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COVER STORY

What’s Your Next Move?
Uncertainty on several fronts currently clouds the capability to map out the right moves for agricultural success. The solution lies in becoming informed and ready to respond.

Race for Relevancy
In a fast-changing marketplace, ISA is taking a leadership position to shape the future of the soybean industry. The plan? Stay ahead of the relevancy curve.

The Dehydrated Elephant in the Room
Aside from air, water is the most important resource for the survival of every species. And the time has long passed for confronting the water crisis and modifying behaviors for its wise use.

The Virtual Public Ledger
Agriculture is one of the least digitized industries. Yet customers want more traceability and transparency. How does blockchain step in to meet the need?

VHS or Beta?
Choosing the wrong technology can waste time and money. As technology accelerates, experts have tips for producers choosing the right solutions for the long haul.

GETTING TO KNOW

Orlando Saez
As co-founder and CEO of Aker Technologies, Inc., Saez helps advance crop diagnostics with practical technology tools and services to improve the profitability and sustainability of farms.
Time to Reevaluate the “Game Theory”

With rearrangement and removal of trade agreements, ongoing tariff disputes with multiple trading partners, and the push for more changes to environmental regulations, global uncertainty is the name of the game for local producers and their associates. The business future is unclear.

So how must agriculture respond? Barry Flinchbaugh, Kansas State University professor emeritus and nationally renowned ag policy expert, quips, “There is so much uncertainty that to make a business plan with long-term decisions, you may as well go to Vegas for better odds.”

The Illinois Soybean Association (ISA) board of directors is addressing this uncertainty with its sights on 2030 — considering what “game pieces” we need for our chess board, so to speak. We are actively seeking out and connecting with innovative thought leaders who are willing to discuss relevant global issues so that we might make the best possible moves in response.

For example, Illinois Soybean Growers is pushing for a reasonable resolution to the tariff battle between the U.S. and China. Our top customer buys about 25 percent of Illinois soybeans each year worth $1.75 billion. We want trade solutions that do not compromise market access.

Likewise, we are monitoring action by the Environmental Protection Agency (EPA). Removal of some regulations helps reduce our production costs. Others, including proposed biofuels volumes under the Renewable Fuel Standard (RFS), may help increase demand but only if unwarranted waivers of RFS volumes EPA recently granted to some petroleum refiners are negated.

In this issue of Illinois Field & Bean, we will explore some of the big picture issues we have identified as critical to a profitable future. And while finding answers as soon as we can is paramount, we also must proceed with the strategic thinking that is behind a competitive chess match. Frank Partnoy, author of Wait, The Art and Science of Delay, says “Our most important policy decisions about the economy, jobs, health care, defense, the environment and foreign relations, require smart people spend long periods of time thinking strategically.”

I encourage you to spend some time critically reading the articles here and giving some timely thought into how these issues affect not only the world, but your farm or business. What are some changes we can implement, with the help of innovative thought leaders, to maintain our position as the most knowledgeable and profitable soybean producers in the world?

“We are actively seeking out and connecting with innovative thought leaders who are willing to discuss relevant global issues so that we might make the best possible moves in response.”

LYNN ROHRSCEIB | ISA Chairwoman
Agriculture on Cusp of Great Economic Breakthrough

> BY J.M. “JIM” SCHULTZ

As a child, my mother encouraged me to memorize these iconic words of Robert Frost. To her it embodied our responsibility to give back, our duty to provide. For me, it has remained both a lasting memory and a guiding way in my Midwestern lifestyle.

These words are symbolic of today’s rural America, providing a reflection of the past and a vision of our responsibility to the future; symbolizing the changing landscape of farmland ownership and pervasive concern over the lack of job opportunities where we raise our families.

Deepening global trade challenges, depressed commodity prices and rapidly changing job skill requirements are undeniable issues and present an overwhelmingly bleak outlook for rural America. These problems aren’t simply affecting farmers, but also communities they call home. Federal jobs data show more than 66 percent of rural counties have fewer jobs than in 2007.

As we approach a crossroads, I see three reasons how this is about to change positively.

First, at Open Prairie, we advocate what we call “Rule 70-32.” This thesis is in full play globally and will be the case for the next one to two decades. Experts predict the world population will increase by more than two billion to just shy of 10 billion people in the next 32 years which will require a 70 percent annual increase above today’s grain and protein production levels.

Further, technology changes will account for 70 percent of the increases in production. Finally, these increases will occur on 1/32nd of the world land mass — a 35 percent reduction from today’s levels of land used to produce our food. The beneficiaries of this robust production growth will be countries with fertile farmland, solid transportation infrastructure and friendly government systems... a la America and, more specifically, the American Midwest.

Another contributing factor to prosperity ahead is investment in broadband infrastructure which will create incredible expansion in rural America. Experts predict that connected agricultural devices will experience a compound annual growth rate of 20 percent over the next few years — from 12 million devices today to more than 225 million by 2024.

This leads to the third reason to be bullish on rural America. Entrepreneurship is burgeoning, presenting an opportunity to leverage the dynamics of global food demands with technology to encourage the next generation to stay or to return to their rural America roots.

**HOW DO WE CAPTURE THIS GROWING OPPORTUNITY?**

1. Entrepreneurship in conjunction with mentoring opportunities at elementary and high school levels should be encouraged and supported by farmers.

2. Reskilling of workforce through active collaboration by farmers with community colleges will provide 21st century job opportunities for rural Americans.

3. Open collaboration in the global education of the needs and capabilities of worldwide food systems should be promoted.

4. Expansion of equity capital programs like the USDA Rural Business Investment Company (RBIC) program will bring much needed capital to rural businesses.

