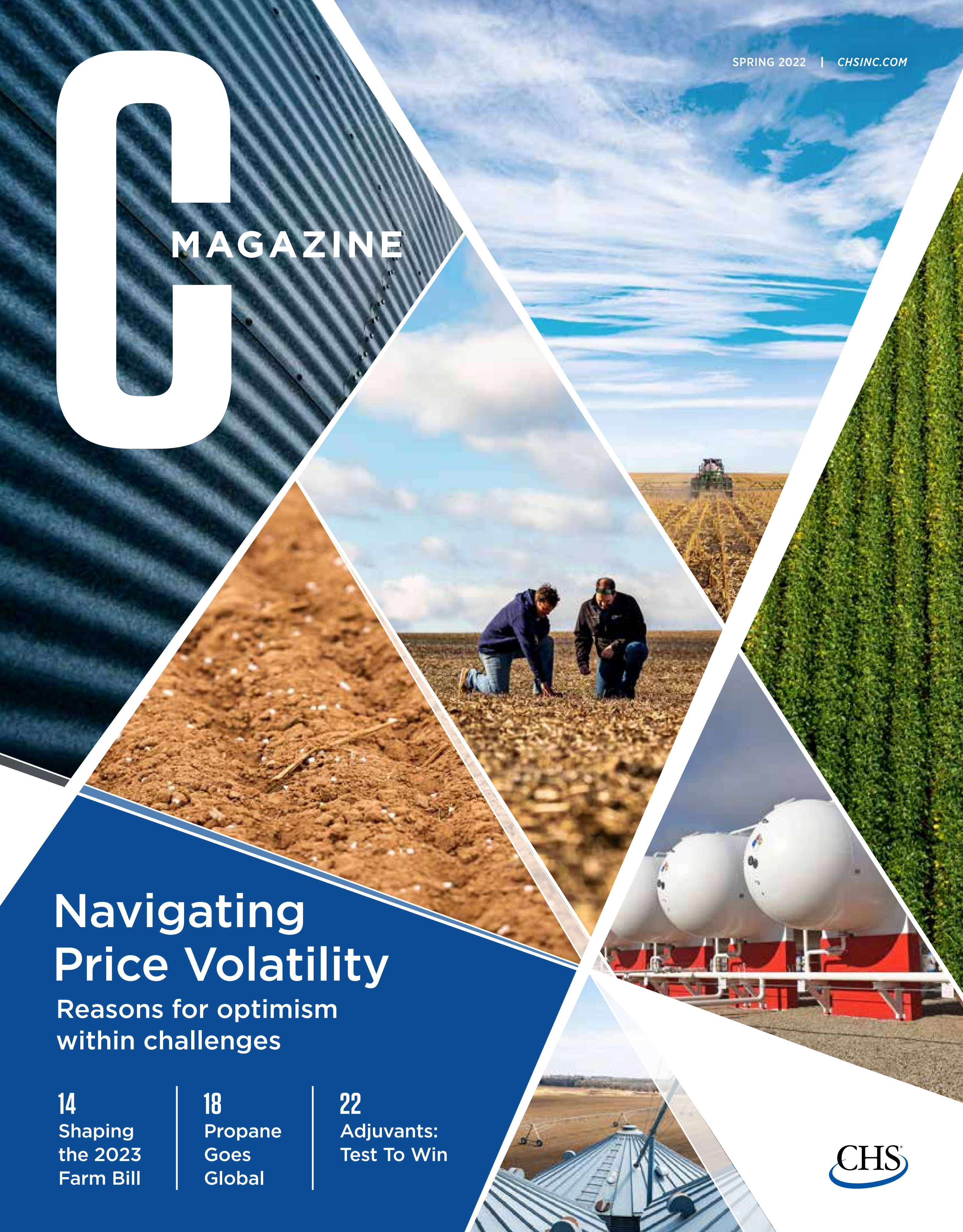

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C MAGAZINE

Navigating Price Volatility

Reasons for optimism within challenges

14 Shaping the 2023 Farm Bill

18 Propane Goes Global

22 Adjuvants: Test To Win

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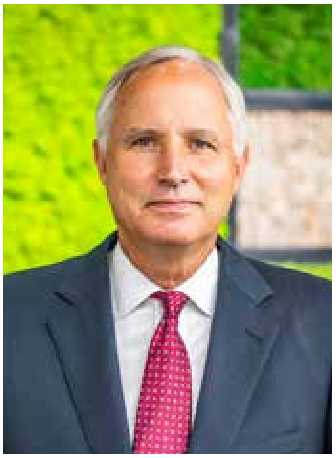


Jay Debertin, president and CEO, CHS

Positioned for Growth

This industry knows volatility. Even with that experience, the number of external forces working on agriculture today is astounding. Navigating through those changes is taking every tool in our arsenal.

