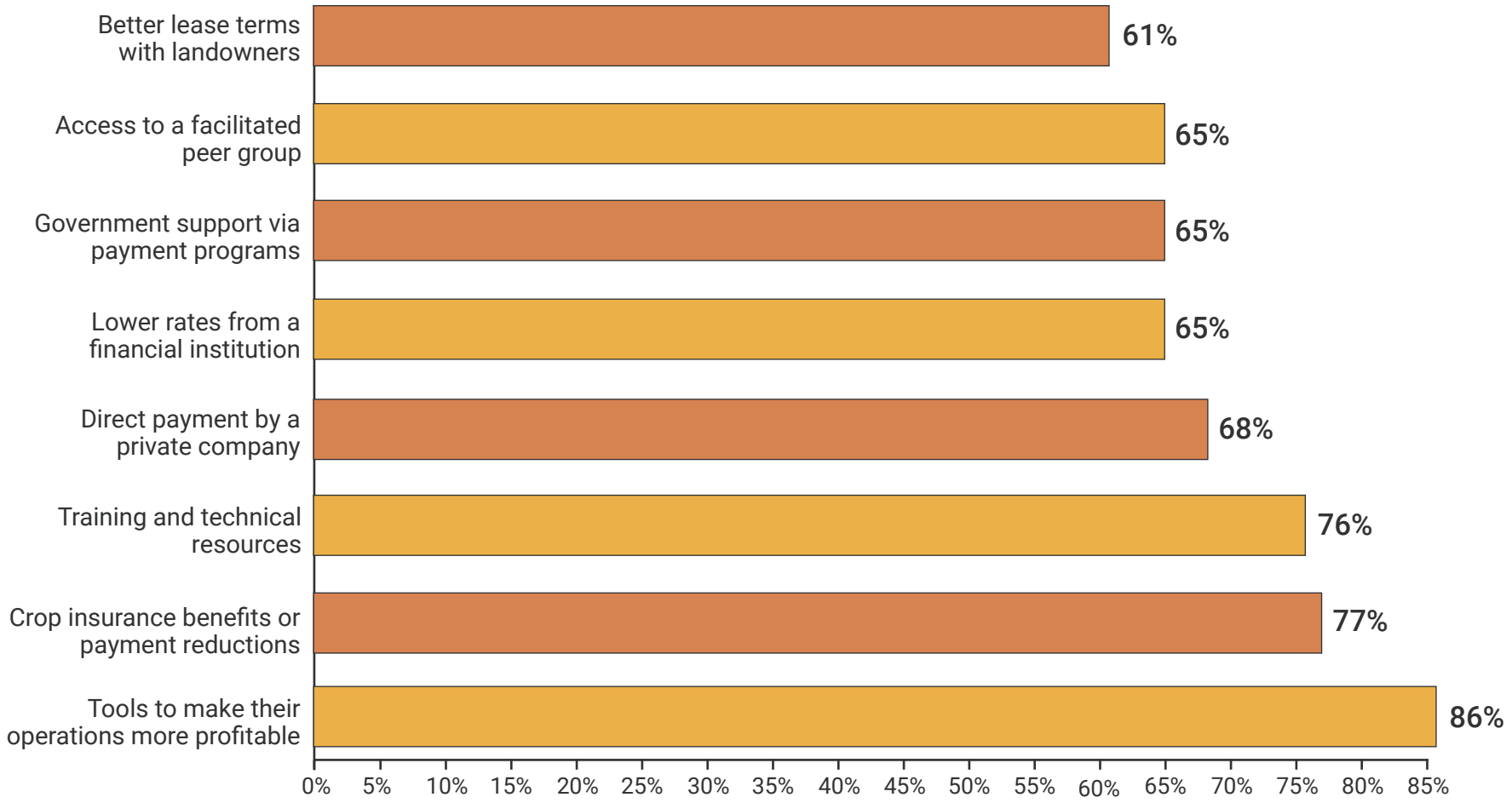
Barriers farmers face sharing data *(N=610)*



Key Findings

Barriers and Pathways to Farm-Level Data Efforts

Interest in incentives for collecting and sharing data *(N=610)*



Actionable Insights

How To Empower Farmers' Digital Transitions

USDA Photo by Kirsten Strough

Actionable Insights
Barriers To Change Exist

The comprehensive use of FMIS and farm-level data is central to sustainability and resilience, both on farm and downstream in the supply chain. But barriers exist that prevent farmers from incorporating data and FMIS into their operations at the rate and scale needed to meet emerging challenges. Here are the key barriers the survey identified and then recommendations, so the sector can empower farmers to move through the barriers and to a greater level of FMIS on farms.

Trust is an issue. Producers don't trust the government or private companies with their data, claiming issues related to trust and proper data usage, as leading reasons why they don't collect / share more.

Action: Private organizations and government agencies must address issues related to trust, as it is complicating the digital transition for many farmers. Trust can be built by redesigning data governance and privacy policies, based on farmer concerns, which focus on companies being more transparent, fair and equitable.

Almost twice as many farmers trust their data with their financial institutions than with government agencies or a private company. Government agencies and private businesses could adapt policies and procedures based on the principles that financial institutions use to gain trust and related to protecting data.

Opportunities to partner with lenders to ensure supply chain sustainability measurement and improvements are occurring on the farm without having to require growers' sensitive information could be a viable option.

Bottom Line: Farmers' concerns about how their data will be used and shared is the single biggest issue preventing their digital transitions. Significant progress in data privacy and governance is required to overcome this barrier.

Actionable Insights
Barriers To Change Exist

The lack of support for FMIS and related technologies by farmers' trusted advisors is a critical bottleneck in the adoption of digital ag solutions. At the same time, farmers cite lack of training and understanding as a key barrier.

Action: We know farmers listen to their advisors, heavily rely on them for decision making and strongly value the technical resources/support they provide. The sector should develop new ways to empower and incentivize the trusted advisor network to more effectively engage with farmers on the topics of data collection, FMIS and related digital technologies.

Respondents' desire for increased technical support could provide an opportunity for organizations to address education and training. Organizations could provide educational training opportunities for advisors that empower them to better understand technology tools and benefits themselves, and therefore communicate to producers the tangible production and business benefits of collecting farm-level data.

Bottom Line: If farmers are to transition exclusively to the use of FMIS, they must first believe themselves capable of utilizing digital solutions and see value to their operations in adopting new practices. The network of trusted advisors can play a key role here if they are empowered with knowledge.

Actionable Insights
Barriers To Change Exist

Use of digital data management solutions is low, and among non-users, there is a low propensity for change.

Action: Widespread adoption of digital farm management solutions is critical along with transitioning producers to rely on them exclusively instead of analog methods. But a significant portion of the current farmer population may simply not convert due to their proximity to retirement or other similar immutable cultural factors that no intervention will affect.

Rather than focusing on attempting to convert these individuals, organizations should prioritize addressing the concerns and needs of partial adopters in order to transition them to full-scale adoption. Attention should also be placed on empowering the next generation of farm operation leadership, especially transitioning them from long-term analog management. At the same time, the supply chain must account for this reality in its reporting—understanding that there will likely be farmers who will not change to digital data management in the foreseeable future.

Bottom Line: Each farmer's challenges with digital transition are unique; organizations should custom build solutions for these. It may be impossible for some farmers to transition to digital. Rather than expending resources here, organizations should prioritize investments that prime the next generation's transition.

Actionable Insights
Pathways To Change Are Clear

Several opportunities exist to improve stakeholder efforts aimed at empowering farmers to undertake the digital transition towards exclusive FMIS use and improved data collection. Here are the key pathways forward and what stakeholders can do.

Producers want tools to help them make better management decisions and are willing to step up where these are present.

Action: Organizations should prioritize developing and refining decision-making tools and accompanying outreach programs with a focus on farmer-informed designs to solve the gaps farmers believe exist in usability. Critical focus should also be placed into how current iterations of these tools and outputs are marketed to farmers, as there may be misunderstanding.

Bottom Line: Farmers are willing to step up to digital transition if they believe they are able to make better decisions by doing so, but many don't feel like the current toolset allows them to do this, so they do not necessarily value the transition. By amplifying direct farmer benefits of digital transitions, FMIS and digital ag organizations are likely to improve adoption rates by ensuring farmers find value in adoption.

Actionable Insights
Pathways To Change Are Clear

Supply chain buyers may have a significant role to play; among respondents who market primarily to food and fuel companies, FMIS use is significantly higher than among those who primarily market their harvests in other ways, such as feed.

Action: While more research is needed to understand the linkage, this may point to a potential influencing connection that buyers of agricultural commodities have regarding how likely a farmer is to use FMIS. Organizations who buy from farmers should evaluate their relationships with farmers around FMIS and data collection to understand how they can better foster digital transitions across operations they buy from. This could take the form of technical support resources or financial incentives. Additionally, FMIS-related organizations must work to ensure their solution set is tailored for their target audiences' marketing needs.

Bottom Line: Any organizations purchasing from farmers should critically consider their role in digital transitions on farms and then empower farmers in their supply chain to transition to digital data management. Buyers of harvested crops can empower digital transitions to scale amongst the farmers they buy from through activities, such as incentives and technical training resources, as outlined throughout this report.

Providing value to farmers and helping them feel capable of making changes are key to helping scale a digital transition.

FMIS usage and conservation practice adoption have an important relationship, one that may not be fully utilized—but could be.

Action: The need for promotion and engagement around conservation practices will only increase in the coming decade as will the demand for increased transparency into on-farm production practices. Organizations should focus on evolving their digital solutions to account for these trends and better incorporate the outcomes of conservation activities in their outputs.

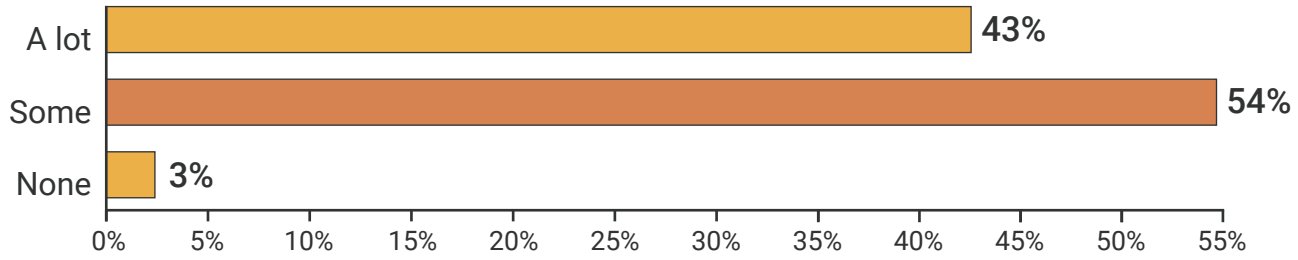
Bottom Line: Considering the symbiotic outcomes of combining conservation practices with FMIS usage and widespread production data collection, organizations can evolve their engagement programs to focus on this "package deal" for farmers. Promoting both simultaneously or promoting one in order to lead to the other sequentially are likely effective strategies.