As Robert Frost’s poem concludes, we have promises to keep. Rural America is on the cusp of a great economic breakthrough. It is our responsibility to act upon this once-in-a-lifetime opportunity. As we march toward the future, we do, indeed, have miles to go before “we” sleep.
Strong chess players know they can’t just figure out their next move on the fly. They have to look at several possible moves with different pieces on the board to determine which might increase their chance of winning. Such forward-thinking strategy may win the match.

The same philosophy can be applied to the global outlook for agriculture. Uncertainty on a broad range of issues is clouding the capability to confidently map out exactly the right moves. But the solution, say several industry prognosticators, is to become informed and ready to respond.

The Purdue University Ag Economy Barometer Index confirms this uncertainty. The index is based on a nationwide survey of 400 U.S. producers each month. When asked to look ahead five years, the percentage of producers expecting good times declined from 51 percent in May to 45 percent in June. Those expecting bad times fell from 38 percent in May to 31 percent in June.

Index coordinators conclude these results reveal the biggest shift was away from answering good or bad to responding neutral, suggesting a rise in uncertainty about the U.S. agriculture outlook.

Multiple factors are at play amid this uncertainty. Brook Cunningham, managing director for Lazard’s Global Agribusiness and Nutrition practice, points to new input and on-farm technologies that continue to increase global crop supplies, fewer periods of major supply disruption and more fluid information flow as ceiling forces for crop prices. She also cites the likelihood of further industry consolidation across the agribusiness value chain via global mergers and acquisitions, all with the objective of creating bigger, more global and lower cost companies that are better able to serve producers, customers and shareholders.

GLOBAL TRADE SHIFT
Perhaps the most dominant factor affecting agriculture is world trade. Outside American borders, Bill Lapp, president, Advanced Economic Solutions, warns trade uncertainty causes exporters to think twice about sending ships across the ocean in case there is no market when they arrive.

“Remember in 1972, President Nixon canceled U.S. soybean sales to Japan, and Brazil rose to become a major world player. We could see a new soybean producer come into the marketplace if trade uncertainty persists. Or we may see a ‘Ukraine’ produce more canola,” he says. “Buyers may build up soybean inventories at lower prices and shift global consumption patterns.”

Darci Vetter, general manager for public affairs and vice chair for agriculture, food and trade at Edelman, says a trade war influences more than current goods and flows movement. She believes ripple effects of trade disputes will only be amplified — input costs will rise and other countries may retaliate against soybeans, meat and seafood. She also predicts tariffs will drive investment in Brazil...
and Argentina agriculture, as U.S. producers put expansion and investment on hold.

She also notes new trade agreements are “going gangbusters” everywhere else. The European Union is making serious inroads that will put the U.S. at a competitive disadvantage.

Barry Flinchbaugh, Kansas State University renowned ag policy expert, agrees lost markets in China, Canada, Mexico and Europe will be bad news. He predicts if other buyers step up to take advantage of lower prices, it will not be an even tradeoff.

“It will get even worse if the president pulls the plug on NAFTA,” says Flinchbaugh. “The president does not want to compromise and use multi-lateral agreements. Farmers will suffer, as bilateral agreements historically do not give farmers a good shake. The policy is not going to work and repercussions will be serious. We will lose some farmers along the way and consumers will have to pay up. No one ever wins in a trade war, although I don’t believe this will last.”

China will remain the big gorilla in the demand equation. “To put the importance of China in perspective, they import in one month equal to 54 percent of the Illinois soybean crop on some 160 ships. Their demand is unrelenting and their livestock production sophistication and protein consumption means they have to be in the market every day to get all they need,” says Lapp.

LOCAL NEXT MOVE CONSIDERATIONS

So how can Illinois soybean producers adjust and prepare for the future? Rob Dongoski, partner, agribusiness, Ernst & Young, believes producer needs are shifting. Profit and risk will drive the future, as insurance companies see opportunities, for example, and bankers rethink their models.

“We will have to put more money in farmers’ pockets by making them more profitable through advancements in innovation and technology. That is not negotiable,” he says.

Technology adoption is critical to advancing producers. Cunningham says the digitization of agriculture is racing to catch up with other industries with massive investments by strategic and financial investors across a wide range of technologies.

“We are reaching an inflection point in ag tech adoption. Farmers willing to try new technologies are at the point where we were on smartphone adoption 10 years ago. Lack of integration between company products to form easily usable solutions, as well as insufficient proof of the value thesis for growers has slowed adoption in many instances. But we are seeing meaningful progress. It is a matter of ‘when’ instead of ‘if’ we will reach critical mass,” she says.

Don Bierman, CEO of Crop IMS, who also serves on the Agricultural Data Coalition board, sees both good and bad coming from technology’s data collection and use.

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Rob Dongoski
partner, agribusiness, Ernst & Young
RACE FOR RELEVANCY

Agriculture is changing fast. ISA will meet producers’ future needs with forward focus.

> BY RACHEL PEABODY

It’s believed that a good association provides members with what they need for today, but a great association gives members the tools they need for tomorrow. The Illinois Soybean Association (ISA) believes the same.

“The marketplace is changing so fast, and we need to ensure that our relevancy to soybean producers is ahead of the next issue, or even the next opportunity,” says CEO Craig Ratajczyk.

While the quest for an association to innovate and transform is certainly not a new concept, it is a challenging one. Ratajczyk notes moving forward rarely appeals to those who like to play it safe. Looking to the horizon means embracing monumental changes about to occur in the industry.

“It means positioning our producers in a world that demands more production on fewer acres using more advanced technology. It’s about pushing boundaries and bringing new partners to the table in an industry chock full of new policies, changing trade environments and retiring industry leaders. It’s knowing what to keep but being strategic enough to know what should change. “We’re creating that vision that will inspire our producers to be the global leaders now and in 2030,” he says. “Agriculture’s theme of the next decade is evolution and ISA will be a stalwart in that journey.”

