



Adopting New Ag Technologies

Tips to Minimize Your Risks

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Technology is changing the way you farm and has ushered in a new level of productivity and efficiency. These advances and those on the horizon have farmers dreaming about what's next. But transitioning those dreams to reality and determining what technology is worth the investment can be an exercise in and of itself.

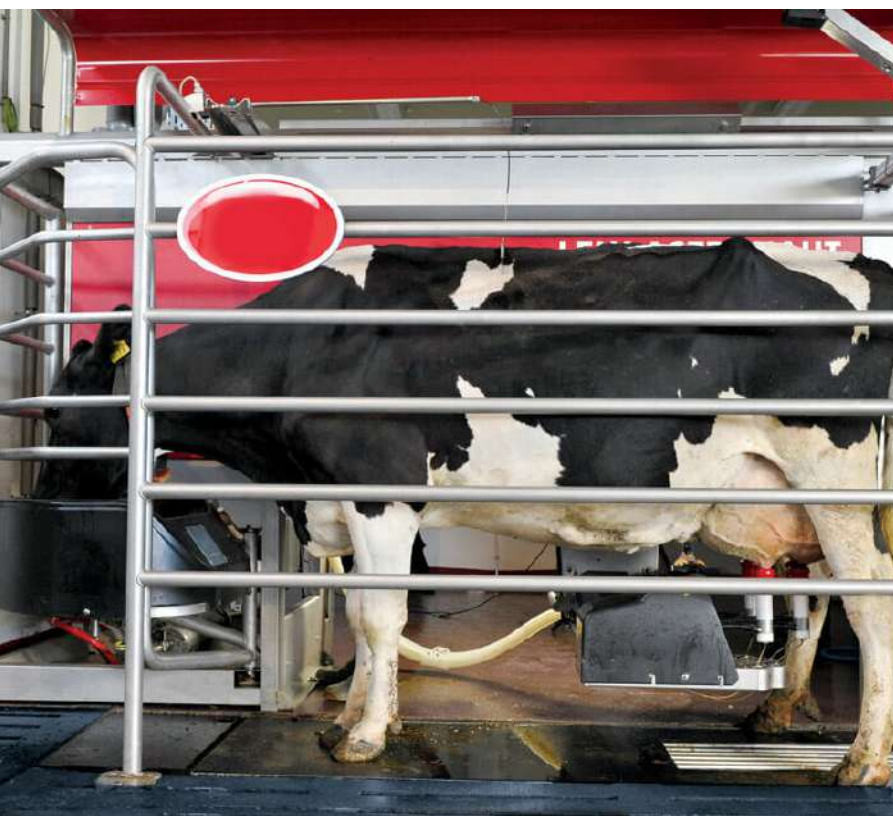
This report will help guide your decision-making by homing in on four key areas you should consider before pulling the trigger on any new technology:

Determine Whether it's a Smart Financial Move.

Technical Support is Critical.

Consider Your Liability.

Make Sure Your Valuable Farm Data is Secure.



IMPLICATION:

To ensure your farm's future, you must take advantage of the productivity and efficiency gains made possible by new agricultural technology.

ACTION:

While necessary, agtech comes with risks. Take time to understand the risks and develop strategies to mitigate their impact to safeguard your farm's future.

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Quick Links

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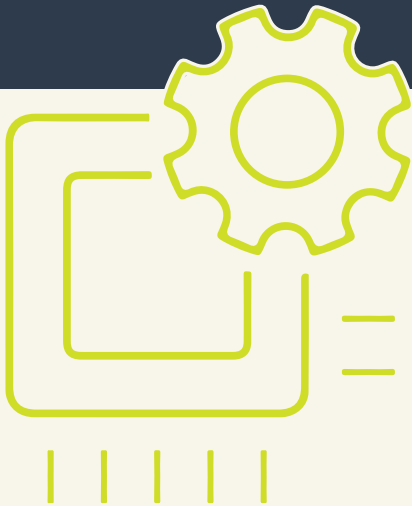
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Farming Evolved Through Technological Eras.

Farmers have used technology to improve their results and way of life since the beginning. Here's a look at the latest evolutions in farming.