Trends in Data Collection, Management and Use

USDA Photo by Lance Cheung

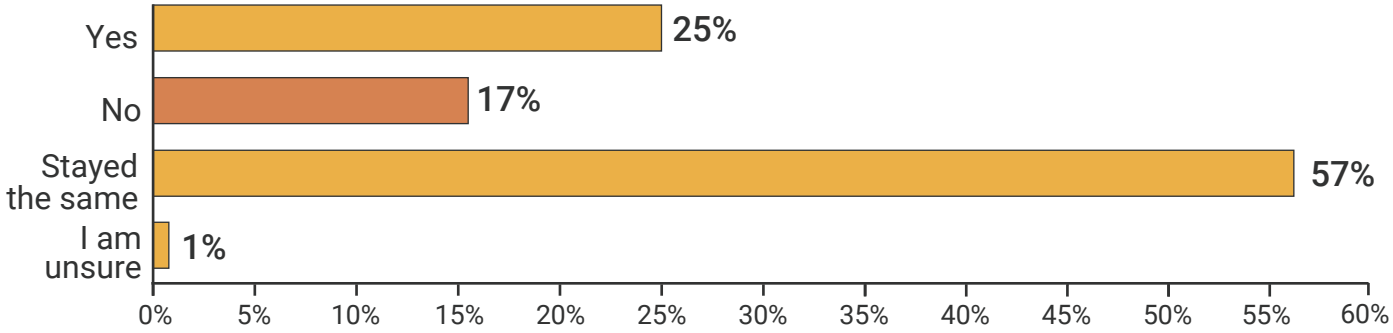
Trends in Data Collection, Management and Use
Farmer Perspectives

How big of a role does the data you collect play in your decision making? *(N=610)*



43% of respondents report that data plays a critical role in their decision-making process.

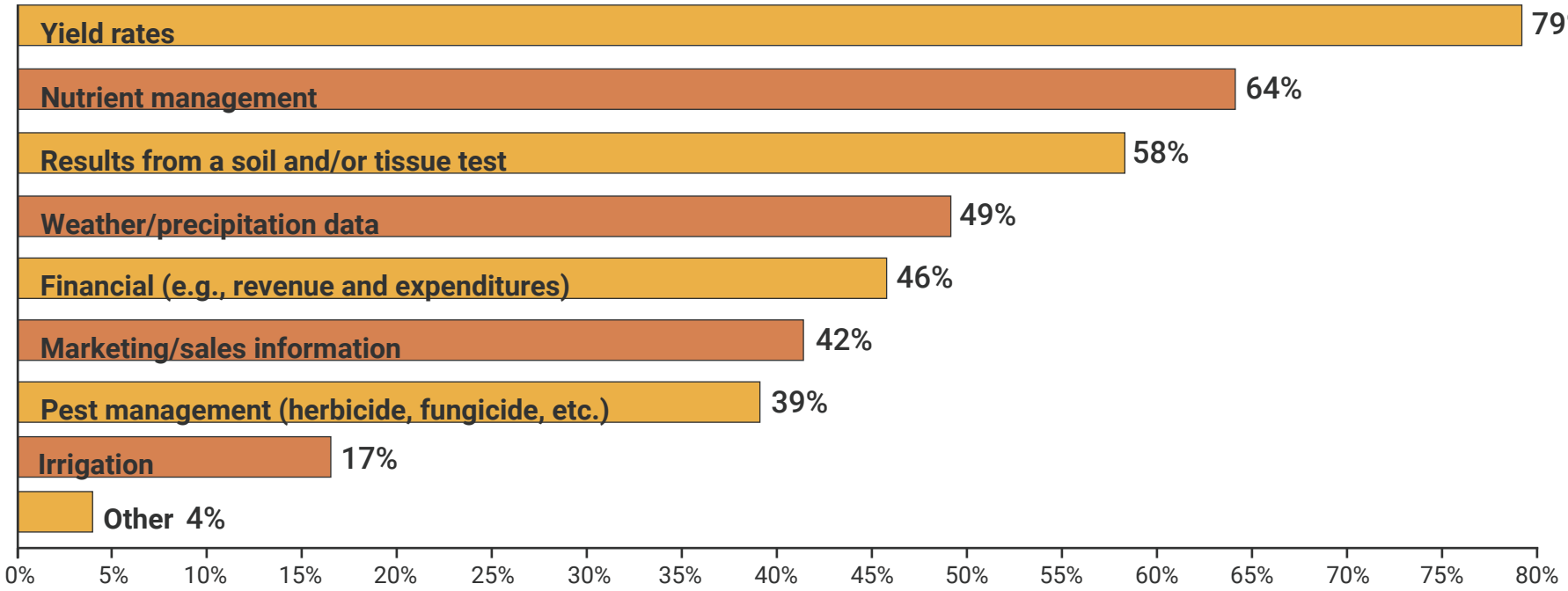
Did your operation increase the amount of production data you collected in the 2020 season compared to the 2019 season? *(N=610)*



57% of respondents reported that the amount of data they normally collect stayed the same in 2020 while 25% reported an increase.

Trends in Data Collection, Management and Use
Farmer Perspectives

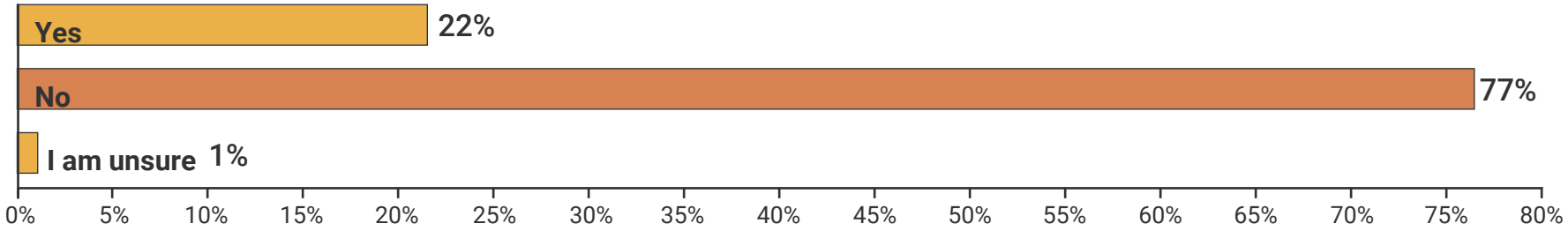
What type of production data did you increase your collection of? *(N=153)*



Of the 25% of respondents who reported they increased the amount of data they collected in the 2020 season, the collection of yield rate data (79%), nutrient management data (64%) and soil or tissue test results (58%) were identified as the data types with the highest increases in collection rates.

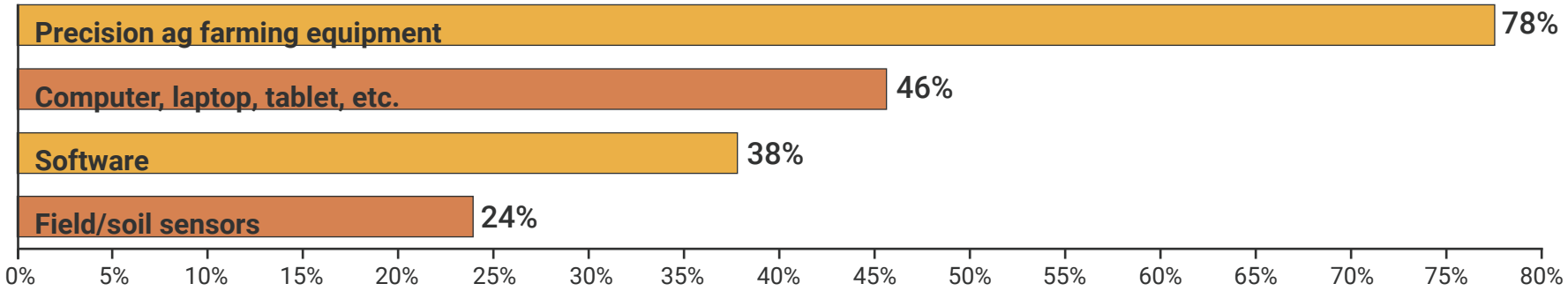
Trends in Data Collection, Management and Use
Farmer Perspectives

Did your operation purchase or lease additional production data collection technologies, either hardware, sensors, equipment or software in the 2020 season? *(N=610)*



77% of respondents did not purchase or lease additional production data collection technologies in 2020 while 22% reported that they did.

What type of additional data collection tools? *(N=132)*



Of the 22% who reported that they purchased or leased additional production data collection technologies in 2020, 78% of those purchases/leases were for precision ag farming equipment.

Trends in Data Collection, Management and Use
Farmer Perspectives

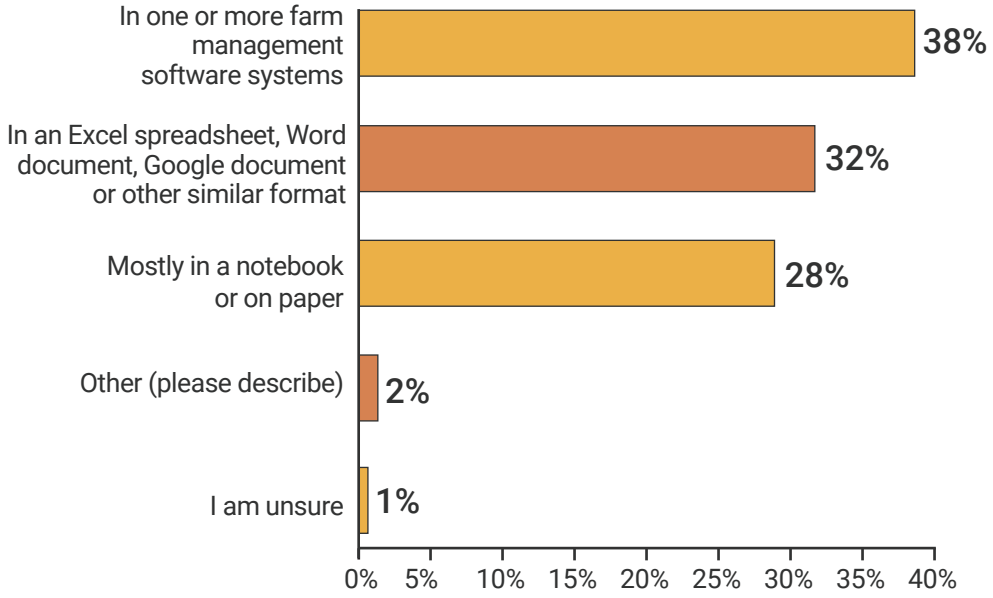
Did your operation purchase or lease additional production data collection technologies, either hardware, sensors, equipment or software in the 2020 season? *(N=610)*

	We **do not** collect this type of data	We collect **some** of this type of data	We collect **all possible** data of this type
Yield rates	3%	30%	67%
Financial (e.g., revenue and expenditures)	8%	34%	57%
Results from a soil and/or tissue tests	9%	44%	47%
Nutrient management	11%	47%	42%
Pest management (herbicide, fungicide, etc.)	16%	43%	41%
Marketing/sales information	17%	49%	34%
Weather/precipitation data	25%	50%	25%
Irrigation	75%	16%	9%

Yield rates (67%), financial (57%) and soil/tissue test results (47%) were the highest-ranking types and level of data collected.

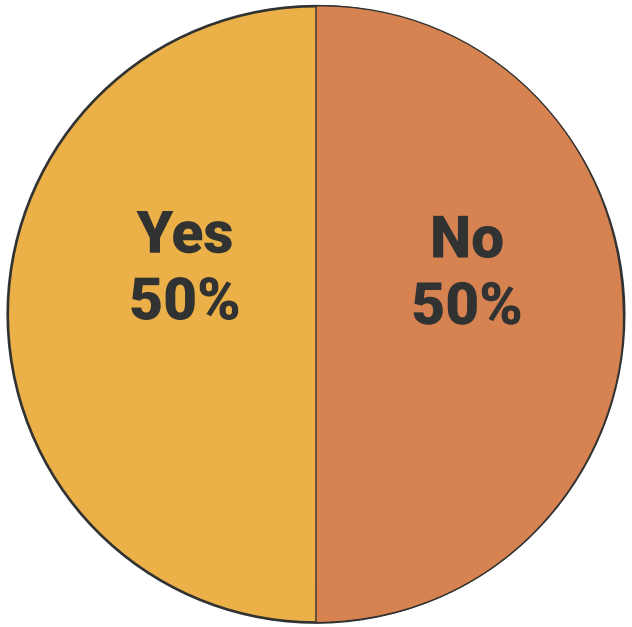
Trends in Data Collection, Management and Use
Farmer Perspectives

What is the primary way you store and manage your operation's data related to production and management practices? *(N=610)*



38% of respondents use one or more FMIS systems to store and manage their operations data while 28% reported they do so mostly in a notebook or on paper.