While we can't eliminate the effects of weather, conflict around the world, monetary policy, inflation and more, CHS and the cooperative system can use our collective strength to secure the inputs you need and continue finding new markets for your grain.

Leveraging both global connections and domestic production through our investment in CF Nitrogen, we made sure crop nutrients were in place in time for this growing season.

Our U.S. refineries and supply agreements, along with our extensive transportation and logistics network, are delivering a reliable supply of diesel fuel, lubricants and propane to propel equipment and power homes and businesses.

And our rapidly growing ability to use real-time data to monitor and predict market dynamics, track shipments and streamline processes is making our supply network increasingly efficient so we can focus on adding more value at every step.

It's true there are some positive outcomes from the volatility we are working to manage. But even as supply uncertainty and disruptions support strong commodity prices that benefit growers and marketers, we are mindful of grim conditions throughout the world that are making it difficult for people to feed and sustain their families.

At CHS, we are doing our best to apply market intelligence, supply chain strength and the expertise of our dedicated teams to navigate market volatility to fuel growth that benefits our owners and customers. We will continue making connections to empower agriculture as we work together to feed the world.

Jay D. Debertin

Have a question or feedback for the CHS management team? Get in touch with us at feedback@chsinc.com.

Obstacles

Doug and Kim Oachs, pictured with sons Jared and Brian, show a photo of the couple from the 1980s.

Opportunities

By Amy Sitze

Increases in farm expenses may be keeping you up at night — but there are reasons for optimism

Doug Oachs has input price increases on his mind. Oachs, who runs a corn and soybean operation near Herman in west-central Minnesota with his wife, Kim, locked in most inputs for this year's crop in 2021, but price volatility has him concerned about 2023.

"When you don't know your input costs, it's nerve-racking to figure out where your breakeven is," says Oachs, a fourth-generation producer who started farming with his father in 1980.

With the national inflation rate hitting 8.5% in March 2022 (the highest since 1982) — and input expenses that are seeing up to triple-digit increases — Oachs is not alone in being concerned. Even the experts are finding it hard to understand the complicated relationships between inflation, supply chain disruptions related to the COVID-19 pandemic, and high demand and low supply.

"Are these increases due to general inflation, the Federal Reserve's monetary policy or supply chain issues? Economists are really struggling with this right now," says Michael Langemeier, associate director of the Center for Commercial Agriculture at Purdue University.

While high costs probably won't decrease overnight, there are glimpses of blue sky. World demand for U.S. grain is positive, crop prices are likely to remain high and many operations have been able to build working capital in recent years. The USDA projects that cash receipts at the farm gate look promising for 2022, as well.

For Oachs, some of it comes down to four decades of experience weathering the ups and downs of farming, including tough times in the 1980s. "I don't think you can be an agricultural producer without being optimistic," he says. "We plan for a good crop, we manage the inputs and market risks with the tools we have, and we go from there. I try not to borrow worry." >

Inflation Myths

By Joe Lardy

One of the interesting things about heading into an inflationary environment is that an entire generation of farmers has never experienced anything like what we're seeing now. They haven't had to learn how to manage their operation differently to account for a double-digit interest environment.

Even for farmers who have lived through times of high inflation, it's hard to draw comparisons to the past. Current price levels are historic — we haven't seen anything like this. There are so many dynamics, from labor shortages to supply chain issues, and it's hard to separate one factor from another. The war in Ukraine has made the global supply and demand situation even more uncertain.

With all this uncertainty, consumers and producers are hearing a variety of advice and analysis. Here are some myths floating around right now.

1

MYTH #1: Exports increase when currency is devalued. A textbook would say inflation devalues a currency, which should open up more avenues for exports. When the U.S. dollar is weaker, for example, foreign currencies should be able to buy more of our goods more easily.