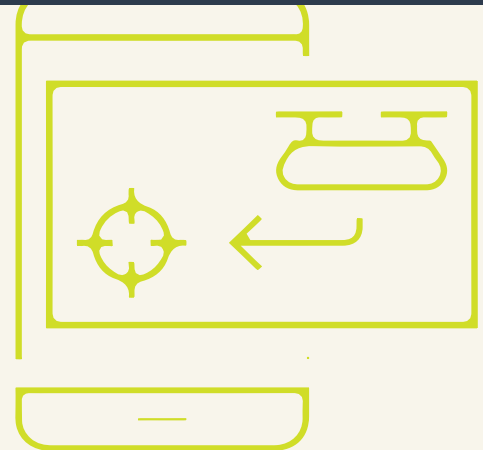
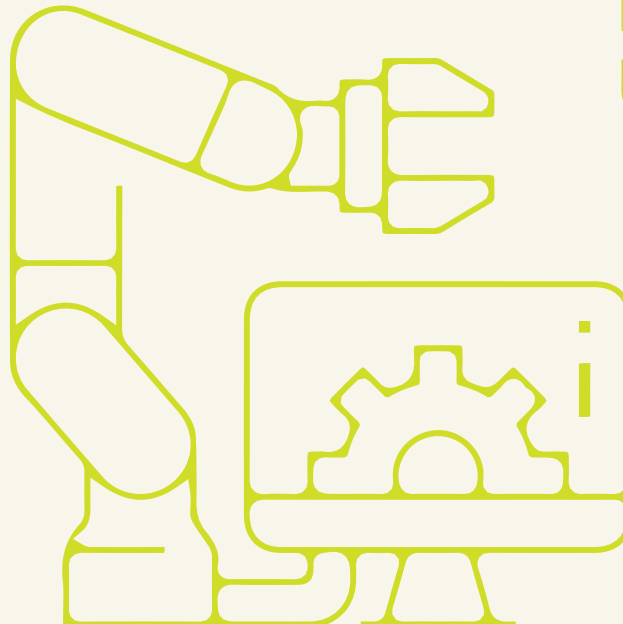


Digital Farming

Advances in technology like 5G, blockchain and artificial intelligence improve data collection and analysis of that info. Farm data is more encompassing, accurate and timely, and better aggregation and analysis of it helps farmers make more holistic decisions. Advances in technologies like AI and automation give farmers the tools to push boundaries in productivity and efficiency.¹

Precision Farming

The pursuit of efficiency is the hallmark of the era ushered in by GPS technology. New farming methods and tools like variable rate applications and section control have helped farmers manage resources more effectively.¹