Have you ever considered transitioning to digital methods of data management? *(N=168)*



There is a 50/50 split between those who don't already use FMIS when asked if they have considered transitioning to digital methods.

Trends in Data Collection, Management and Use
Farmer Perspectives

Why haven't you considered going digital?
(open-ended; N=168)

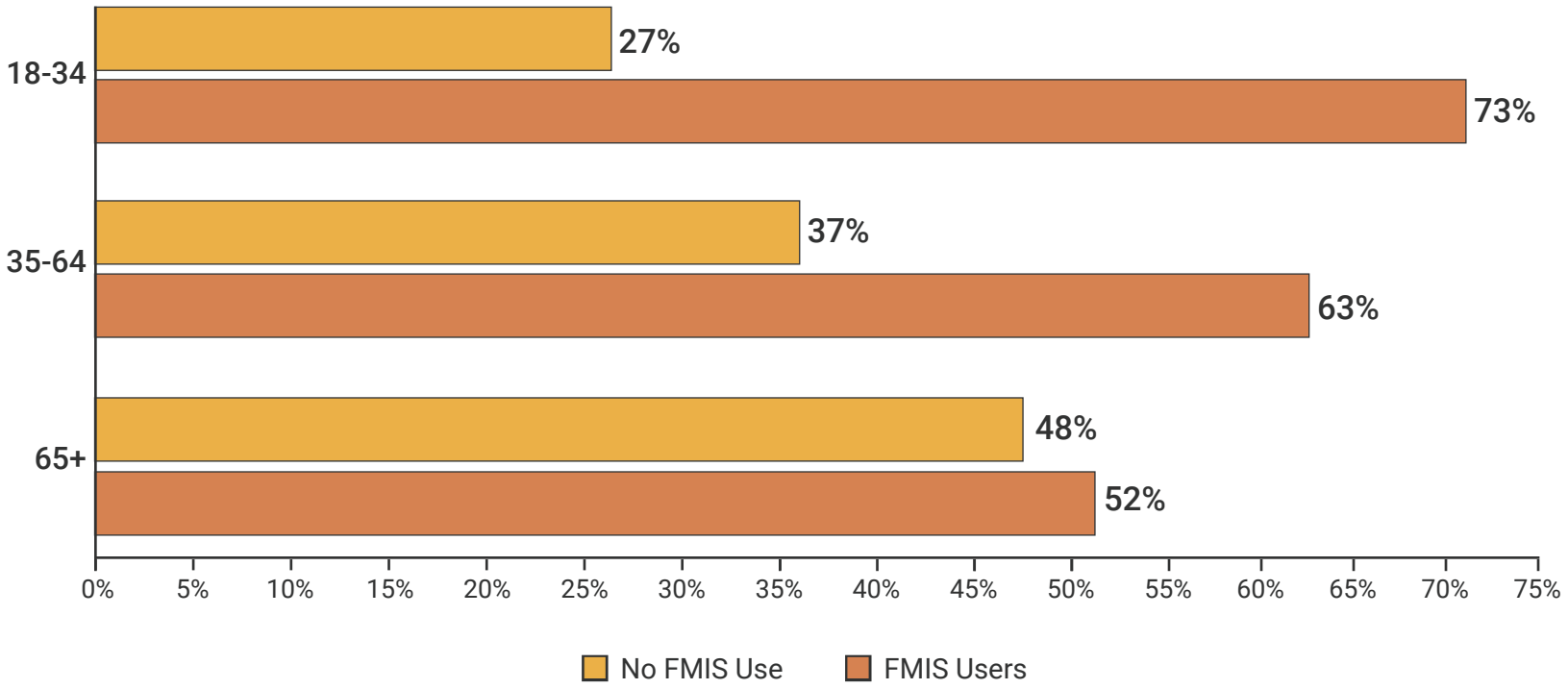
When asked why respondents would not transition to more digital methods, computer equipment issues, interest, time and mental energy were the most prevalent reasons why they had not considered investing in the digital transition.

Select Responses:

- "Too old to learn new tricks."
- "I am not good with computers."
- "Retiring soon, so no point."
- "Can't train my partners."
- "More security with hard copy—it can't be hacked or crash."
- "Don't trust my data won't be used for gain by someone else."

Trends in Data Collection, Management and Use
Farmer Perspectives

The percentage use of FMIS by age group is shown here; as age goes up, usage goes down. (*N=610*)



Trends in Data Collection, Management and Use
Key Findings

Use of digital data management solutions is low, and among those who do not use digital solutions, there is a low propensity for change.

Almost one-third of respondents manage their farm's data using paper methods; more than half don't rely on a digital FMIS solution primarily. Widespread adoption of digital farm management solutions is critical. Transitioning from analog methods to digital exclusively is also crucial. To drive comprehensive use of digital solutions among partial adopters, organizations must first address the unique challenges each farmer faces, understanding that each has unique needs requiring a unique solution. A significant portion of the current farmer population may simply never adopt digital data management systems due to their proximity to retirement or other similar immutable cultural factors that no intervention can affect. This was exemplified in the responses shown in the previous word cloud of the most common reasons why an individual would not consider transitioning to digital. Respondents over 65 were nearly twice as likely to not use FMIS as respondents 18-35.

Bottom Line:
Each farmer's challenges with their digital transition are unique; organizations should custom build solutions for these. It may not be possible for some farmers to transition to digital regardless of incentives or changes in the sector; rather than expending resources here, organizations should prioritize investments that prime the next generation's transition.

Trends in Data Collection, Management and Use
Key Findings

Farmers recognize the benefit and role of data in how they manage their operations, but for many, the level of data they collect has plateaued.

43% of farmers report that the data they collect play an important role in deciding how they manage their farm operations, but only one quarter of farmers report increasing the level of data they keep. This indicates that a significant portion of the farm base feels they have reached optimal capacity for the benefits of digital data management, based on the level of data they collect. However, the benefits of increasing the level of data collected are widespread, and some farmers may not be aware of these added benefits, such as decision validation, input modelling, crop protection, profit mapping and the ability to see the ROI on decisions year-over-year. While yield monitoring, financials, nutrient management and soil test results are the types of data most commonly collected – organizations can focus on the added value of increased data collection – as an engagement tactic that goes beyond tracking farm profitability and allows farmers to manage their operations more holistically.

Bottom Line: There are more benefits to increasing the amount of farm-level data beyond profits and input monitoring. Amplifying the added value of data collection could engage farmers more deeply and highlight how to use their farm-level data more comprehensively to benefit their entire operations.

Trends in Data Collection, Management and Use
Key Findings

Investment into additional production data collection technologies was low for 2020 but impactful for those who did increase their investments in this aspect of their operations.

77% of respondents reported that they did not purchase or lease additional production data collection technologies in the 2020 season. Of the 22% who did increase their investment in this area of their farm business, the majority (80%) invested in precision ag farming equipment while 46% invested in additional computer equipment, 38% invested in software and 24% in field sensors. The year 2020 was full of complexities not previously encountered, and the ag sector was no exception to this. While uncertainties were prevalent and payment programs were deployed to bolster farm business, nearly 1 in 5 farmers continued to invest in additional data collection technologies. FMIS organizations should seek to learn more about why, in a year riddled with unknowns, farmers chose to make such an investment in technology and then analyze their motivations before engaging with other farmers more widely.

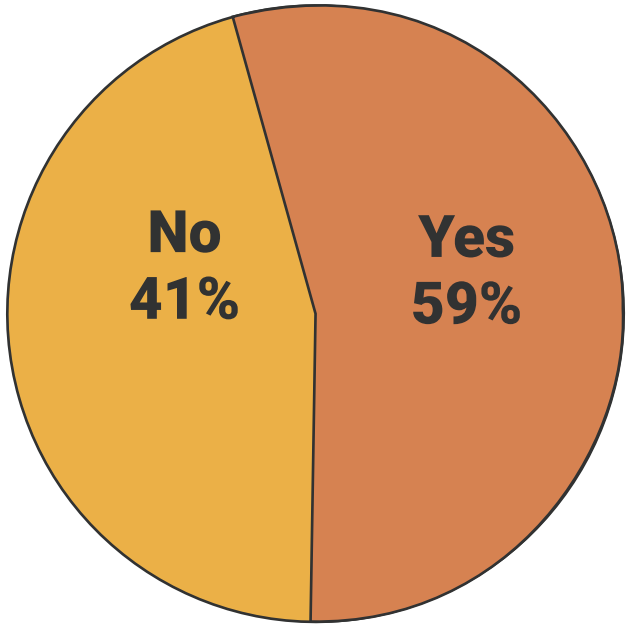
Bottom Line: Even in a year of unknown complexities, 1 in 5 farmers chose to invest in production technologies. Understanding farmer motivations to do so could result in additional engagement tactics.

Data Collection/Sharing Software Platforms

USDA Photo by Lance Cheung

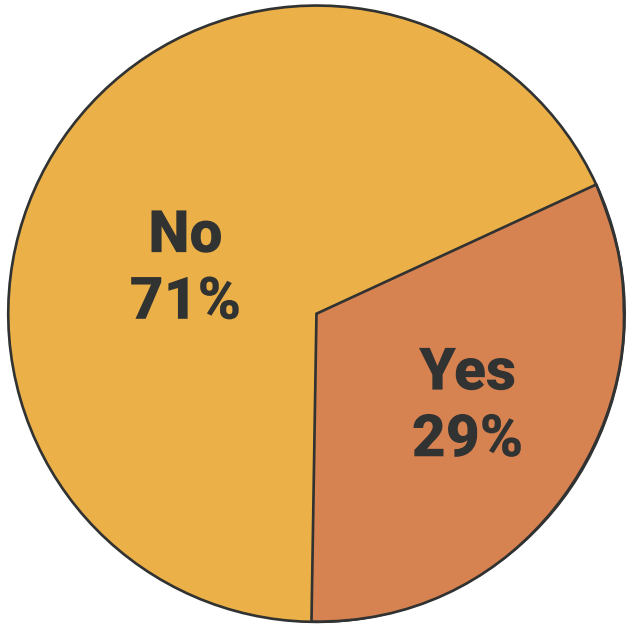
Data Collection/Sharing Software Platforms
Farmer Perspectives

In 2020, did your operation use any of the following farm management software to centralize, manage or optimize the production activities of your operation? *(N=610)*



41% of respondents reported that they used no FMIS to centralize, manage or optimize the production activities of their operations. Respondents could select multiple FMIS systems.

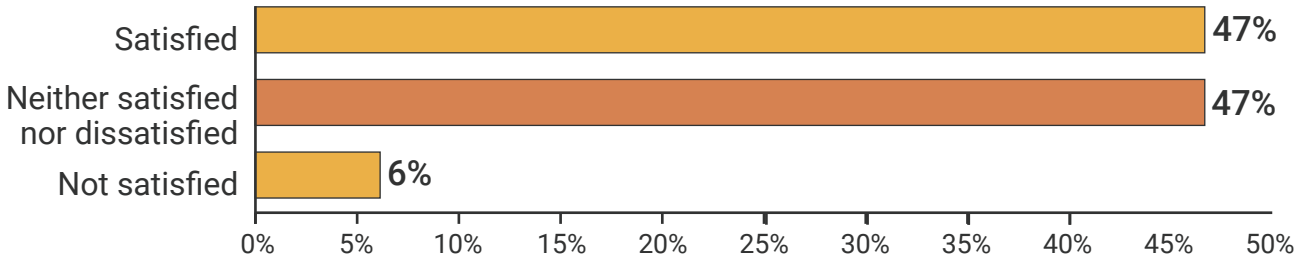
In 2020, did your operation utilize or participate in any of the following software-based sustainability/conservation tools? *(N=610)*



71% of respondents reported that they did not use or participate in any software-based sustainability tools. Respondents could select multiple systems.