ISA AS A THOUGHT LEADER

One way ISA plans to engage going forward is by taking a leadership position with those issues that will ultimately shape the future of the soybean industry.

“Whether the conversation be around policy, new market opportunities or water resources, we are positioning ISA to not just follow what the rest of the industry is doing, but rather taking control of those available opportunities and challenging the constraints,” says Ratajczyk. “We want to help influence the influencers and be part of the transformations taking place.”

A bold approach? Perhaps. But Ratajczyk stresses to stay relevant, ISA sees the shift as imperative to remaining relevant with issues that will impact soybean producers going forward.

“As we pivot to the future, you will see ISA challenging people to think differently and looking at topics outside the well-worn path of traditional agriculture,” says Lynn Rohrscheib, ISA chairwoman and soybean producer from Fairmount, Illinois. “We will explore topics we hope will encourage producers to think outside of the box about how they might enhance their plans to produce soybeans more profitably and sustainably.”

ISA AS MATCHMAKER

Ratajczyk sees ag technology playing a crucial role in ISA’s future.

“The U.S. is behind the curve when it comes to technology adoption. We can help by focusing on increasing the adoption rate by producers,” he says.

ISA will initiate new partnerships with venture capitalists and non-traditional ag investors focused on farm innovations like smart farming platforms and autonomous equipment. And Ratajczyk sees optimism on many other fronts, including exploring new maritime markets for biodiesel, mapping out the infrastructure of 2030 to better solve transportation challenges, and re-engaging in global protein conversations to get soybeans back in the center of discussions.

“ISA is prepared to evolve and adapt and is positioning Illinois soybean producers to be more knowledgeable, profitable and business-minded operators than ever before,” he says. ■
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We drink it. We bathe in it. We secure it in tiny rubber sacks and wage aquatic war on backyard battlefields. We grow our food with it. Aside from the air we breathe, water is the single most important resource for the survival of every species. Life literally depends on it. Why, then, do so many seem to take water for granted? Do they see vast oceans and ceaseless waterfalls and presume they are limitless? Does water have a ubiquitous presence that people don’t wonder how much is left? Or do people understand how precious water is but are so dependent on it that a change in behavior would impact their standard of living?

Regardless of the origin of this subconscious apathy toward the future of water, the time may have long passed to confront the issue, change perceptions and modify behaviors in how we use this resource—particularly in agriculture, which accounts for 69 percent of the world’s freshwater withdrawals, according to United Nations (UN) Food and Agriculture Organization.

First, we must understand the extent of the issue. The world’s supply of fresh water, despite its apparent infiniteness, is smaller than most people think. While it’s true 71 percent of the Earth’s surface is covered with water, only 2.5 percent is fresh. And only one percent of that 2.5 percent is accessible for human use. Imagine all the Earth’s water contained in 100, one-gallon jugs, filled to the top. Less than a half cup would represent the fresh, usable water.

According to the World Health Organization (WHO), 783 million people do not have access to clean, safe water. Water limitations perpetuate cycles of poverty in these areas, as poor health and the inability to grow food beget poorer health and even less food. In fact, these cycles prompted the UN to declare 2018 to 2028 the Water Action Decade, which includes accelerated efforts towards meeting water-related challenges like limited access to safe water and sanitation, increasing pressure on water resources, and a heightened risk of droughts and floods.

As the world population continues its rise, the situation will become dire. WHO estimates 9.7 billion people will inhabit the earth by 2050; a 27 percent increase over today. By that same year, UN Secretary-General António Guterres predicts, “At least one in four people will live in a country where the lack of fresh water will be chronic or recurrent.”

GLASS HALF EMPTY

Then there’s climate change, the trigger phrase that’s gone from standard meteorological terminology to partisan politics headliner. Whether or not climate change is caused by human influence is irrelevant for this conversation. It remains an irrefutable fact supported by empirical scientific data that the climate is changing. And these changes affect the water supply.

“Climate change is drastically changing global patterns of freshwater availability,” says Jay Famiglietti, director of the Global Institute for Water Security and former senior water scientist at NASA. “In the United States, we see a very clear, west-east dividing line, above which the northern states are getting wetter and southern states are getting drier. Classes of water ‘haves’ and ‘have-nots’ are becoming far more apparent.”

Famiglietti and other climate change observers point to extreme global fluctuations between flooding and drought that could affect the ability to harness the resource.

“Changing extremes pose an incredible challenge for water managers, since capturing more intense bursts of runoff and streamflow is quite difficult. It is not something that our present infrastructure in much of the United States was designed to accommodate,” says Famiglietti.
Of course, no one has a more acute awareness of this impact than farmers. Gregg Halverson, CEO of North Dakota-based Black Gold Farms, says, “We have seen the production areas for more water-sensitive crops shifting, moving from water-sensitive areas to more water-plentiful regions.”

Factors such as pollution and contamination also threaten the future of available water. In some densely populated regions of Asia and areas with less developed environmental regulations, foreign pollutants and toxins render waterways completely unusable and rife with disease.

**GLASS HALF FULL**

Given these circumstances and a somewhat bleak outlook, the most immediate concern is whether or not there is hope of sustaining freshwater for our children’s children.

Famiglietti believes there is, and agriculture has a key role to play. “We can effect change, a little bit at a time, if we work together. It takes increased awareness, ownership of the problem at the grassroots level, and accountability from elected officials and in particular, the food industry, the biggest global user of water,” he says.

As with most issues facing a hyper-digital world, answers may lie in technology. Halverson notes technology is changing irrigation practices. “Channel and flood irrigation is giving way to center-pivot irrigation to use less water,” he says. “Plus, the new irrigation systems allow for variable irrigation and only put water on the areas of the field where it is needed.”