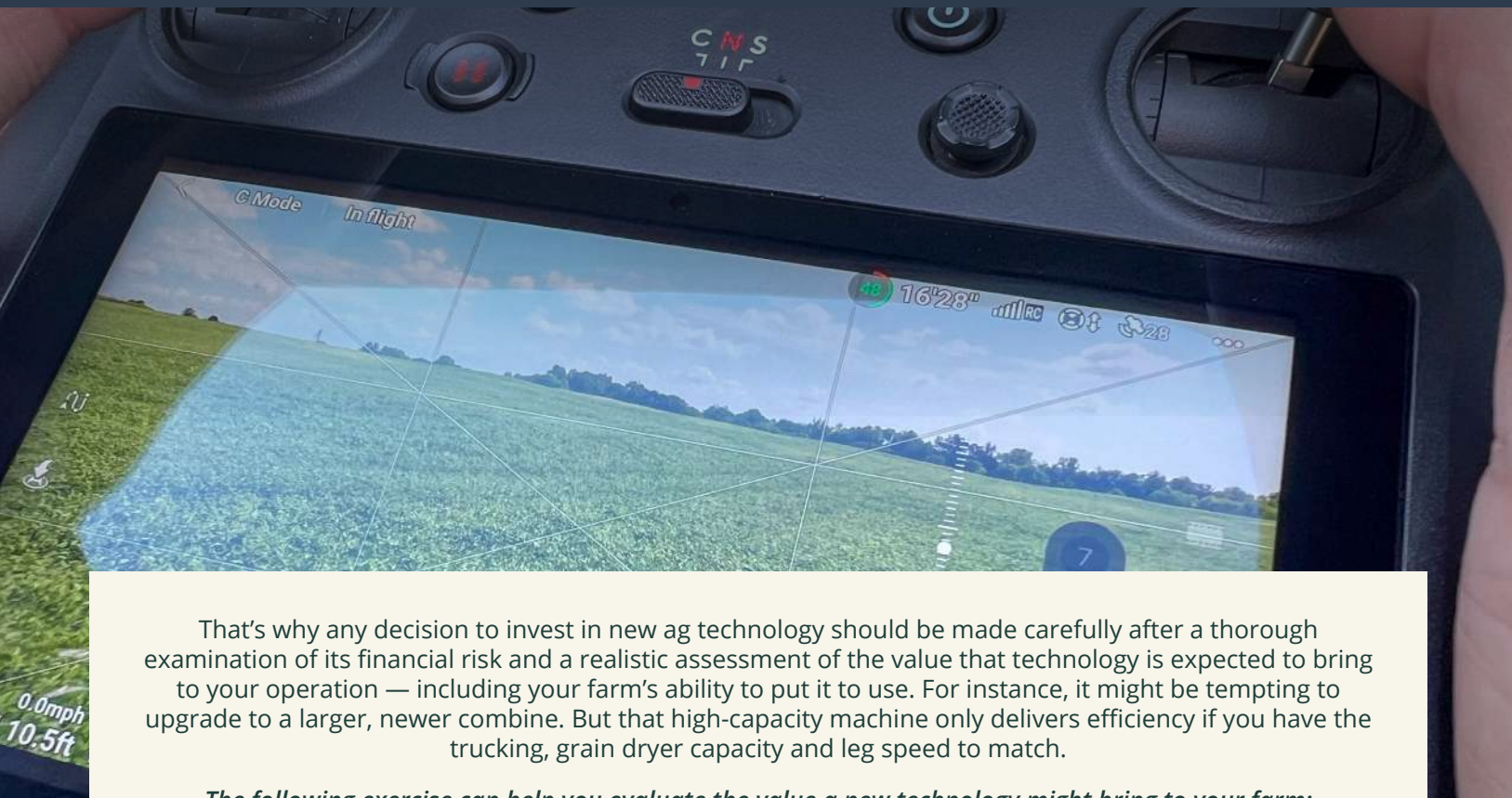


Connected Farming

Data-based decision-making defines the era made possible by automation and digital connectivity. Autonomous machines, sensor-equipped robots, drones and satellite-based technology gather troves of data. Analysis of that data drives decision-making and enhances farm management.¹

Determine Whether it's a Smart Financial Move.

New technology often comes with a substantial price tag. In 2022, U.S. farms spent \$26.9 billion in tractors and farm machinery alone.² When you spend your hard-earned dollars on technological upgrades, you want to be confident in its ability to improve your bottom line.



That's why any decision to invest in new ag technology should be made carefully after a thorough examination of its financial risk and a realistic assessment of the value that technology is expected to bring to your operation — including your farm's ability to put it to use. For instance, it might be tempting to upgrade to a larger, newer combine. But that high-capacity machine only delivers efficiency if you have the trucking, grain dryer capacity and leg speed to match.

The following exercise can help you evaluate the value a new technology might bring to your farm:

Exercise #1 Define the value of technology to your farm.

Before making an investment, ask yourself these questions to fully define how the technology will bring value to your farm.

1. What problem/challenge am I trying to solve?
2. Does this technology help solve the challenge/problem? How so?
3. What improvements to the farm operations do I want to make?
4. Can this technology help me achieve these? How so?
5. Can this technology reduce my risk? If so, in what ways?
6. What can I learn from other farmers who have adopted this technology?
7. Do I or my employees have the tech-savvy skills to install, implement and utilize the value of this technology? How so?
8. What's my investment in this technology? What return can I expect and in what time frame?
9. What other affiliated costs or investments will I also need to make to optimize the value of the technology?