However, a weaker dollar today doesn't push up commodity prices right now because the commodity trade is pretty inelastic. If the dollar index starts to go way down, it's not as if China suddenly says, "Soybeans are on sale, so we're going to buy 10 times more!" It just doesn't work that way. When countries buy commodities from the U.S., everything they purchase has to go into a person or into an animal. Because that demand doesn't change quickly, the impact on exports might be less than expected.

An example closer to home is consumers buying toilet paper. Households use a finite amount every year. If the price is a little higher or a little lower, we still buy the same amount. If it's on sale we might buy more, but throughout the course of the year, it adds up to be roughly the same amount.

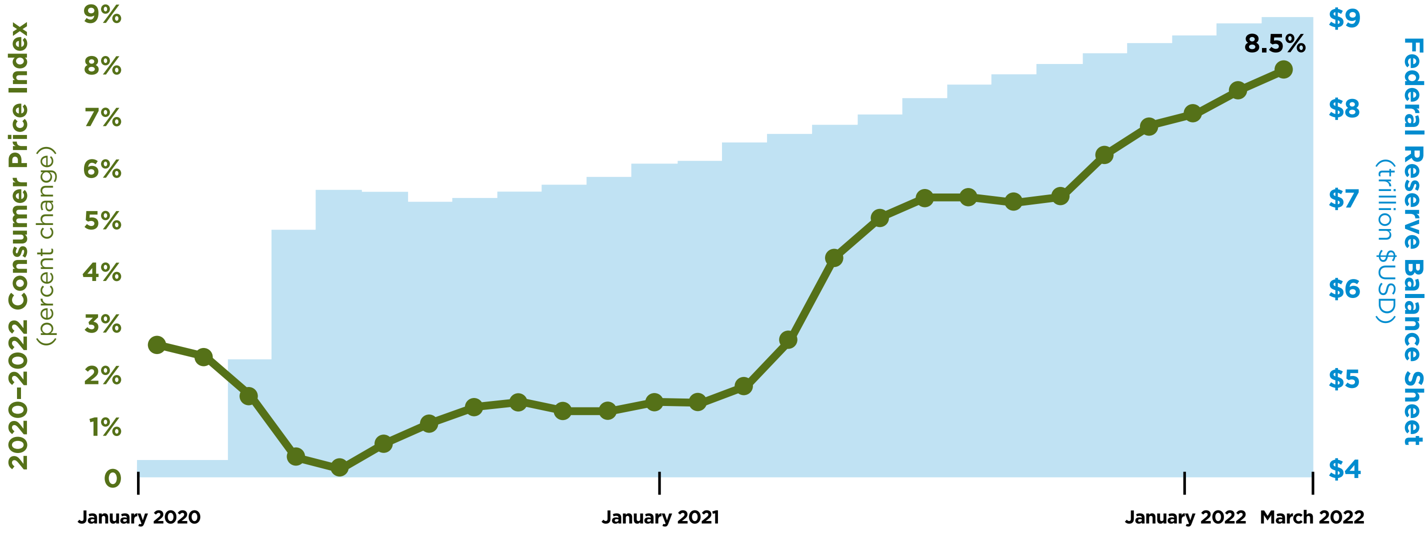
Whether we export more is a function of supply and demand in the market, not an external force like the dollar index.

2

MYTH #2: Risk management strategies right now should revolve around prices. With an increased inflationary environment, we generally see higher price volatility. And higher volatility leads to bigger cash flow needs. So if you have higher volatility and higher prices, margins will be higher. If you're in the futures market, you need more cash to pay your broker for margin requirements. When we get into periods of high volatility like the one we're in now, it's not a matter of exactly what price you're buying or selling at; it's a cash flow situation. Do you have enough cash to pay your margin call?

Right now, producers should be looking at their overall profit margins rather than just high input prices. What does your operational margin look like? Are you profitable when locking in both ends of that spectrum? What are your input costs, irrigation costs and fuel costs? What does your return per acre look like? Can you make profitable decisions at those levels? It's important to look at

U.S. Inflation Soars to 40-year Highs



Sources: U.S. Bureau of Labor Statistics, U.S. Federal Reserve your whole farm operation to make the best decisions.

MYTH #3: Inflation is temporary. For a long time, the Federal Reserve said inflation was supposed to be transitory. The Fed isn't using that word anymore and is rethinking how it talks about inflation.