Illinois farmers already are implementing best management practices to protect the downstream water supply. On many acres, cover crops prevent runoff and help soil improve its nutrient and water-storing abilities. No-till and reduced tillage practices improve soil health for better water usage. Bioreactors, buffer strips and water control structures are joining the scene.

All of these practices depend on even more widespread adoption to have a meaningful impact. Some require new machinery or additional costs which may not be feasible in down markets. But agriculture has an opportunity to be at the forefront of positive change, setting an example for other industries that changing one or two habits can have a tangible effect on water’s future.

Of course, the freshwater crisis extends much further than agriculture. Think about golf courses, construction sites and homes with lush, green lawns. Consumers may be the key as they...
gain awareness of water issues and become more curious about where and how their food is produced.

“Our customers, be they the chip companies or the French fry companies, are wanting more information about how their potatoes are grown, how much water we use per crop acre and making sure it’s at a sustainable, efficient level,” Halverson says.

For Famiglietti, the future depends on collaboration across government, industry and individuals.

“I believe we need new, regional institutions that bring governments, non-profits, industry, philanthropy and academics together,” he says. “I see these new institutions as an important step towards moving the needle on global water security.”

The unfortunate reality is there is no undiscovered reservoir. No one is going to stumble upon magical new sources of water. Although personal experience may dilute our thinking, freshwater is finite, and we’re slurping through it at an alarming rate.

What the world does next will determine how long it lasts. Experts like Famiglietti and Halverson agree 2050 doesn’t have to be an unmitigated disaster. With agriculture leading the way through technology and recommitment, society can rewrite water’s future. ■

While it’s true 71% of the Earth’s surface is covered with water, only 2.5% is fresh. And only 1% of that 2.5% is accessible for human use.
From the first sale of U.S. soy to China to the release of the first soybean oil-based tire, the soy checkoff has been behind the scenes, growing new opportunities and customers for the soybeans you produce. We’re looking inside the bean, beyond the bushel and around the world to keep preference for U.S. soy strong. And for U.S. soybean farmers like you, the impact is invaluable.

See more ways the soy checkoff brings value to farmers at unitedsoybean.org
“People hear blockchain and assume cryptocurrency, and it turns them off,” says Jason Tatge, co-founder and CEO of Farmobile, which created a blockchain-powered farm data store. But many experts agree blockchain provides unlimited potential, including for agriculture. The “virtual public ledger” offers opportunities for commodity trading — as already proven in cotton and peanuts — as well as supply chain verification, guaranteed transactions and more.

**BLOCKCHAIN IS NOT BITCOIN**

Blockchain Revolution authors describe blockchain as “an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value.” But what exactly does that mean?

Blockchain is about verified transactions, whether records, contracts, data or money.

“Bitcoin is the first application of blockchain technology. It just happens to be currency,” says Mark Pryor, CEO of The Seam which created the first online, neutral trading cotton exchange.

The appeal is blockchain’s inherent security. It is built on impenetrable encryption, multi-level cryptography that creates a series of chronological, networked data blocks which comprise a virtual public ledger. Created under the pseudonym Satoshi Nakamoto, its complexity can be intimidating. But the reality is, while users may not understand how the internet or cars work, people still use them. Pryor says everyone needs to think about blockchain the same way.

**AGRICULTURE’S OPPORTUNITY**

Agriculture presents particular challenges for blockchain because of industry paper reliance. “We’re one of the least digitized industries. We have very paper-based processes,” Pryor says.

But agriculture’s players want more. Driven by food safety, companies are asking for greater traceability and transparency and demanding information that can be trusted implicitly. For example, suppliers who want soybeans with special attributes, and are willing to pay a premium for them, will increasingly demand independent verification.

“That’s where blockchain comes in,” says Pryor. “Farmers can provide proof and make it visible, convey their practices and command a premium for what they’re doing.”

Tatge envisions a world where farmers market data like commodities with blockchain. “Farmers could license their data as a revenue stream,” he explains. “Turn it into a monetizable asset.”

The beauty of data, he adds, is that a new crop is created every year. Farmers can sell it three or four times, record who bought it and have complete transparency. New data is valuable, even to people who already bought data. “It’s an infinite commodity,” he says.

In addition, blockchain provides opportunities through guaranteed transactions and smart contracts where a set of rules is programmed as a contract placed on blockchain.

“A farmer could deliver a high-oleic soybean as confirmed by a grader, with a simultaneous exchange of ownership or for currency when certain provable conditions are met,” Pryor says. “They’re doing it in Australia, delivering electronic ownership and getting grain farmers paid.”

Blockchain’s transparency is part of what makes it so secure. “You have the traceability from origin on,” says Pryor. “Companies like Levi Strauss have an interest in looking back down the supply chain, because they have a responsibility to the consumer.”

Blockchain gives them that. “Blockchain is one way you develop a sense and confidence that you have a trail and know for what purposes your data is being used,” says Tatge.

Success with blockchain will take the cooperation and collaboration of the entire industry, says Pryor, from software providers to processors to farmers. He’s seen its success in cotton, where many organizations came together and united the supply chain.

“We see blockchain as a shared source of truth,” he says. “It’s an actual, distributed, decentralized platform. It allows multiple partners to connect through this digital fabric.”

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**THE VIRTUAL PUBLIC LEDGER**

**Experts Eye Blockchain Applications in Agriculture**

> BY JOLI A. HOHENSTEIN

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**TRANSACTION REQUESTED**

1. The requested transaction is broadcast to a P2P (peer-to-peer) network consisting of computers, known as nodes. The network of nodes validates the transaction and the user’s status using known algorithms.

**VALIDATION**

A verified transaction can involve cryptocurrency, contracts, records or other information.

**BLOCKS**

Once verified, the transaction is combined with other transactions to create a new block of data for the ledger. The new block is then added to the existing blockchain, in a way that is permanent and unalterable.