Evaluate your responses and consider sharing them with your trusted advisors, gathering their thoughts before making an investment.

Is the ROI likely there for my operation?

Scott Shearer, Ph.D., professor and chair of the Department of Food, Agriculture and Biological Engineering at The Ohio State University, has watched too many farmers buy new technology based on a neighbor's success without running the numbers for their operation.

"One of the first things farmers should consider is whether they can recover the cost of that technology within a couple of years," says Shearer, who adds that amortizing the cost often requires farmers to cover quite a few acres. "If that payback period is two years, do it."

That return on investment (ROI) calculation should consider yield as well as savings on things like inputs or labor. Those factors can also improve your bottom line. Special consideration should also be given to time saved at planting, according to Shearer. High speed planting can increase a farmer's planting capacity 40% to 60%, he says. Plus, timelier seeding can add to a crop's yield potential. Given its relatively marginal cost, Shearer says that's an efficiency gain that shouldn't be overlooked.



What are the supplemental costs?

It's also important to recognize that the costs of technology adoption can go well beyond the initial purchase. In an increasingly electronics- and data-based world, that might include the cost of implementing and/or analyzing the data, software updates, subscription fees, building upgrades, related components, or maintenance and training costs, as just a few examples.

"Often, farmers will purchase a lot of the related components, but they'll miss one or two essential items," Shearer observes. Sometimes that's due to oversight. Sometimes it's an intentional cost-cutting decision. Either way, the omission can undercut your ability to take full advantage of the technology and optimize your return on investment.

When weighing bigger purchases, you should meet with a team of experts (accountant, banker, farm manager) to confirm your ROI calculations and make sure you have all your bases covered.



Technology investment worksheet

The Ohio Farm Bureau created this worksheet to help you calculate the initial investment in technology and uncover the potential recurring expenses to maintain the technology. Capturing these costs will help you make an informed decision.

Download an Excel version of this worksheet [here](#).

INITIAL INVESTMENT

Hardware	_____
Software	_____
Licensing fees <i>(if applicable)</i>	_____
Installation fees by vendor or third-party <i>(if not included in hardware/software price)</i>	_____
Training <i>(product use/installation training for you and your employees)</i>	_____
Wi-Fi upgrades <i>(if applicable)</i>	_____
Data security upgrades <i>(if applicable)</i>	_____
Total Initial Investment	_____

ANTICIPATED COST

RECURRING EXPENSES

Annual subscription fees	_____
Annual maintenance fees	_____
Annual fee for access to tech support/help desk	_____
Ongoing training <i>(product use/upgrade installation training for you and your employees)</i>	_____
Annual upgrade/update fees	_____

ANTICIPATED COST

Depreciation

Annual Recurring Expenses

(add recurring expenses and depreciation)

Useful Life of the Technology *(in years)*

Total Recurring Expenses over Life of Technology

(multiply annual recurring expenses times useful life of technology)

Budget for adoption, training and maintenance.

The efficiency and productivity gains made possible by technology are increasingly essential to “making it” in farming. A 2022 study by McKinsey & Company found 60% of North American farmers surveyed are currently using or plan to use at least one ag tech innovation in the next two years.³ That’s telling.

But those investments can be significant, especially for smaller operations or years when margins are slim to non-existent. Consider incorporating annual savings for new technology, budgeting for the upgrades your operation will inevitably need. That budget should also include contingency funds to cover unexpected costs that might come with the adoption of new technology.

Technology can also help provide a practical solution to an ongoing challenge in farming: labor shortages. Integrating a specific technology into your farm operation could reduce the need for an employee or provide an opportunity for that employee to focus on other higher value tasks. On the other hand, the adoption of ag technology and automation also ushers in the need for more skilled workers.

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Download it today.

The skills needed to adopt and use new technology to your advantage differ from those in the past because so many of these tools are data-driven, digital-centric and will require additional expertise and skills of you and your employees.

For example, variable rate seeding is one precision ag tool that can pay off in terms of yield and input savings. Recognizing that, many farmers bought into the technology. But that technology is only useful if the farmer has a data-based plan for varying seeding rates across his or her ground. You should also be realistic in assessing whether you'll take advantage of the technology you purchased.