Every three months, members of the Fed Board of Governors have an opportunity to submit forecasts on where they think interest rates are heading. The forecasts give us a sense of the sentiment held by the people who set interest rates. In the most recent report, most forecasts didn't predict runaway interest rates — they indicated the rates will settle down. But they also think this period of higher inflation and higher interest rates will probably persist for at least two years.

Joe Lardy is a research analyst with the CHS global research team.

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Inflation 101

Jason DeVinny, research analyst with the CHS global research team, answered some key questions about inflation. The team seeks to educate farmers, ranchers and cooperatives on market information, analytics and insights to help inform decision-making.

What's the scale and scope of inflation right now?

On a global scale, no nation has gone untouched. Before the pandemic, global inflation was averaging around 4% per year.

The U.S. was at approximately 7% when the calendar turned over to 2022, and the International Monetary Fund thinks there will be another 4% increase for developed nations including the U.S. this year. That's big.

What caused this rise in inflation?

Some of it is supply-driven. Coming out of the pandemic, people have cash and they want to spend it. There are industries that can't keep up with demand because of labor shortages or lack of materials.

Other industries could have kept up with demand, but ran into significant logistical challenges across almost every area of global transportation.

And some of it is labor costs: As inflation rises, workers demand higher wages and businesses raise prices to cover those increases. It becomes a vicious cycle.

What can be done about it?

The Federal Reserve's goal is to delicately bring prices down and get inflation more in line with long-term goals of around 2% annually without harming business growth, which could toss us into a recession. Historically, periods of high inflation have been followed by a recession.

On March 16 this year, the Fed made a long-awaited announcement that it would raise interest rates by a quarter point. What markets and observers are watching now is the pace and size of interest rate increases over the balance of the year.

Is inflation good or bad for farmers?

We can only loosely answer that question right now. The USDA has reported that cash receipts at the farm gate in 2021 were way up versus prior years. It's great when the top line of your income statement is healthy. The USDA is also suggesting that the forecast for 2022 looks promising.

But that's only half the equation. When you look at the other side of the coin, farm production expenses are up significantly.

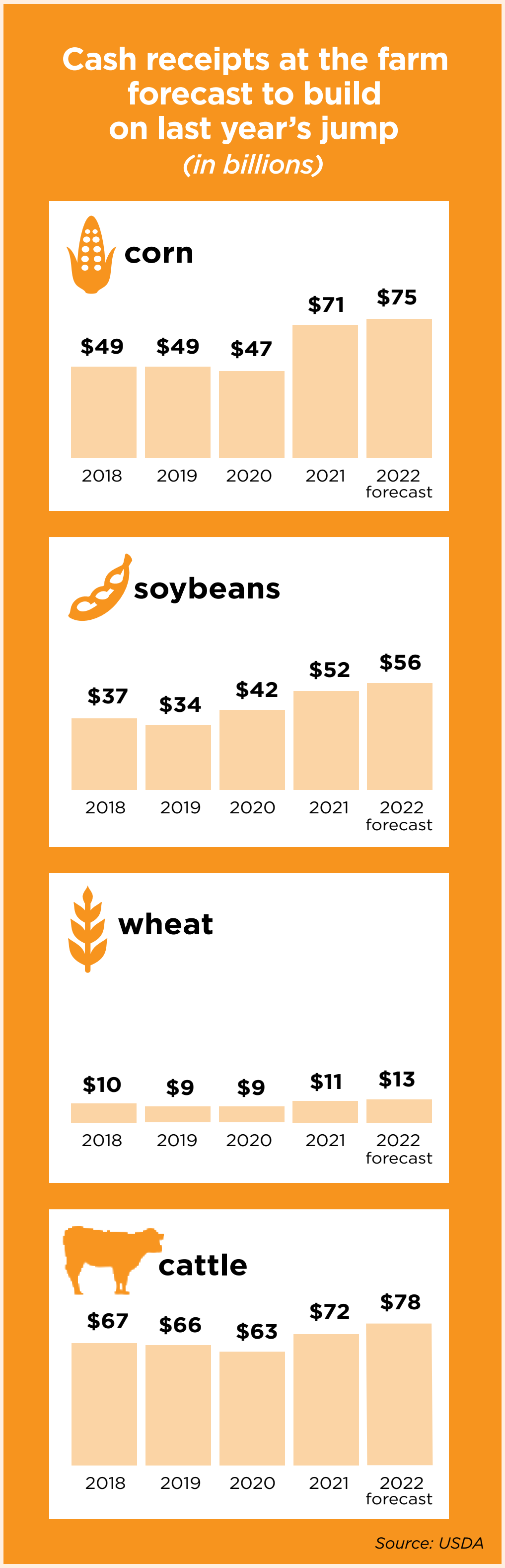
I think the opportunities to make money were there in 2021 for farms that had a good growing season and/or crop to sell and were able to effectively manage margins through input and marketing decisions. And the USDA is forecasting that the opportunity could be there again this year. >

> What about borrowing costs?