---

**TRANSACTION COMPLETE**

#1

#2

#3

#4
It pays to have the right connections.

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Want to make more profit off your soybeans? Have your people connect with our people! SoybeanPremiums.org makes it easy for soybean growers to find premium programs and buyers. So take a look at the latest program opportunities in your area—food-grade, identity-preserved, non-GMO and watch your profits grow.
“Technology can help manage risk, increase profits and reduce the time and effort needed to be successful. But it’s important to know what answers and solutions you seek.”

ROB DONGOSKI 
agribusiness leader with multinational professional services firm Ernst & Young

“Technology can help manage risk, increase profits and reduce the time and effort needed to be successful. But it’s important to know what answers and solutions you seek.”

JONAH KOLB
vice president with Moore & Warner Ag Group in Clinton, Ill.

“Ag tech is not a one-size-fits-all solution, and it’s important to know what answers and solutions you’re looking for,” says Kolb. “Most of these technologies are not yet fully developed, so when you choose to explore a technology solution, you should be prepared to take an active role in helping make it work the best for your operation.”

UNDERSTAND YOUR RISK LEVEL

When considering any change, it is important to understand your appetite for risk. Are you comfortable investing time and/or money just to learn? Or are you trying to address a specific problem where a new technology may offer a solution?

“There’s no question that technologies such as artificial intelligence and advanced analytics offer a ton of promise for farmers. It’s early, but these tools are here to stay, and the technologies are maturing rapidly and becoming closer to reality for more farmers.”

ROB DONGOSKI

TRY BEFORE YOU BUY

Many emerging companies look for farmers who are willing to try out new technologies to ground-truth and refine solutions. “Having more farmer perspectives will help us make better bets on the right tools and technologies,” says Leclerc. “And having this involvement early on helps remove risk for everyone, from start-ups, to investors, to the farmers themselves.”

Kolb suggests interested-yet-apprehensive farmers start with free versions offered by many companies. “Free accounts help generate additional data, and those help build better answers and solutions for the system and for your operation. But to get the best results, farmers should commit to actually using and understanding a tool. There is a difference between genuine learning and just ‘poking around,’” he says.

FIND YOUR FIT

“The promise of technology is it will help reduce risk, increase profits and reduce efforts, making farming easier and more profitable and making operations more resilient over time. Overall, consider options that work together to meet your operation’s needs,” says Dongoski.

AVOID SHINY TOYS

As farmers evaluate choices, they should avoid being sucked in by the “wow” factor of a shiny new toy, according to Dongoski. Focus on the outcomes. Will new technology increase or decrease your risk, your profit or your effort?
“Today, ag tech is less about a solution and more about the promise of a solution tomorrow. We really start to think about the farmer and farms of 2020 or 2030 and then work backwards to identify the tools and resources that will enable those future visions.”

ROB LECLERC
CEO and co-founder of AgFunder, a Silicon-Valley-based venture capital firm specializing in ag tech companies

LISTEN TO EXPERTS

Personal relationships still drive most ag purchase decisions. And while farmers should rely on trusted local advisors as they have in the past, those looking at the tech space should increase their technical literacy and pay attention to trends both inside and outside of agriculture as well.

“At AgFunder, we analyze hundreds of companies every month,” says Leclerc. “We use Artificial Intelligence systems to help analyze a company or product and their competitors. It can be very costly and time-consuming to choose the wrong answer, so our vetting system can help identify the winners.”

IMAGINE THE POSSIBILITIES

Ag technology can offer many benefits, especially related to automation that leads to labor savings and to smarter decisions that can increase crop yields or profitability. Eventually, Leclerc sees autonomous systems that will help manage the farm operation.

“Today’s tools help with scouting, for instance, but tomorrow’s solutions will evolve to include more management and decision support tools. Where we might use drones now to capture images and to help identify issues, tomorrow’s solutions should offer ‘push notifications’ that alert growers to issues that should be addressed.”

Longer term, Leclerc and others see automation further streamlining operations and increasing efficiency. Autonomous grain carts, for instance, will know the combine is getting full and move themselves into the right location for loading, which could be a huge timesaver for farmers.

BIG MONEY ACCELERATES GROWTH

Outside investors, including hedge funds, private equity investors and venture capitalists (VC), are flooding the global ag tech marketplace, helping propel technologies forward more quickly.

In 2017, one major VC firm, AgFunder, helped ag tech startups raise $10.1 billion, a 29 percent year-over-year increase. Those funds went to 994 different companies. The funding came from more than 1,400 unique investors, with the largest single deal valued at a full billion dollars.

Notable AgFunder clients include software management company, Granular, which was acquired last year by DowDuPont for $300 million, and ag robotics company, Blue River Technologies, which was snatched up by John Deere for $305 million.

DON’T WAIT

While most experts agree that ag tech is still in its infancy, there are risks associated with not being on the bandwagon. “If you wait too long to adopt new approaches, including technology, it may be hard to catch up as systems, platforms and solutions evolve,” Kolb says.
HOW HAS TECHNOLOGY TRANSFORMED THE AGRICULTURE INDUSTRY?

We know that our industry needs to do more with less, and the only way we can create additional margin and profitability for farms and managing resources is to rely on technology. We also need to continue to get more yield out of acres we have, and technology is key to that as well.

HOW IMPORTANT IS PRECISION FARMING TO TODAY’S PRODUCERS?

It’s everything. Farmers can’t control nature, and they can’t control commodity prices. Farmers are limited in what they can control. Precision agriculture allows them to have a little bit of control back. It can allow farmers to better manage what’s happening in the field and it can allow them to be more fiscally responsible by making better decisions regarding spending on inputs. Precision farming is an enormously powerful tool. People even outside of farming, including myself and many at Aker, are attracted to the energy and innovation in this industry.