- *Develop a business plan and budget for funding new technology.*
- *Evaluate your and your employees' technological skills.*
- *Identify training to equip your team with needed skills to implement and manage the technology or consider a reliance on consultants.*
- *Conduct regular audits of your farm's technology needs.*

Intangible benefits matter, too.

Some technology is worth adopting even if it doesn't pencil out. While it can be difficult to quantify the benefits of a yield monitor, farmers know it's a tool that shows them what worked and what didn't. Similarly, a convenience like auto steer can lessen the strain of long hours in the cab. While that may not directly improve your bottom line, you can probably think of a scenario where fatigue contributed to a costly mistake.

Intangible benefits have their place, too. They just must be balanced against the economic realities of your farming operation.



EXAMPLE SCENARIOS:

Financial Decision-making in Action.

Let's explore how that decision-making might play out for a dairy or row crop operation

The decision: Robotic milkers or parlors?

A dairy producer is considering an investment in an automated milking system (AMS), and trying to decide between robotic milker or a parlor system to capitalize on benefits like:

- *Reduced labor costs.*
- *Improved cow welfare.*
- *Improved herd performance.*
- *Increased time for cow and operational management.*
- *Enhanced management information regarding individual cow health, welfare, behavior and nutrition.*

Installing any automated milk system requires a large capital investment. Calculating a return on investment depends on your assumptions about:

- *Projected decreases in labor.*
- *Projected increases in milk production.*
- *The financial terms of the investment.*
- *Future prices of milk, feed, labor, etc.*
- *Plans for growth.*

According to the University of Minnesota, a dairy producer with a 120 to 240 milking-cow herd may find robotic milking more profitable than investing in new parlors.⁴ Whereas at a 1,500-cow dairy, robots would need to deliver a projected 4 to 5 pounds more milk per cow daily than parlors to be as profitable. The main reason for this is that robots tend to yield:

- *Higher milk production when compared to two times milking under parlors.*
- *Lower milk production when compared to three times milking under parlors.*

So, what's the best option for your operation? Whitney Davis, a dairy equipment project specialist with Finger Lakes Dairy Service, suggests that to determine the ROI for robotics, the producer needs to explore how the investment would meet or exceed the specific goals and challenges for their dairy — now and in the future.⁵ He suggests determining the following:

- *Your current results and costs.*
- *Your current labor situation and whether that can be sustained.*
- *At what cost human labor is no longer viable.*
- *The availability of quality workers.*
- *How the addition of robotics might improve your situation.*



Davis created a simple way to calculate the return on investment of robotics based only on increased milk production and possible labor reductions. Let's explore what this would mean for a 500-head dairy operation in Ohio.⁵

A. Current average milk production (cow/day) at 2x milking	_____
B. Estimated increased milk production of 15% (Line A x .15)	_____
C. Total cows milking per day	_____
D. Total milk gain per month (Line B x Line C x 30 days)	_____
E. Conservative value of milk gain \$0.15 per lb (Line D x .15)	_____
F. Paid (milking) labor savings per month (include all expenses)	_____
G. Increase in monthly revenue (Line E + Line F)*	_____

**This is the amount available for a robotic equipment investment.*

Note: Additional costs (barn construction or remodeling, infrastructure upgrades, feed or manure storage/handling, etc.) typically exist with any milking system upgrade.⁵



The decision: Upgrade an existing planter or buy new?

New technology goes beyond new equipment. You can use technology to upgrade existing equipment, increasing productivity and efficiency at a lower cost than buying new iron. For example, you may be evaluating whether to upgrade your existing planter with a performance upgrade kit or purchase a new high-speed planter. Many factors can go into this decision, including farming goals, budget, and the age and condition of your current planter.⁶

First and foremost, what are your farming goals?

Ask yourself, is how I'm planting today how I want to be planting in 10 years? Then ask yourself, will this require advanced technology and features? If yes, what technology and features will you need?

Now consider your budget.