Data Collection/Sharing Software Platforms
Farmer Perspectives

How satisfied are you with the outputs you receive from the farm management software you use? *(N=366)*



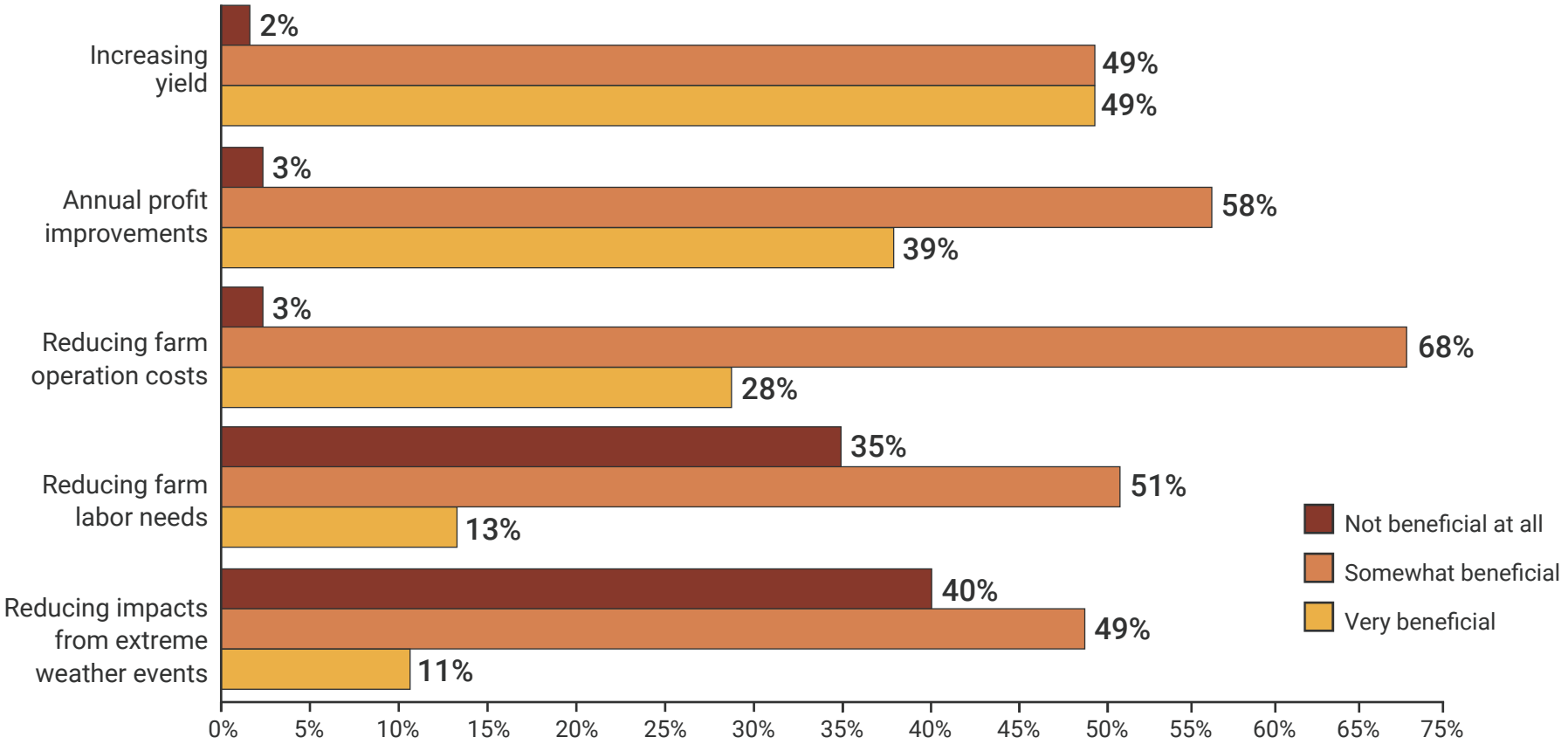
Less than half of respondents report being fully satisfied with the outputs they receive from the FMIS they use.

What would need to change in order to increase your satisfaction with the farm management software you use? *(N=366)*

Of those who reported they were semi or fully dissatisfied with the outputs they received from the FMIS they use, improving the ease and lessening the time commitment needed to incorporate FMIS would improve their satisfaction.

Data Collection/Sharing Software Platforms
Farmer Perspectives

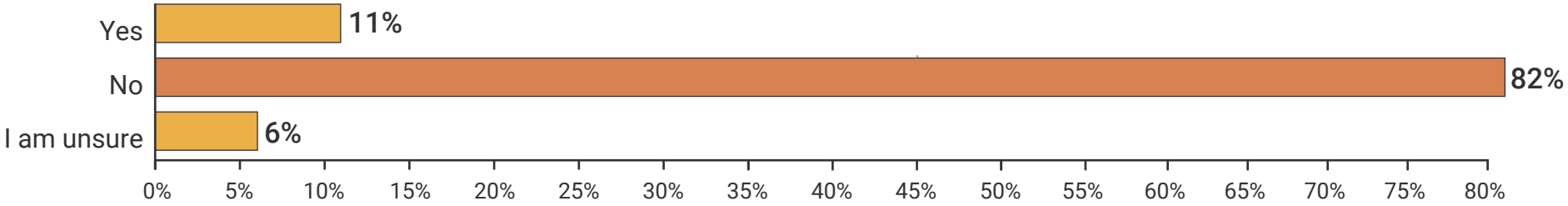
For each of the following choices, please describe how beneficial the use of farm management software has been. *(N=366)*



Respondents who use FMIS reported the most beneficial use cases for FMIS in their operations were increases in yields (49%), annual profit improvements (39%) and reducing operation costs (28%).

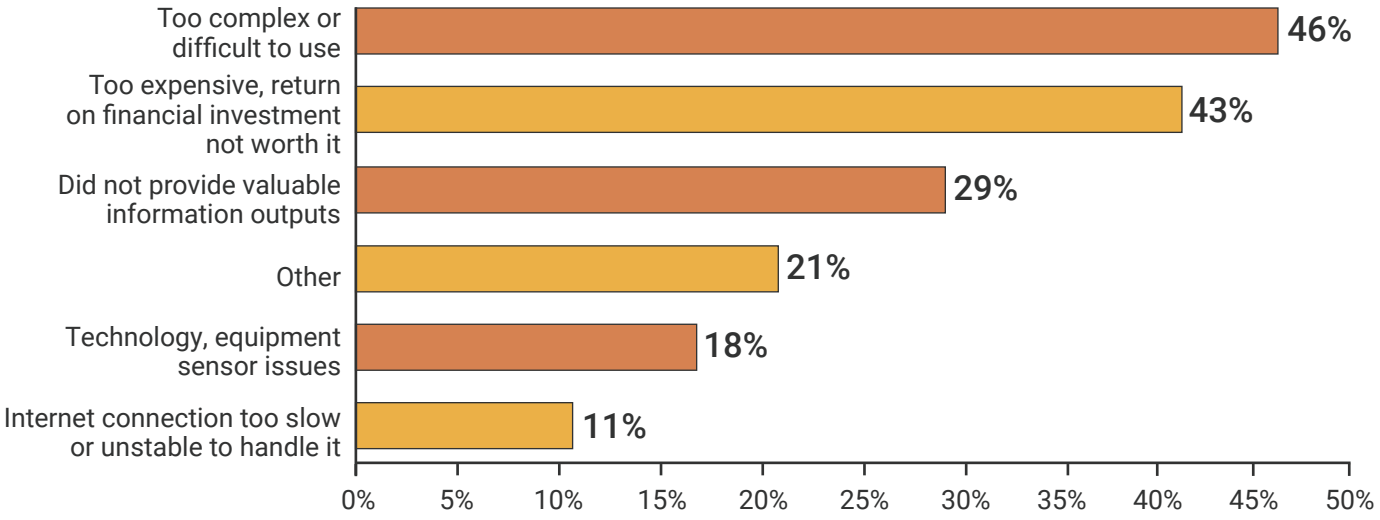
Data Collection/Sharing Software Platforms
Farmer Perspectives

Has your operation previously used a farm data platform in the past but since discontinued its use? *(N=610)*



Only 11% of respondents report discontinuing the use of FMIS if they used one in the past.

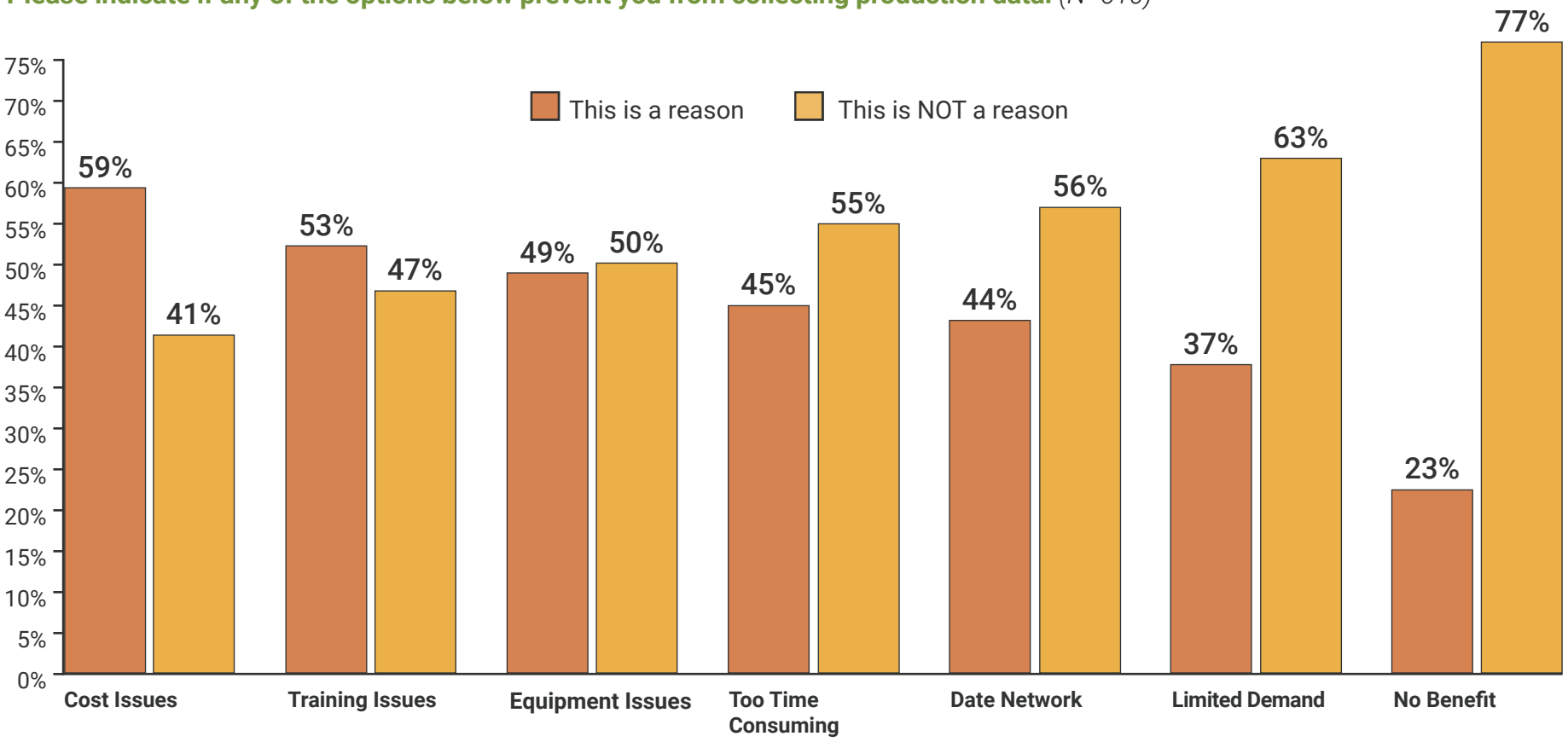
You said your operation previously used a farm data platform in the past but discontinued using it. Why is that? *(N=28)*



Of those who had discontinued use of an FMIS solution in the past, most attribute their discontinuation to the platform being too difficult, and many attribute to the cost being too high or an unrecognized financial benefit.