THE THEME FOR THIS ISSUE IS “WHAT’S NEXT?” WHAT’S NEXT FOR AKER?

For us, what’s next is bringing farmers technology to fill a void. We are building a new platform for what farmers control in-season. There’s this neglected region between after you plant and dry-down, and growers need a technology that helps them make better decisions during that time frame. We have geo-referenced information on pests and pathogens on a large scale to help solve the disease triangle. We think by making this information available, farmers can be more proactive in mitigating yield loss by applying when it matters.

HOW DOES AKER WORK TO PREVENT DISEASE AND PEST OUTBREAKS?

First of all, we respect how farming has worked for hundreds of years. That’s the importance of crop scouting. Today, we have larger farms, more acres to cover and less people. It’s hard to find someone who can scout all of those acres. Aker is automating the function of crop scouting.

Our technology acts as a supercharged scout. We go into the field and collect data below the canopy, just like an agronomist would do. We use drones as our eyes and nose. It allows us to see precisely underneath the leaves – such as for sudden death syndrome and aphids – early on when it matters. For diseases, we use drone technology with biometric film that can predict with an accuracy in parts per million. Our technology can sniff the air and determine the density of pathogens that eventually correlate to plant disease. We think that is a new frontier.

WHAT ARE FUTURE TRENDS YOU ANTICIPATE WITHIN AGRICULTURAL TECHNOLOGY?

I see a lot of momentum building in biologicals and microbial engineering. I think we will continue to see more technology in how we build better inputs and treatments. I also see more drone use at the ground level, possibly in the form of robots. It’s no longer a matter of if it will happen, but when. There’s a lot of testing and a lot of investment in ag technology now and I believe this type of work will generate a lot of positives for everyone involved.

Orlando Saez is co-founder and CEO of Aker Technologies, Inc. Aker’s mission is to advance crop diagnostics with practical technology tools and services to improve the profitability and sustainability of every farm operation. The company provides in-season crop monitoring of disease and insects, with services utilized in precision farming applications around the world.
Customers prefer U.S. soy because it’s sustainable. But demands for sustainability continue rising. Adopting a common practice like reducing tillage to control erosion and increase organic matter is another step forward in improving your sustainable footprint. Show your commitment to sustainability with a free truck magnet available at unitedsoybean.org/sustainability.
New technology can rapidly bring solutions to life.

Consider what plant breeders can do with the new technology increasingly filtering into their labs. Soybeans with four-bean pods, nitrogen-efficient crops, and protein and oil characteristics tailored to specific end uses are no longer pipe dreams, they are becoming reality.

Plant breeders have been working on challenges like these for decades. Like any genome, soybeans display great genetic diversity, with 20 chromosomes and more than 1.1 billion DNA pairs making up its genes. The game changer is now all of the characteristics mentioned above that occur naturally within that diversity can be found and manipulated much more quickly.

“Gene editing uses plants’ own genetic material to make selections and drive change,” explains Kevin Diehl, Ph.D., global seed regulatory platform director for Corteva Agriscience. A very precise plant breeding technique, gene editing may hold the key to harnessing genetic diversity to improve soybean production, processing and end products. It is the newest tool in a long history of breeding advancements. While genetically modified organisms (GMOs) introduce genes from other species, gene editing inserts genes from within the species.

“The power and diversity that exists within a plant’s own genome offers a lot of opportunities to create new and better products to help address big challenges that exist today,” Diehl says. “We can take advantage of naturally occurring pest and disease resistance, or adaptability to climate change and geography.”

Diehl describes gene editing as a tool to solve problems, not a technology in search of an application. The solutions-centered strategy pulls technology into a product and may appeal more to consumers. “Gene editing could lower gluten content in wheat,” he says. “It could protect the cocoa plant from new disease challenges as in marginal environments. It could quickly address disease issues in bananas, which come predominantly from one plant.”

Evolving Technology

Gene editing does what traditional breeding crosses would eventually accomplish, but with more accuracy. It allows recovery of genetic diversity lost to domestication and traditional breeding. Mark Stowers, senior vice president of operations and products at Inari, a plant breeding start-up based in Cambridge, Massachusetts, believes gene editing is a valuable tool to help farmers have sustainable business and be good stewards of the land.

“Gene editing should have virtually no unintended consequences because of the precision of the technology,” Stowers says. “We estimate that it cuts breeding time by roughly two-thirds, and production costs by up to 90 percent.”

He sees challenges for the technology use in plants because he says knowledge of plant biochemistry lags knowledge of people and animals. But he is optimistic about progress in tools. Researchers currently choose among meganuclease, zinc finger nuclease, transcription activator-like effector nuclease (TALEN) and Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) as tools to deliver gene edits.

“They all have different strengths and weaknesses, but we hear the most about CRISPR because it is currently the most cost-effective and efficient tool available,” Stowers says. Jennifer Doudna, one
of the creators of CRISPR is on Inar’s Scientific Advisory Board.

He expects ongoing improvements for nucleases available for gene editing. “For example, I anticipate plant-optimized tools that work best at lower internal temperature of plants,” he says. “I also think we will improve efficiency and develop the ability to edit multiple genes at once.”

How will this help create better soybeans?

“In soybeans, gene editing will allow us to solve problems like iron deficiency chlorosis,” he says. “It’s difficult to address with traditional breeding.”

Stowers predicts the technology will benefit soy customers, developing high-value soy protein isolates and concentrates and healthier oils that replace trans fats. However, he notes gene editing may not address resistance to complex pests like soybean cyst nematode and Asian soybean rust.

GLOBAL REGULATORY PERSPECTIVES

Although many researchers highlight the differences between transgenic GMOs, which move genes across species; and gene editing, mutagenesis that changes genes within a species; interpretations vary when it comes to regulation.

Argentina was among the first to address gene editing regulation. It embraced the technology, developing case-by-case assessments for gene-edited products, and Brazil followed suit.