If your budget is tight and your current planter is compatible with a performance upgrade kit, an upgrade kit might be more cost-effective. Also, keep in mind the labor required to update the planter. Do your research and know how much time and money you will need to make the upgrades. Investing in a new planter also has advantages, such as bypassing the need to reconfigure the toolbar and a warranty.

What's the condition and age of your current planter?

If your current planter is older or experiencing significant wear and tear, or if the technology you want to adopt is not compatible with your existing planter a new planter, may be a better choice. On the other hand, if the current planter has a toolbar that's in good shape and is the right configuration, then an investment in new row unit technology may be a wise choice.

Technical Support is Critical.

Technology fails. That's nothing new. What has changed is your ability to fix it. In an increasingly electronic-, satellite- and cloud-based world of farming, your ability to repair iron yourself has faded. The implications of that are twofold:

Technical support is now more important than ever.

You and/or your team may need some new skills.



Photo courtesy of
AGCO Grain & Protein

Technology rarely fails when it's convenient. Breaks, outages and software glitches typically occur in the thick of planting or harvest when everyone is trying to get a service tech on the line. Downtime is costly, which is why technical support must prominently factor into your purchase decision and your implementation plans.

"A lot of the technology being introduced comes from startups, which are the least prepared for technical support," Shearer says. Limited staff, a focus on product development and more standard work hours means the support side of their business may not meet your needs. Online options may be available, but you'll compete with others for attention.



Photo courtesy of
AGCO Grain & Protein

Vet new tech providers for their customer service capabilities.

"If technical support isn't available locally or by phone, you have to ask yourself whether you really want to invest in that technology," Shearer says. When vetting the service element of a new technology provider, ask yourself the following:

- 1. Do they provide clear and comprehensive contracts or service agreements? These documents should outline the terms of liability, responsibilities, and dispute resolution mechanisms in case of technology-related failures. You'll want 24/7 support.**
- 2. Are there adequate training resources online for my team to learn how to use and maintain some of the technology?**
- 3. Is there a local dealer/support person I can trust and rely on? If not, do they have the ability to remotely diagnose and troubleshoot issues?**

A good relationship with a local dealer/support person is critical to getting you back and running. Make sure you're using vendors with a strong track record for reliable support. Do research and ask peers about who provides accessible customer service, prompt response times and a robust knowledge base. Prioritize vendors with around-the-clock technical support, especially during peak farming seasons. Finally, don't underestimate the importance of location.

A well-trained team limits downtime.

Evaluate your ability to manage and troubleshoot new technology. Do the same for your staff. Identify those team members who are comfortable with technology and best able to troubleshoot. Designate a point person who can provide initial troubleshooting and assistance to colleagues before contacting the vendor. Above all, ensure multiple employees are versed in each piece of technology.

If no one on staff has those technical skills, pursue training for your team and/or look into whether you could hire out that work. Having someone at your disposal who is comfortable with technology and statistical analysis will be increasingly important to your farm's success.

It's also important to recognize that just because you can handle something yourself doesn't mean you should. There are times when bringing in an expert is more efficient. There are also scenarios when trying to fix something yourself can void a warranty. Make sure you're reading all the paperwork, and consult your dealer if you're ever in doubt about what's off-limits.

What is your plan B, C and D?

Contingency planning takes the guesswork out of solving on-farm issues. Your farm's technology plan should include access to contacts for equipment backups when yours stops working. This might include keeping your less advanced equipment ready to run, if needed, and maintaining strong relationships with other farmers who can help in times of crisis.

Your plan should allocate time for regular maintenance, updates and check-ins from your vendors to ensure everything is ready to work. Be thorough with off-season maintenance and be sure to give yourself plenty of time.

Don't underestimate the value of being prepared.

Does this innovation have staying power?

After investing in a new piece of equipment or technology, the last thing you want is to find out the business has gone out of business, been acquired or quickly rendered obsolete. But these are very much the reality of a rapidly evolving tech space, with artificial intelligence fueling the flame.

What's a farmer to do? We suggest:

- *Thoroughly researching the technology provider and the technology itself.*
- *Comparing it with competitors.*
- *Talking to other farmers.*
- *Identifying who is financially backing the company and their approach to funding. (Are they short- or long-term investors?)*

If the technology provider is acquired, don't panic. Being scooped up by a company with deeper resources can confirm the promise of the technology and signal more improvements to come.