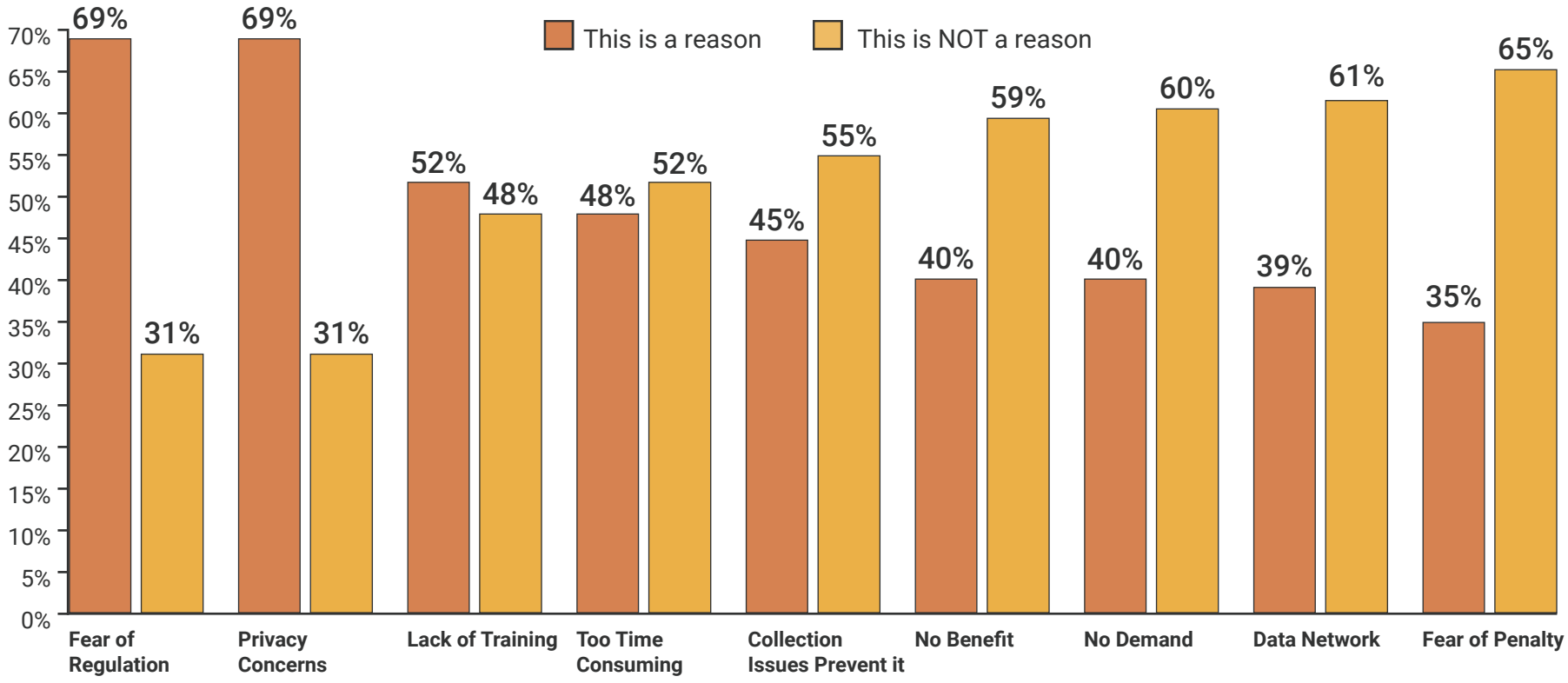
Data Collection/Sharing Software Platforms
Farmer Perspectives: Barriers

Please indicate if any of the options below prevent you from collecting production data. *(N=610)*



Data Collection/Sharing Software Platforms
Farmer Perspectives: Barriers

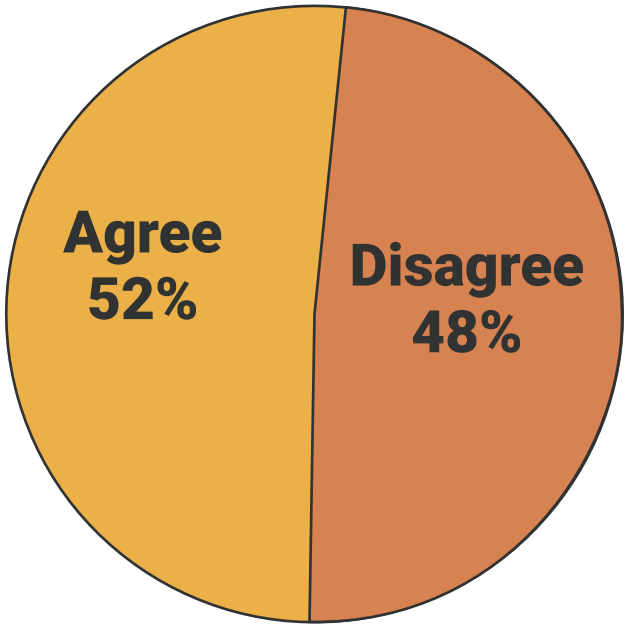
Please indicate if any of the options below prevent you from sharing production data. *(N=610)*



Respondents identified regulation (69%) and privacy (69%) issues as the major barriers to sharing production data with lack of training (52%) ranking at a close third.

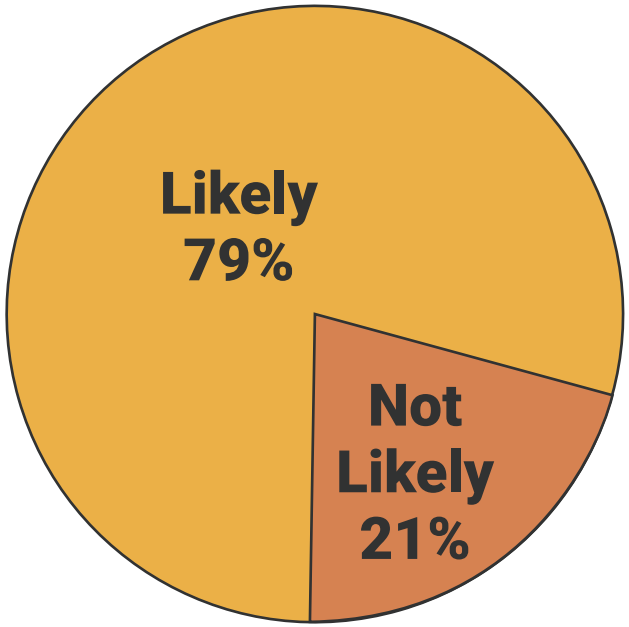
Data Collection/Sharing Software Platforms
Farmer Perspectives

If I have a question about farm-level data collection methods, technology, sharing or privacy – I know an expert who I can call to ask to help me understand. *(N=610)*



48% of respondents do not feel they have an expert they can ask to help them understand farm-level data collection should they have a question.

How likely would you be to start or increase your use of precision farm management technologies if you could acquire the equipment needed (software, sensors, etc.) at no charge? *(N=610)*

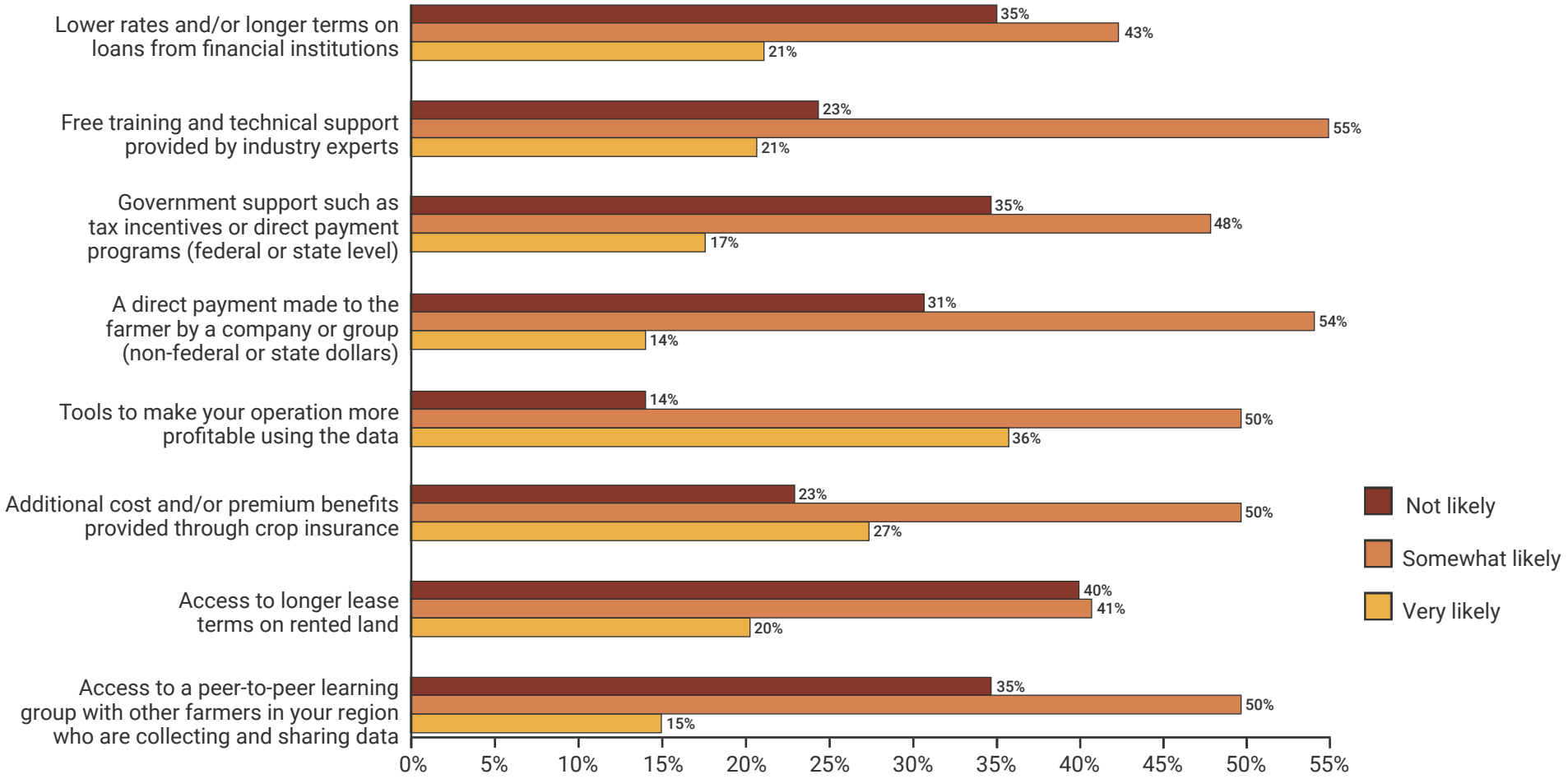


79% of respondents report that they would be likely to start or increase their use of precision farm management technologies if they could do so at no charge.

Data Collection/Sharing Software Platforms

Farmer Perspectives: Opportunities

How likely would you be to both collect and share more data about your operation if you received [one of the following]? *(N=610)*



The incentives that are most likely to motivate farmers to collect and share more data about their operations are lower rates and/or longer terms from financial institutions, free training, government support and direct payments.

Data Collection/Sharing Software Platforms
Key Findings

Producers want tools and training to help them make better management decisions and are willing to invest where these are present.