The U.S. government focuses on regulating products, rather than the processes used to create them. Plant biotechnology is primarily regulated by USDA, based on products’ plant-pest risk.

“A number of products that have been developed using gene editing technologies have gone through USDA’s Am I Regulated process,” says regulatory lawyer Karen Carr, partner at Arent Fox. “The agency clarified that such products created without using plant pests or that are not themselves plant pests, will not be subject to regulation premarket under USDA’s biotech regulations.”

In contrast, the European Union (EU) Court of Justice ruled in late July that organisms obtained by mutagenesis, which includes gene editing, will be regulated as GMOs.

“This ruling appears to bring genome editing into the EU’s

HOW GENE EDITING WORKS

Founded on familiar principles of biology, gene editing precisely changes the building blocks of genetic information. The technology can be applied across human, animal and plant genomes.

Living cells have deoxyribonucleic acid (DNA), which carries genetic information to determine biological traits. DNA guides cells in making new proteins that get copied as they reproduce. The four DNA component bases are: adenine (A), cytosine (C), guanine (G) and thymine (T). They bond – A with T and C with G – to form units or base pairs, which organize as genes in strands like twisting ladders, or a double helix. A long strand of genes makes up a chromosome.

The illustration below shows the process of gene editing to replace a DNA sequence with a different DNA strand.

Source: Based on information from Reuters, Nature, Massachusetts Institute of Technology
GMO regulatory framework, which has never been efficiently implemented,” says Beat Späth, director for agricultural biotechnology at EuropaBio. “The EU has essentially expelled GM crop innovation, and now runs the risk of locking out the benefits of genome editing from Europe. And there is little chance for a shift in the ruling, since this ruling cannot be appealed.”

Späth cites potential innovations like nutrient-enriched crops that tackle malnutrition, stress-resilient crops that cope with climate change, and conversion of waste into feedstocks to decrease dependence on fossil carbon and develop a sustainable bioeconomy as reasons the EU should embrace gene editing.

“Supporters of this ruling, mostly a small group of often radical multinational environmental non-governmental organizations and some politicians closely associated with them, focus on market power of companies, completely overlooking the many benefits,” he says. “But GMOs and gene-edited products can and do provide numerous benefits to society, consumers and farmers.”

How the differences in gene editing regulations could impact the quest for better soybeans and the global market has yet to be resolved. Researchers hope to see decisions based in science.

Stowers says, “Regardless of process, biology is still biology, and breeding is still breeding.”

Mark Stowers of Inari, a plant breeding start-up, describes the steps of gene editing used to create new crop varieties and hybrids.

1. Identify a problem. “We want to understand challenges, environmental factors and desired results ideally up front so we can create an effective solution,” Stowers says.
2. Determine genes that affect the issue. Genome mapping and data management technology allow researchers to identify gene locations for specific characteristics.
3. Find a gene sequence with good probability of solving the problem. Breeders use rich genetic diversity to find naturally occurring genes or DNA segments to produce the desired response.
4. Choose the best tool to implement change. “Gene editing tools are protein molecules that can be instructed to find the sequence in existing DNA we want to change,” Stowers explains.
5. Cut the appropriate DNA strand. “The gene editor uses the same mechanism, or ‘scissors’ that plants use during traditional plant breeding, but it is much more precise,” he says. “The tool cuts the DNA strand in an exact place.”
6. Repair the DNA strand. “The gene editing nuclease also carries instructions to repair the strand with the desired DNA sequence,” Stowers continues.
7. Dispose of protein. After a cut and repair has been made, the cell naturally will process the nuclease and removed DNA like any other waste material.
8. Evaluate variety options. Gene editing speeds up the discovery phase of plant breeding. Once desired characteristics are inserted into known varieties or hybrids, they are traditionally evaluated in the lab, greenhouse and field. Select options are made commercially available.

“Gene editing does not have many drawbacks,” concludes Stowers. “It allows breeders to design plants as they’ve always wanted. That’s not possible with other technologies.”

FUNDED BY THE ILLINOIS SOYBEAN CHECKOFF

TECHNOLOGY

HOW GENE EDITING CAN IMPROVE SOYBEANS

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FRANK PARTNOY | author of Wait, The Art and Science of Delay

“We are involved because we do not want farmers to give up too much in the technology process with data access. The farmer is becoming a user just like a user on Facebook. Customers are those behind the scenes getting data from farmers. We are just beginning to learn what is happening with that data.”

DON BIERMAN | CEO of Crop IMS, Agricultural Data Coalition

“Rising supplies of protein, over time, will persist in the U.S. as chicken continues to displace beef and pork. This is the next ‘greater protein demand for soybean meal’ story.”

BILL LAPP | Advanced Economic Solutions

“The average age of a U.S. farmer is 55. These often are not small businesses, they are complicated enterprises. As farmers retire without successors, land ownership will shift. Over time, we will likely see greater numbers of large industrial farms, as well as an increase in small niche farms, with fewer in the middle.”

BROOK CUNNINGHAM | managing director, Global Agribusiness and Nutrition, Lazard

“Farmers should tighten their belts and stay in a holding pattern. We are starting to see a turn in the countryside and hear more complaints from farmers about the current situation. Pay attention to the farm bill for some good news. Push for a stable permanent legal workforce. Monitor deregulation because it will lower costs. It is overshadowed by trade and immigration.”

BARRY FLINCHBAUGH | Kansas State University ag policy professor emeritus
ISA Strengthens Trade Ties Through Summer Team Visits

Marketing plays a vital role in maintaining high demand for Illinois-grown soybeans. Roughly 60 percent of Illinois soybeans are exported with an estimated value of $3 billion.