Whatever changes come, make sure to stay abreast of what's happening and how it might impact your operation. Consider an exit strategy for your farm and your data, and make sure you're ready to execute Plan B, C or D.



Photo courtesy of the National Pork Board, Des Moines, Iowa

Consider Your Liability.

Technology like autosteer, robotics or automation can come with questions about who's liable if something goes wrong. A lack of coverage can leave you exposed to both financial and reputational damage. That's why liability should be considered BEFORE adopting any new technology.



Traditional insurance policies may not adequately address the unique risks associated with the adoption of emerging technologies. What's more, insurers may be cautious underwriting policies for technologies without a proven track record and many uncertainties regarding potential risks and liabilities.

"Having a strong understanding of how the technology works, piloting it on their own ground (if possible), and implementing sound risk management protocols would all be areas to focus on to help mitigate the risk of any third-party damage that could occur," says Peter LaMair, director of CL Product (Farm) at Nationwide.

Having those conversations with your insurance agent will be key to protecting your farm and peace of mind as you adopt new technologies.

Technology Also Helps Mitigate Risk.

Aside from enhanced productivity, efficiency and potential labor savings, the adoption of new technology can also help you manage and mitigate potential risks in your farming operation. The technologies listed below can help you stay on the leading edge to maintain a safe and successful farm operation.



Fleet Telematics

Telematics and fleet management tools like Razor Tracking provide real-time location data and facilitate informed decisions for trucks and machinery on what's next in the field or on the road. The data is then relayed to a mobile app or desktop browser, helping the user make informed decisions, minimize risk and improve driver behavior, all while cutting operation costs.



HAYTECH

HAYTECH has designed a probe that can be placed inside hay bales to wirelessly monitor and record temperatures inside bales, helping to prevent hay fires. The platform can tell the operator the status of his or her haystack and alert them to any temperature changes that might indicate a developing problem.

ShockAvoid

ShockAvoid uses sensor to help alert an operator — like in a sprayer — when he or she is getting too close to a power line, helping to mitigate the risk of electrocution if the boom makes contact with a power line. A set of LED lights shows proximity to and direction from electrical power sources so the operator can steer clear.

Learn more about these risk mitigation technologies and others by visiting the Nationwide [Ag Insight Center](#).



Make Sure Your Valuable Farm Data Is Secure.

A data breach or data misuse is a very real risk when you bring new technology to your farm. Before doing so, consider whether the benefits of sharing data outweigh the drawbacks. You must also do all that you can to confirm your data will be protected on their platform.

Ask potential vendors these questions to ensure your data will be secure.⁷

Value: What benefits do I receive from the data that is collected?

Ownership: Who owns my data once it is compiled?

Control: Can I control access to my data and how it is used? If so, how? (And if not, why not?)