Out of the top three potential incentives most likely to motivate farmers to collect and share more data, two are tools and training that enable the farmer to make better business decisions with their data. But a lack of usable outputs is one of the largest complaints about FMIS this survey uncovered. Organizations should prioritize developing and refining these tools and accompanying outreach programs with a focus on farmer-informed design to solve the gaps farmers believe exist in usability. Critical focus should also be placed into how current iterations of these tools and outputs are marketed to farmers, as they may be misunderstood by farmers.

Bottom Line: Farmers are willing to step up to the digital transition if they are able to make better decisions by doing so, but they don't feel like the current toolset allows them to do this. Therefore, many producers may minimally value the transition . FMIS and digital ag organizations can evolve their solution set to better meet farmer needs and entice more to transition to digital.

Data Collection/Sharing Software Platforms
Key Findings

Supply chain buyers may have a significant role to play; among respondents who market primarily to food and fuel companies, FMIS use is significantly higher than among those who primarily market their harvests in other ways, such as feed.

The farmers marketing primarily to food and fuel companies are roughly 24% more likely to be users of FMIS than the farmers primarily marketing to other outlets, all of which see near identical FMIS usage rates, except for those engaged in animal feeding. While more research is needed to understand the linkage here, this may point to a potential influencing connection that buyers of agricultural commodities have regarding how likely a farmer is to use FMIS. Those organizations should evaluate their relationships with farmers around FMIS and data collection to understand how they can better foster the digital transition across those they buy from. This could take the form of technical support resources or financial incentives.

Bottom Line: Any organization purchasing from farmers should critically consider the role it plays in digital transition and do all it can to empower farmers in its supply chain to transition to FMIS. Buyers of harvested crops can empower the digital transition to scale amongst the farmers they buy from through activities, such as incentives and technical training resources, as outlined throughout this report. Providing value to farmers for making the transition to digital data and helping them feel capable of making the change are keys to helping scale.

Data Collection/Sharing Software Platforms
Key Findings

The lack of support for FMIS and related technologies by farmers' trusted advisors is likely a critical bottleneck in the adoption of digital ag solutions. *[FIGURE 19]*

About half of producers who responded to the survey don't have a trusted advisor they can call on for support related to FMIS and digital technologies. In last year's survey, 71% said their primary agronomic advisor or retailer had not recommended that they increase their data collection. Farmers listen to their advisors, rely on them heavily for decision making and strongly value technical resources/support. The sector should develop new ways to empower the trusted advisor network to more effectively engage with farmers around FMIS and related digital technologies.

Bottom Line: If farmers are to transition exclusively to FMIS use, they must first believe themselves capable of utilizing digital solutions and see value to their operations in adopting. The network of trusted advisors—and indeed any organization working with farmers—can play a key role here, if empowered to do so.

Producers want the tools to help them make better management decisions and are willing to step up where these are present.

Organizations should prioritize developing and refining decision-making tools and accompanying outreach programs with a focus on farmer-informed designs to solve the gaps farmers believe exist in usability. Critical focus should also be placed into how current iterations of these tools and outputs are marketed to farmers, as farmers may not fully understand how these tools help.

Bottom Line: Farmers are willing to go through digital transitions if they believe they are able to make better decisions for their operations by doing so, but many don't feel like the current toolset allows them to make any better decisions than they currently do. They do not necessarily value the transition. By amplifying the direct-farmer benefits of digital transitions, FMIS and digital ag organizations are likely to improve adoption rates by ensuring farmers find value in adoption.

Trust & Beliefs

Photo Credit: USDA NRCS Montana

Trust & Beliefs
Farmer Perspectives

Who do I trust with the security and use of my farm's data? *(N=610)*

Federal, state and county level government offices

42% Agree

58% Disagree

*58% of respondents **do not** trust federal, state and county level government offices with the security and use of their farm data.*

Private companies

27% Agree

73% Disagree

*73% of respondents **do not** trust private companies with the security and use of their farm's data.*

My lenders and bankers

71% Agree

29% Disagree

*71% of respondents **do** trust their lenders and bankers with the security and use of their farm's data.*

Trust & Beliefs
Farmer Perspectives

I believe that my customers have a right to know how I manage my farm. *(N=610)*

35% Agree

65% Disagree

65% of respondents do not believe that their customers have the right to know how they manage their farms.

Data about my farm's production and management practices should be as tightly secured as my family's health records. *(N=610)*

87% Agree

13% Disagree

87% of farmers believe that their farm's production data should be as tightly secured as their family's health records.

I believe collecting and sharing data on my farm's production and management practices will help my operation be more financially successful in the future. *(N=610)*

58% Agree

42% Disagree

42% of respondents believe that collecting and sharing data on their farm's production and management will NOT help their operations be more financially successful in the future.

Trust & Beliefs
Key Findings

Trust is an issue; producers don't trust the government or private companies with their data, claiming issues related to trust and proper data usage as leading reasons why they don't collect / share more.

Private organizations and the government must address issues related to trust, as it is complicating digital transitions for many farmers. This could be achieved by redesigning data governance and privacy policies, based on farmer concerns, to be more transparent, fair and equitable. Almost twice as many farmers trust their data with their financial institutions than with the government or a private company. Businesses and government agencies could adopt policies and practices related to data based on the trusted methods of financial institutions.

Bottom Line: Farmers perceive too much risk related to the organizations who may have access to their data, and it is preventing widespread adoption of digital data management. These organizations and companies must address these trust issues, or efforts, in assisting producers with digital transitions, or will likely fall short of their intended targets.

Farmers may be undervaluing the suite of benefits that use of FMIS can provide.

Respondents report that the most common types of data they collect are related to their yields, financials, nutrient inputs and soil tests. While capturing these types of data are incredibly valuable, the use of more sophisticated data management practices, such as FMIS, can serve as a force multiplier for that value. Farmers may not recognize many different ways digital data management can benefit them, such as: the legacy value of the data they collect, validating on-farm change to partners and lenders and help them enter, or remain in compliance, with the markets they supply. Organizations looking to increase engagement with famers who do not use digital solutions could gain headway by presenting a wider suite of benefits to farmers.

Bottom Line: Increasing the sophistication of how on-farm data is collected and managed has a suite of benefits that need to be communicated to farmers alongside the more widely understood benefits.

Conservation Agriculture Trends

USDA Photo by Lance Cheung

Conservation Agriculture Trends
Farmer Perspectives

What farming practices related to conservation and sustainability does your operation utilize? *(N=610)*

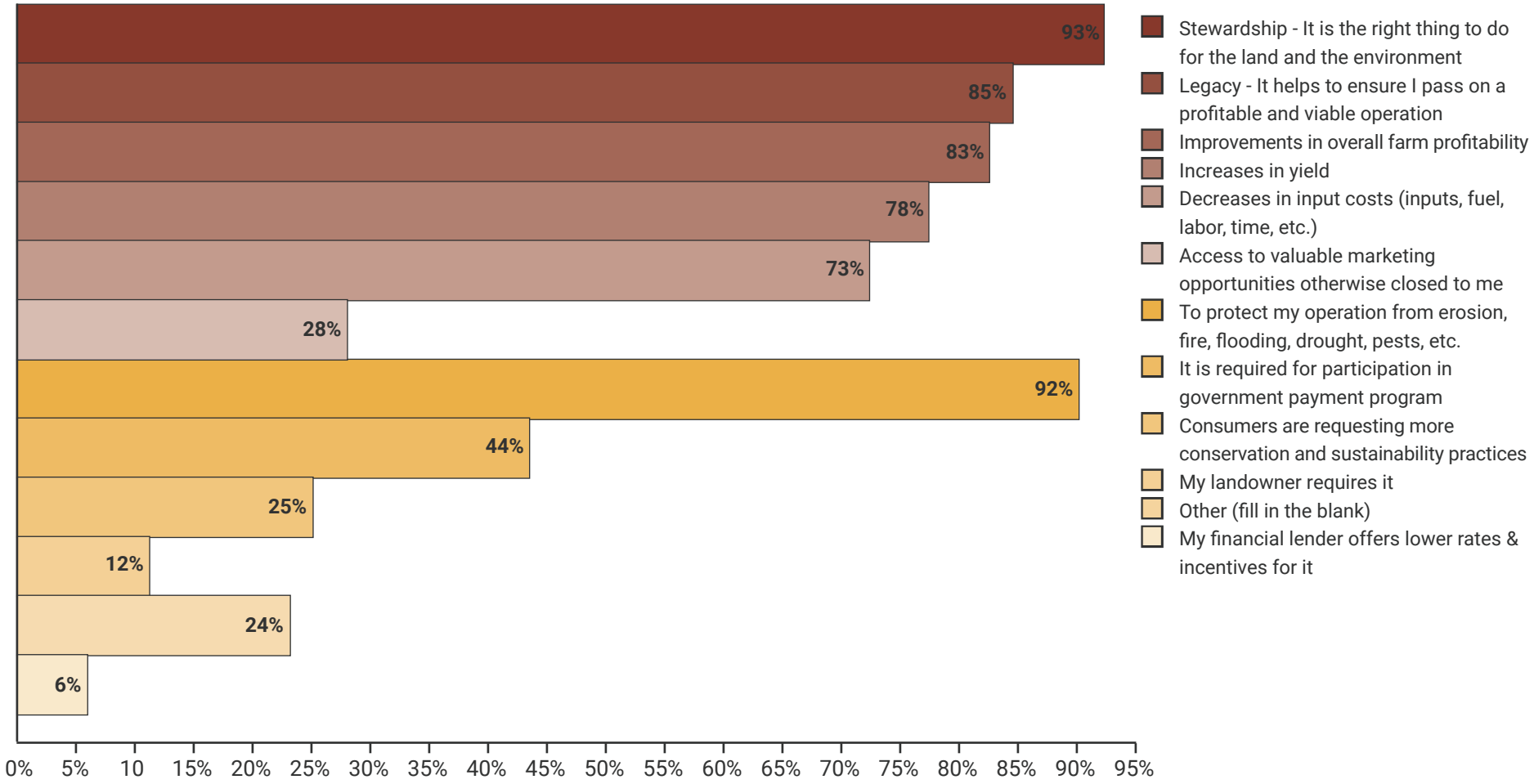
Select all that apply	*Choice count*
Conservtion tillage - (any tillage practice that covers 30% or more of soil with residue after planting. Include such practices as reduced-till or strip-till)	62%
Grassed waterways	57%
Conservation crop rotation	53%
Integrated pest management strategies	38%
Single or muli-species cover crops	38%
Conservation planning with NRCS	35%
Wildlife habitat protection, including for pollinators	29%
100% no-till	27%
Drainage water management structures on sub-surface drainage systems	27%
Field borders	27%
Filter strips	25%
Vegetative barrier/windbreaks	20%
4R nutrient stewardship use	19%
Water and sediment control basins	17%
Contour strip cropping/contour buffer strips	11%
Riparian herbaceous cover/stream habitat management	9%
Field strip cropping	7%

Nearly all respondents implement one or more of the listed conservation ag practices on their operations.