As the Fed raises interest rates, borrowing costs will increase for everyone, including farmers. Farmers today actually have a bit more cash than in past years and are enjoying greater liquidity. They've been able to cut down debt in both real estate and non-real estate holdings. In an April 2022 report, the Federal Reserve noted that farm loans had increased at the fastest pace in nearly four years but remained modest by recent standards.

Any advice for farmers during this time of volatility and uncertainty?

Stay nimble and consult with experts across the spectrum of input needs and marketing opportunities. They are dialed in to their respective markets and can provide advice on decision-making. Opportunities are there for 2022, and I think there can be good upside for farmers.



Price Pinch

By Matt Welp

5 things to know about crop nutrient costs

Even as prices for crop nutrients continue to soar, growers remain engaged in the market. They have cash on hand and tell us they're confident about what they're growing this spring. Despite that positive sentiment, we're keeping a careful eye on world events in our forecasting models. Consider these factors as you make decisions about crop nutrient purchases.

1. Nitrogen supply in the U.S. is adequate — for now.

There's plenty of nitrogen production in the United States, but we're still seeing cost increases because U.S. prices generally follow global prices. In the U.S., we imported a lot of fertilizer before the current price run-up, so we don't have severe fertilizer supply chain issues right now. There might be localized problems in some areas of the country, but on a macro level the U.S. is looking good.

2. Russia's invasion of Ukraine changes the equation.

Ukraine and Russia produce and export nitrogen-based fertilizers, contributing about 20% of the global trade flow. Right now, Ukraine can't produce fertilizer, get it to port or ship it out. We don't know yet what the supply chain will look like later this year if we can't source product due to this situation.

3. All ag roads lead to China.

China produces roughly 30% of the world's urea. If 2021 urea exports from China are curtailed in 2022 and beyond, we would likely not see that product replaced in the marketplace until late 2023 as new urea manufacturing projects in areas with cheap natural gas are completed. With global demand still rising, any absence of Chinese urea will be acutely felt.

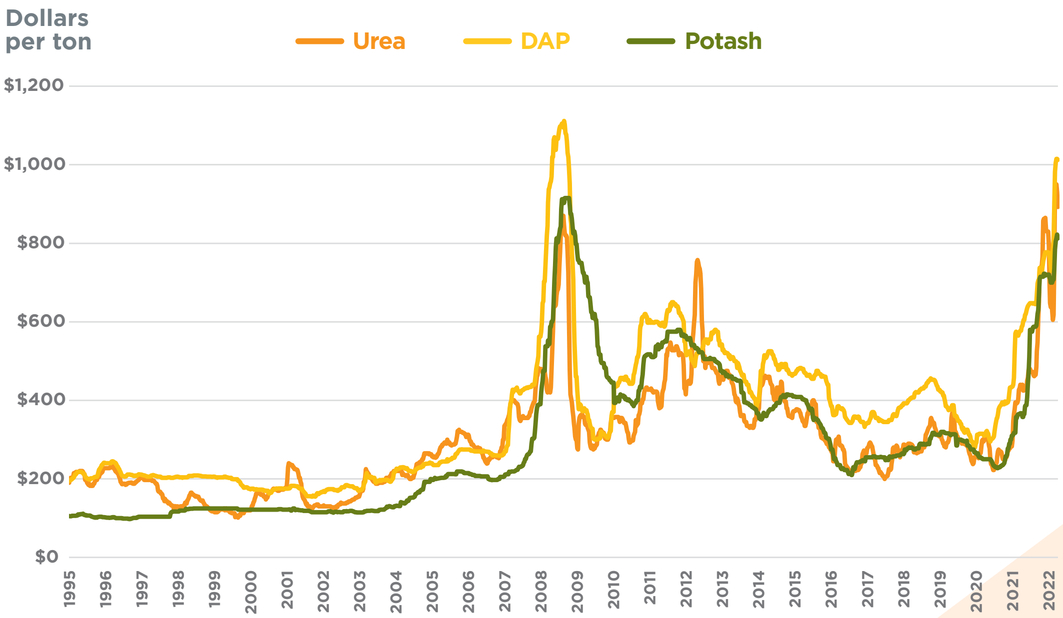
4. P and K are feeling the pressure of world events, too.