To keep fueling that demand, ISA hosts trade teams to connect with foreign buyers. This summer, ISA Trade Team Lead David Headley hosted 14 international delegations, including groups from China, Mexico and Australia. When these visits occur, Headley works to create a dialogue between buyer and producer, ultimately establishing a relationship.

The better the international buyer knows the seller, the more the buyer trusts producers, and the more likely the buyer will keep purchasing Illinois soybeans. ISA utilizes its two offices in Chicago and Bloomington to host international trade teams. Both facilities provide space to educate and connect farmers and buyers who come to learn more about what ISA is doing.

Inland Waterways Solutions Summit Seeks Answers

ISA officials led a group discussion with 38 inland waterways professionals this summer during a summit sponsored by the ISA checkoff program in Washington, D.C. Participants included inland waterways users, government officials like the U.S. Army Corps of Engineers (USACE) and congressional staffers, commodity organizations and more. Discussions included collaboration, funding and regulations as they relate to addressing the issues that exist with the nation’s aging locks and dams. ISA feels inland waterways improvements are an urgent need to ensure continued efficient product delivery. ISA plans to continue to engage with inland waterways stakeholders to create the change required to solve the funding challenge.

ISA WISHH Director Sees More U.S. Soy in Central America

ISA Director Roberta Simpson-Dolbeare, who serves on the ASA/World Initiative for Soy in Human Health (WISHH) Committee, recently saw new opportunities for U.S. soy sales in Central America. Simpson-Dolbeare was part of a WISHH trade team this summer. The team made presentations and met with multiple companies in El Salvador and Guatemala.

“We were able to see first-hand that more soy-enhanced products are being added in retail markets at a variety of price points, making them attainable by more people and thus increasing the amount of soy used,” she says. “We visited with business representatives who are pursuing opportunities for developing new products and/or product lines or expanding production of current ones that include soy as an ingredient. As these markets grow, there could very well be an increase in the amount of U.S. soy purchased.”

Multiple companies buy U.S. soy to improve the nutritional value of Central American-made food products, including selling products to government social programs like school meals.

ASA Encourages Illinois Applicants for 2018-19 Young Leader Program

ISA encourages young Illinois soybean producers to consider taking advantage of the annual Young Leader Program leadership development opportunity. The program, sponsored by Corteva Agriscience and the American Soybean Association (ASA), is a two-phase educational program for active farming individuals and couples who are passionate about the future possibilities of agriculture. Women and men who participate in this program often become leaders that shape the future of agriculture. Phase I of the 2018-19 Young Leader program will take place in Johnston, Iowa, Nov. 27–30, 2018. The program continues Feb. 26–Mar. 2, 2019, in Orlando, Florida, in conjunction with the annual Commodity Classic Convention and Trade Show. Additional information and qualifications for the Young Leader program are found at soygrowers.com. Applications must be completed online by September 30, 2018.

CORRECTION: In the July issue of Illinois Field & Bean, Kelli Bassett, agronomist with Bassett Farm and Seed, Pioneer sales representative and a South Central CCA Soy Envoy, was identified incorrectly on page 15. We regret the error, and appreciate Kelli’s continued contributions assisting Illinois soybean farmers with her agronomic insights this season.
CUSTOMERS PREFER U.S. SOY BECAUSE IT’S SUSTAINABLE.

But as demands for sustainability continue rising, meeting those demands remains a journey of continuous improvement. Which sustainable practices do you do now? Which ones could you adopt to improve your sustainable footprint? Show your commitment to sustainability with a free truck magnet available at unitedsoybean.org/sustainability

SUSTAINABILITY NEVER GOES OUT OF SEASON

- Cover Crops
- Water Management
- Reduced Tillage
- Nutrient Management
- Decision Farming
- Pest Management
Calculated Connections

Advocacy Impact Requires Strategy, Endurance

> BY MIKE LEVIN, Illinois Soybean Growers director of public policy and regulatory affairs

Advocacy isn’t easy. It takes time to articulate compelling messaging, solidify a position on an issue, establish a relationship with the people you’re trying to influence, and advance an opinion through the legislature. For issues important to Illinois Soybean Growers (ISG), it can take months or years. In recent history we’ve seen successes on issues both big and small. For example, the Waters of the United States (WOTUS) rule was repealed and suspended, and biomass-based diesel volumes under the Renewable Fuel Standard (RFS) are slowly increasing.

A thoughtful, strategic approach, along with resilience and grit have enabled Illinois soybean producers to not only endure the advocacy marathon, but also to find success. Identifying the appropriate times and situations to lead the race or jog supportively alongside colleagues is critical. Sticking with the marathon analogy, the gear you select to successfully complete that race is essential. Just like choosing the appropriate running shoe, the plan and medium selected to reach a legislator can be the difference between crossing the finish line or stalling out.

Everyone has something at stake, including the decision makers with whom we engage. Similar to the ISG Voice for Soy legislative action network system that tracks responses on critical issues to legislators, staffers have a system to track incoming requests from constituents. These requests include everything from phone calls and letters to Tweets and in-person visits.

The more diverse the responses, the more successful the campaign. According to the Congressional Management Foundation, 94 percent of congressional staffers say in-person visits from constituents would have some or a lot of influence on an “undecided” lawmaker while 92 percent say individualized email messages from constituents would do the same. It’s not a one size fits all approach to how we advocate. We need to deploy a strategic, but nimble, plan based on the issue, legislators we’re targeting and the required outcome.

The ISG interconnected approach is working. Since Voice for Soy was established in 2012, the number of actions taken by producers has nearly tripled. A calculated, strategic approach, compelling messaging and ongoing visibility has resulted in more than 100 media requests from high-level domestic and international outlets the past few months. Connecting with industry partners and national groups at the appropriate times amplifies our voice to achieve these results.

The marathon will continue as we approach the Nov. 6 election. Our strategy is set and we’re ready for whatever comes our way. ■
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