Conservation Agriculture Trends

Farmer Perspectives

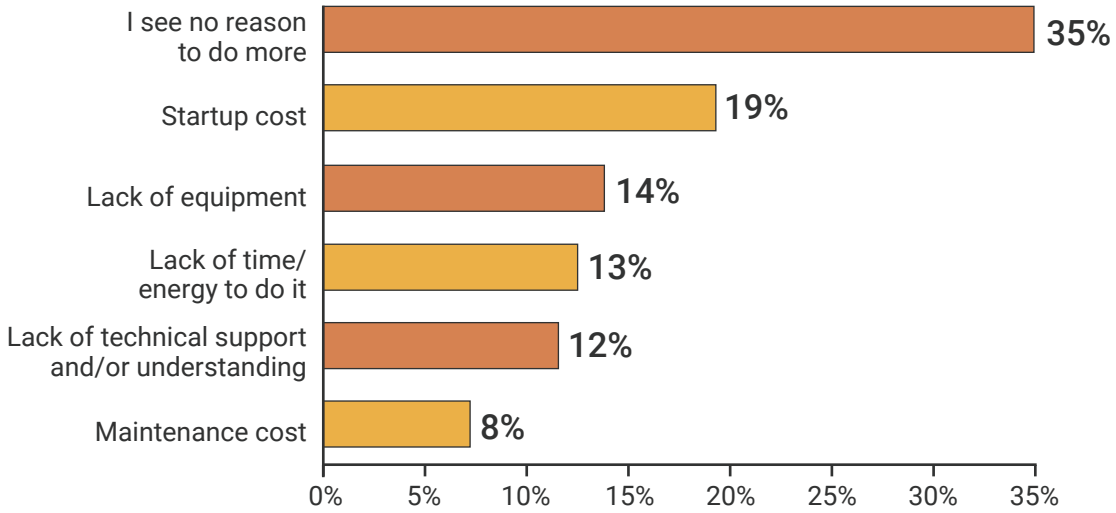
Of the conservation agriculture practices you utilize on your operation, what are the reasons for doing so? *(N=610)*



Stewardship (93%), climatic or pest risk mitigation (92%), legacy (85%), profitability improvements (83%) and yield increases (78%) were the highest ranking reasons for why respondents implement the conservation practices they do.

Data Collection/Sharing Software Platforms
Farmer Perspectives

What is your primary barrier to implementing conservation agriculture?
(N=610)



The highest ranking barriers to conservation practice implementation reported by respondents were not seeing a reason to do more (35%) and the initial startup costs (19%).

Data Collection/Sharing Software Platforms
Key Findings

There may be untapped opportunities to position FMIS as a tool to help drive conservation practice adoption and vice-versa.

While the reported adoption of conservation ag practices is widespread, with every respondent reporting they use at least one or more practices, use of FMIS is not as widespread. The use of FMIS and conservation practices simultaneously is mutually beneficial, but many users of conservation practices aren't using FMIS and extensively collecting digital data. Given the feedback related to how farmers view FMIS and its place on their farms, they may not recognize the benefits that increased data collection can add to their overall operation management approach where conservation is concerned. Organizations should recognize that farmers feel a need to quantify not only financial-related data but also the impact of conservation practice choices on their operational efficiency as well as ROI of conservation adoption.

Bottom Line: Farmers may not understand how to fully utilize FMIS solutions to increase the overall efficiency of how they manage their farm operations and track their ROI related to conservation. Similarly, the adoption of conservation practices on more acres is an ongoing need. Considering the symbiotic outcomes of combining conservation practices with FMIS usage and widespread production data collection, organizations can evolve their engagement programs to focus on this “package deal” for farmers. Promoting both simultaneously or promoting one in order to lead to the other sequentially are likely effective strategies.

Data Collection/Sharing Software Platforms
Key Findings

Many farmers state they don't see the need to do more conservation; as a result, there could be an opportunity to effectively combine FMIS and conservation outreach efforts.

More than one third of respondents (35%) said that a key barrier to them doing more conservation activities is that they do not see the need to. A critical step in the change process is the recognition of value from the new behavior, in whatever form it may come. If farmers do not perceive value or benefit provided to them by conservation practices, then they are unlikely to change. This is inline with a similar issue previously referenced about farmers' perceived value related to FMIS usage.

Bottom Line: FMIS use, data collection and conservation may all share a significant and identical barrier--farmers' lack of understanding around the benefits. Given this significant overlap here, combined with the significant compounding benefits provided when these three things are utilized in union, organizations could design effective education and outreach programming by focusing on all three and their co-benefits.

Conclusion

More sustainable ag supply chains are possible, but will require support from all corners.

This annual report analyzed farmers' perspectives on data collection and sharing and emerging trends around digital agriculture. The increased use of FMIS and related digital technologies within agriculture is expected to have a large impact on farm productivity, economic performance, adoption of conservation practices and the broader agri-food sector. Nonetheless, this research showed that the use of FMIS solutions is still low.

There are several reasons for the low use of FMIS solutions. Farmers indicated that the most significant barrier they face in collecting data is cost, whereas the most significant barrier in sharing data is trust. The perceived risk associated with sharing data is reflective of most farmers' lack of trust in the government and private companies with their data. Farmers' perceived risk of sharing data ranged from fear of additional regulation to concerns about the lack of equitable distribution of the benefits of on-farm data collection along the supply chain. We suggest that data governance and privacy policies should be redesigned to improve transparency and address farmers' concerns regarding the use of their data. We also recommend creative financial and funding solutions to address the significant cost and training barriers reported by growers.

Collecting data alone, however, is not valuable or meaningful to most farmers; they need actionable information. That is the critical role that trusted advisors can play in supporting farmers' digital transitions. Trusted agricultural advisors can help farmers identify FMIS and related digital technologies that have the greatest benefits and potential use on farms and encourage farmers to adopt these technologies. In addition, organizations should prioritize developing and refining FMIS and other tools, with a focus on analytics, to create value out of the on-farm data collected and adequately address the gaps farmers believe exist in usability of these tools.

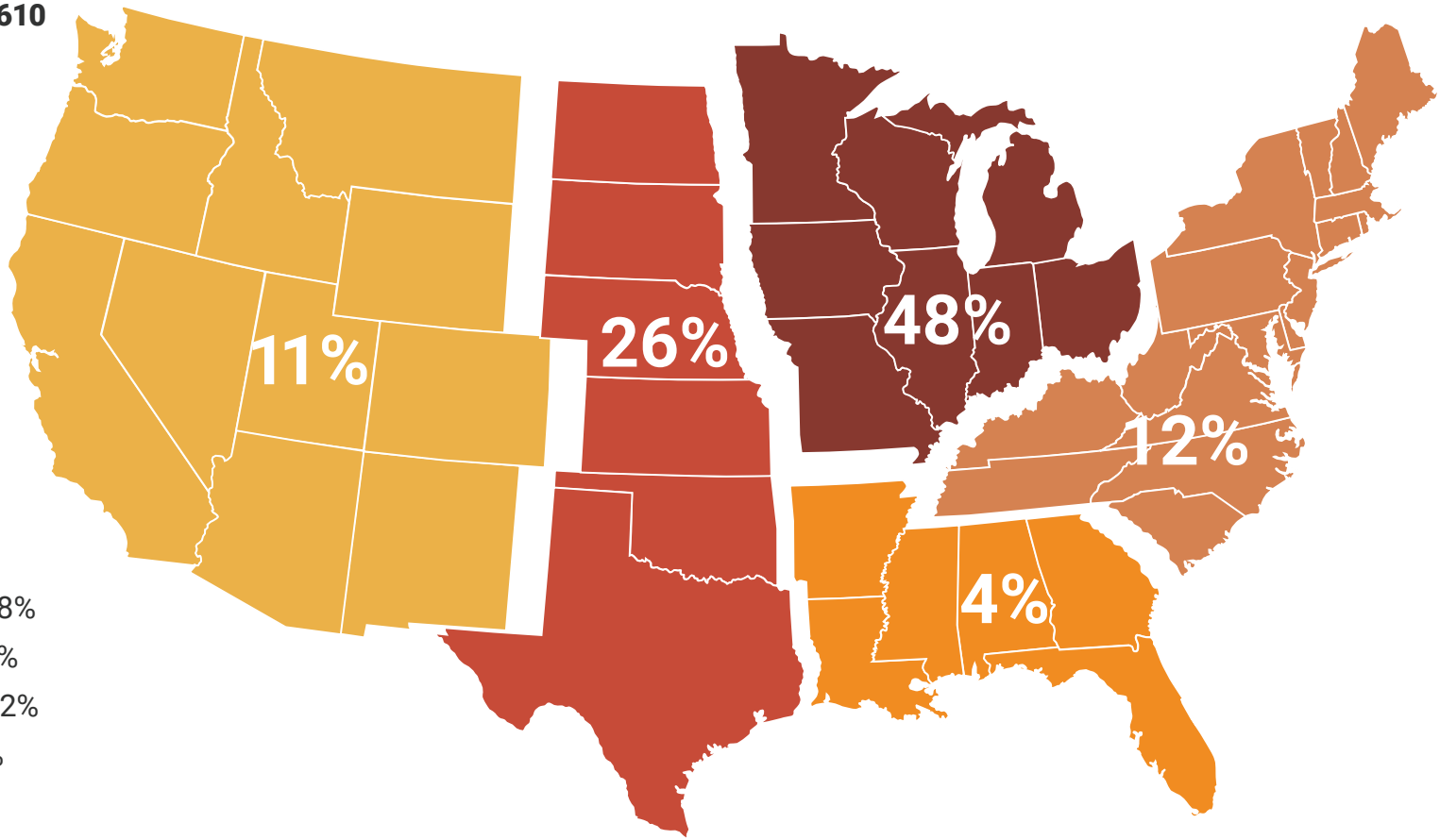
FMIS and related digital technologies have the potential to be a driving force in the evolution of agriculture, and it will play a central role in meeting the expectations of consumers around transparency. However, the challenges associated with cost, trust, access, support, privacy and the equitable distribution of the benefits of on-farm data collection along the supply chain need to be addressed first before we can achieve the on-farm digital transition and scale conservation agriculture to achieve a resilient U.S. agriculture supply chain.

– Christy Slay
Senior Director, Science and Research Applications, The Sustainability Consortium (TSC)

Appendix
Survey Respondents Sample

Total sample size (N) = 610

Breakdown by region

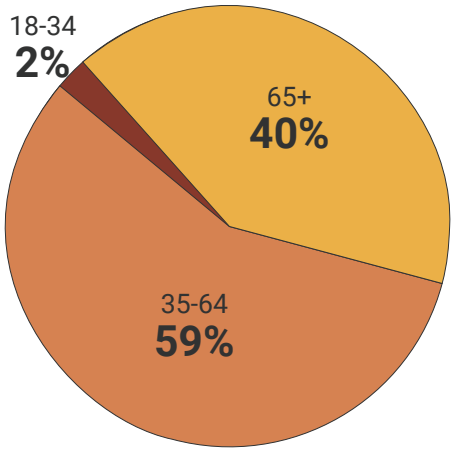


- Midwest Region – 48%
- Plains Region – 26%
- Atlantic Region – 12%
- West Region – 11%
- South Region – 4%

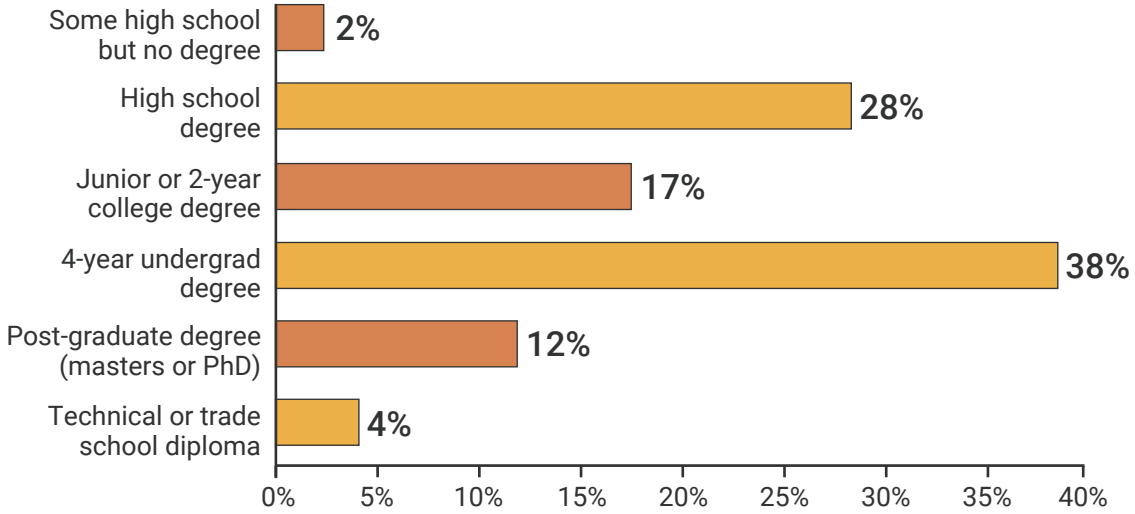
*The 610 total respondents represent 42 of the lower 48 states. This figure shows respondent geography broken out by USDA Production Regions: 48% Midwest Region, 26% Plains Region, 12% Atlantic Region, 11% West Region and 4% South Region. *No responses were received from Arizona, Delaware, Florida, Rhode Island, Vermont or West Virginia.*