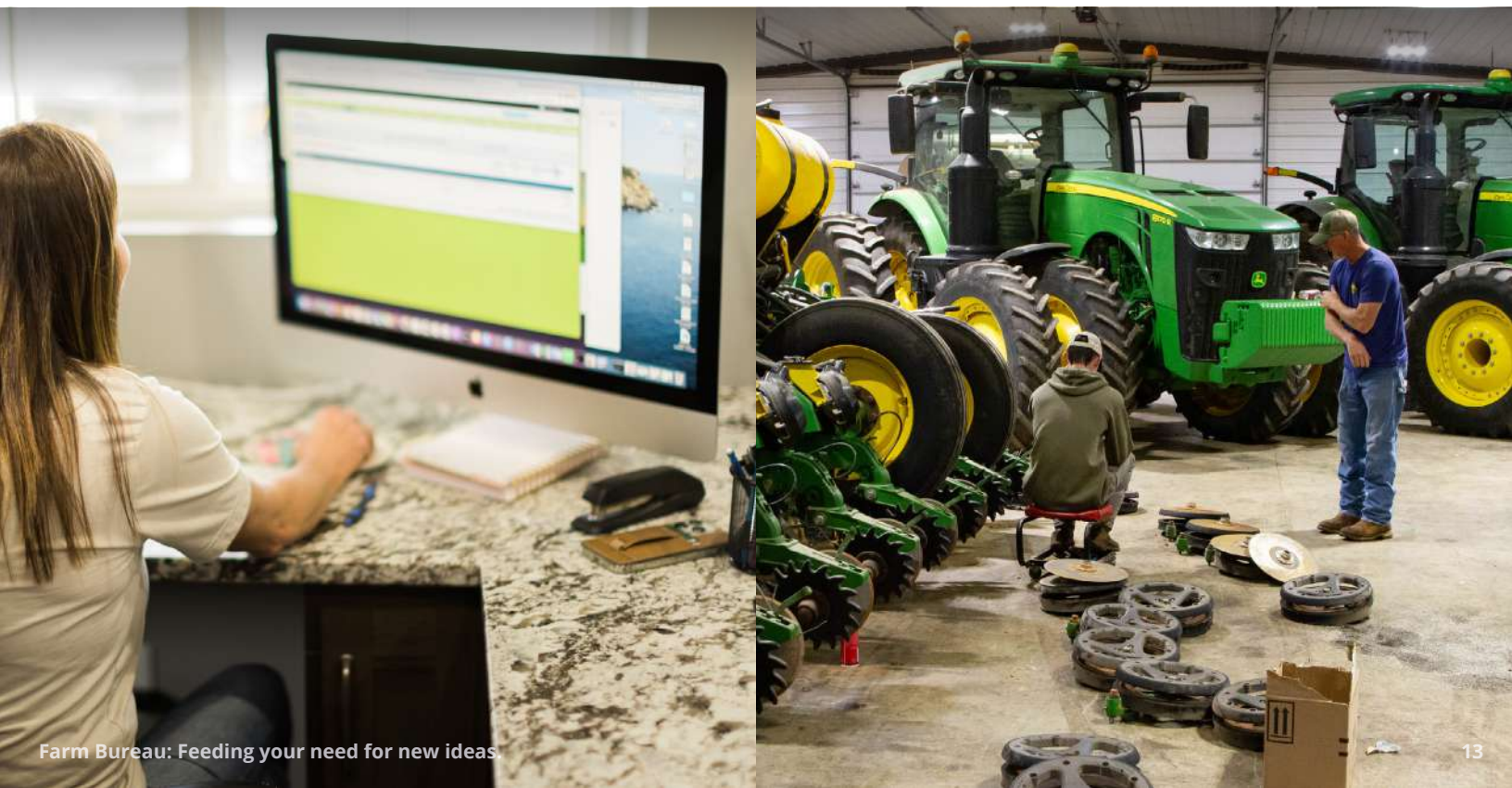
Third-party sharing: Is my data shared with or sold to third parties? If so, where and why?

Stewardship: Who has access to my data? How is it being protected from inappropriate use?

You can also take steps to maintain a high level of cybersecurity on your farm, such as⁸:

- *Performing recommended software updates.*
- *Installing antivirus protection on computers, tablets, phones, etc.*
- *Changing account passwords frequently. (Tip: Use a password manager.)*
- *Checking applications and platform security settings regularly.*
- *Making sure any data storage platform has adequate security protocols.*
- *Using a server or storage device with adequate firewalls.*
- *Addressing cybersecurity regularly with your team, making sure everyone understands and follows protocols.*

You can also consult with a trusted Nationwide Farm Certified Agent to make sure your farm is covered should any cybertheft or data breach occur. Cyberliability coverage is available via Nationwide.



Invest Wisely.

Before adopting technology, Shearer advises farmers to do five things:

1

Assess whether your farm has the skill level needed to adopt and make new technologies work.

2

Talk to farmers who have adopted the technology.

3

Put together a set of protocols laying out what you'd do to adopt the technology.

4

Crunch the numbers, and make sure those numbers are realistic.

5

Ask yourself what happens if no value is returned.

The technology vetting process isn't easy work, but it's work that strengthens the odds that any new technology you adopt will add real value to your farm operation.

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