Appendix
Survey Respondents Sample

Breakdown by age



Breakdown by education



98% of respondents have completed high school while 71% have obtained some degree of higher education

Breakdown by gender

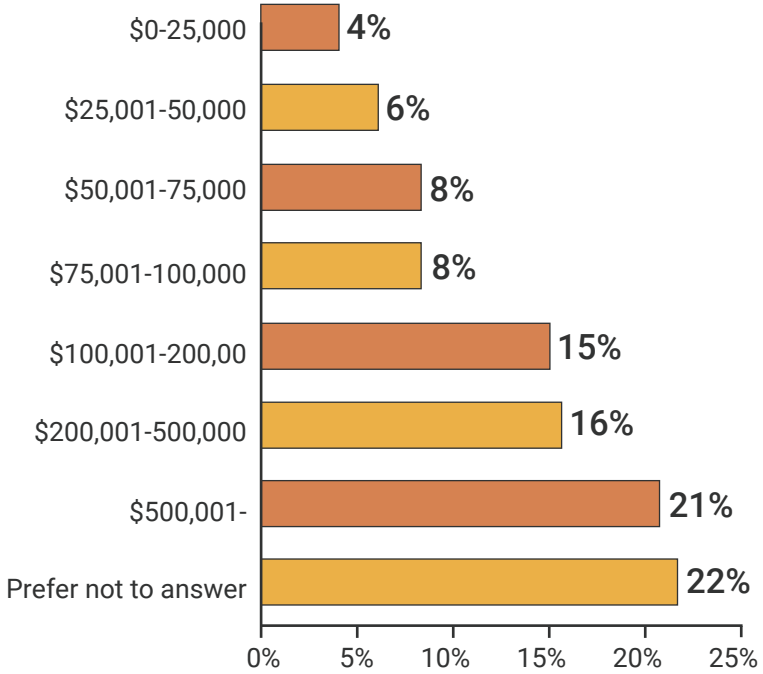
♂ 93% Male

♀ 6% Female

2% Prefer not to say

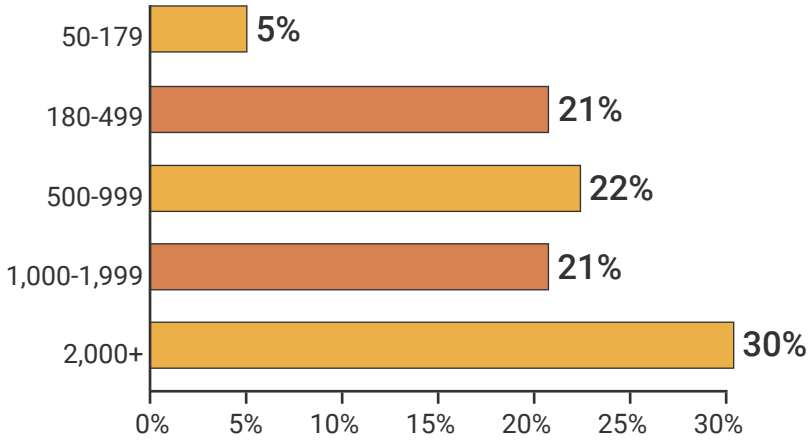
Appendix
Survey Respondents Sample

Farm Income Level (Gross)



Gross Farm Income (GFI) ranges from $0-500,000 or more with over 74% of respondents earning $100,000 or more.

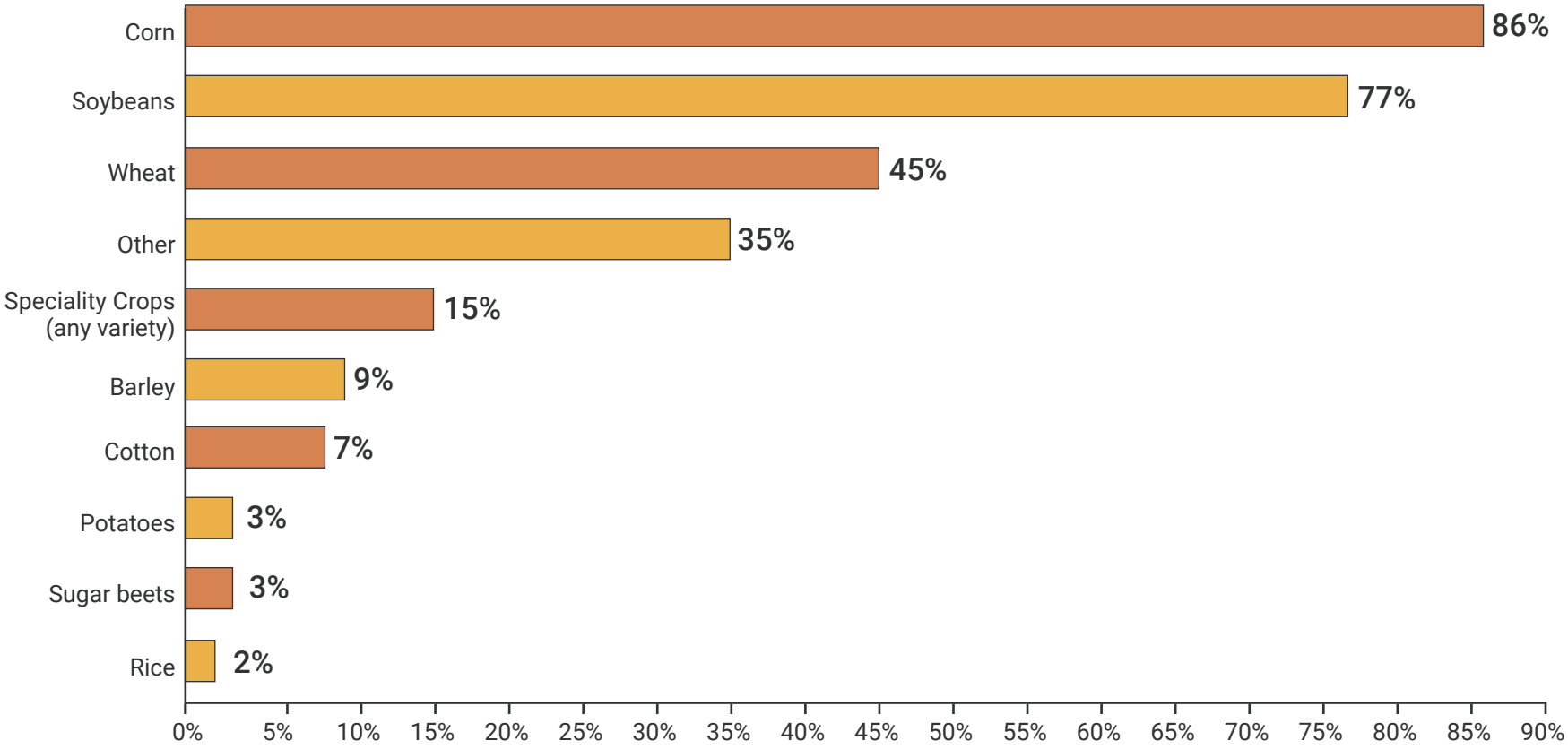
Total Operation Acreage



Respondents' farm size, in acres, ranges from 50 acres to 2,000 or more with 73% of respondents operating on 500 acres or more.

Appendix
Survey Respondents Sample

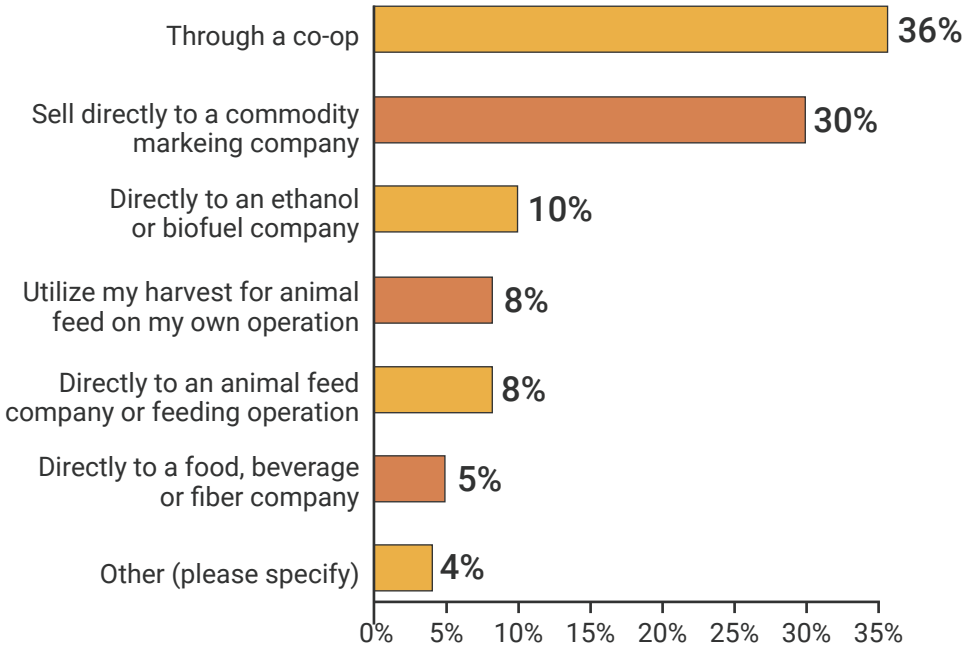
Breakdown by Crops Grown
(% of respondents that grow each - more than one response choice was possible)



Corn (86%)and soybean (77%) acres were the most prevalent of production types reported by respondents with 15% of respondents growing specialty crops.

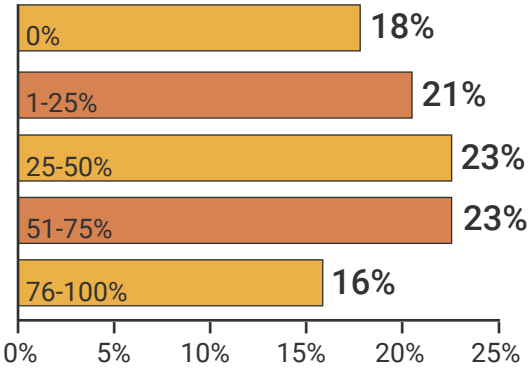
Appendix
Survey Respondents Sample

Primary Marketing Method



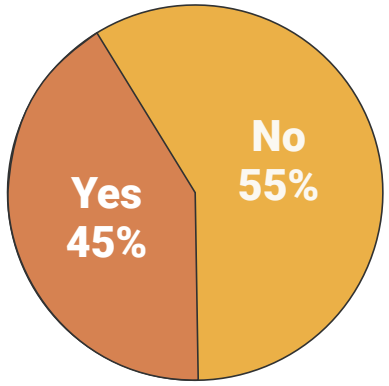
Primary marketing methods were mixed. Marketing through a co-op (36%) and selling directly to a commodity marketing company (30%) were the most prevalent.

Percentage of Total Operation's Acres That Are Rented



The distribution of the percent of respondents' acres that were rented was relatively evenly distributed.

Livestock Producers



45% of respondents raise livestock.

Farmer Perspectives on Data 2021

Actionable insights to empowering businesses and farmers to scale farm-level production data activities

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