Russia and Belarus contribute over 40% of total potash trade flows, and Russia contributes almost 15% to total phosphate trade flows. Brazil imports approximately half of its fertilizer from Russia and Belarus — and the premiums Brazil buyers are paying for potash and phosphate over U.S. gulf prices is in the unheard-of $200 to $300 per ton range.

5. Uncertainty makes it hard to forecast 2023.

There's a lot of interest right now in 2023, but the volatility we've seen recently has been a challenge for our pricing models. The models have never seen input prices like these. Our models are not pointing to much relief in fertilizer prices for the next year, and with 2023 new-crop grain prices well under 2022 prices, we're in a new world. >

U.S. Fertilizer Prices
1995-2022



Source: Green Markets

Matt Welp is an agronomy research analyst for the CHS global research team.

Back to the **Future?**

By Amy Sitze

> Here's how today's financial picture is rewriting the 1980s script

For those who weathered the 1980s farm crisis — or who grew up hearing stories about farm foreclosures from older family members — the current volatility in crop prices and farm expenses, plus increasing inflation and interest rates, may bring back memories they'd rather forget.

While there are a few parallels with that difficult time in U.S. ag history, economists say financial conditions today differ from the 1980s in several key ways.

It's more than monetary policy

The main similarity between now and four decades ago is that federal monetary policy has played a role in rising inflation, says Michael Langemeier, associate director of the Center for Commercial Agriculture at Purdue University. "It does make you reminisce about inflation in the early 1980s," he says. "Monetary policy has been quite loose in the last couple of years — a lot of money has been printed. That aspect is similar to what we saw in the '80s."

But today, monetary policy isn't the only driver of inflation. Logistical supply chain issues related to COVID-19 have also had an impact, he says, most dramatically on fertilizer and crop protection prices — and on producers' ability to buy those inputs.

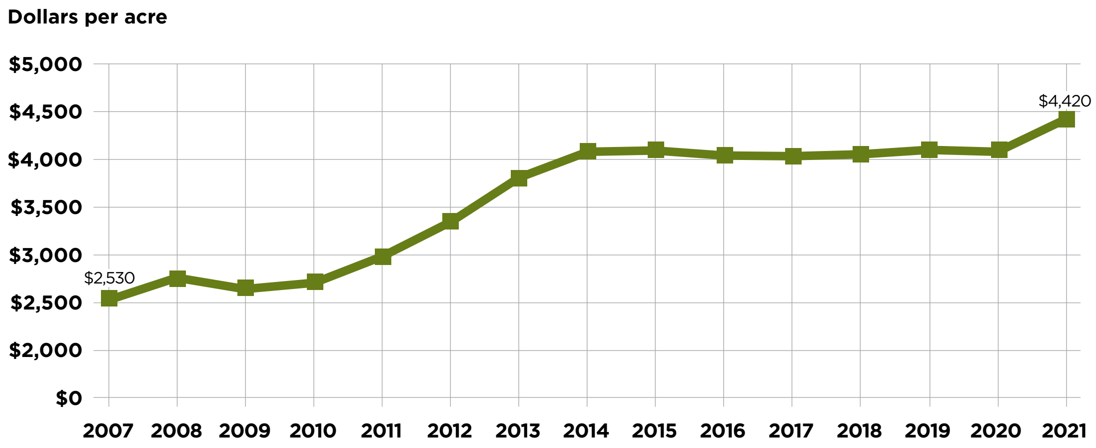
The Purdue University/CME Group Ag Economy Barometer, a nationwide measure of the health of the U.S. agricultural economy, surveys 400 ag producers about economic sentiment each month. In the May 2022 report, 34% of producers said they've had difficulty sourcing crop inputs for the 2022 season, which Langemeier calls "unusual."

"The supply chain issue is a very real part of inflation," he says. "It's hard to disentangle it from the effects of monetary policy, which is what makes this environment so challenging, but we have some unique sources of price changes right now that we did not see in the 1980s."

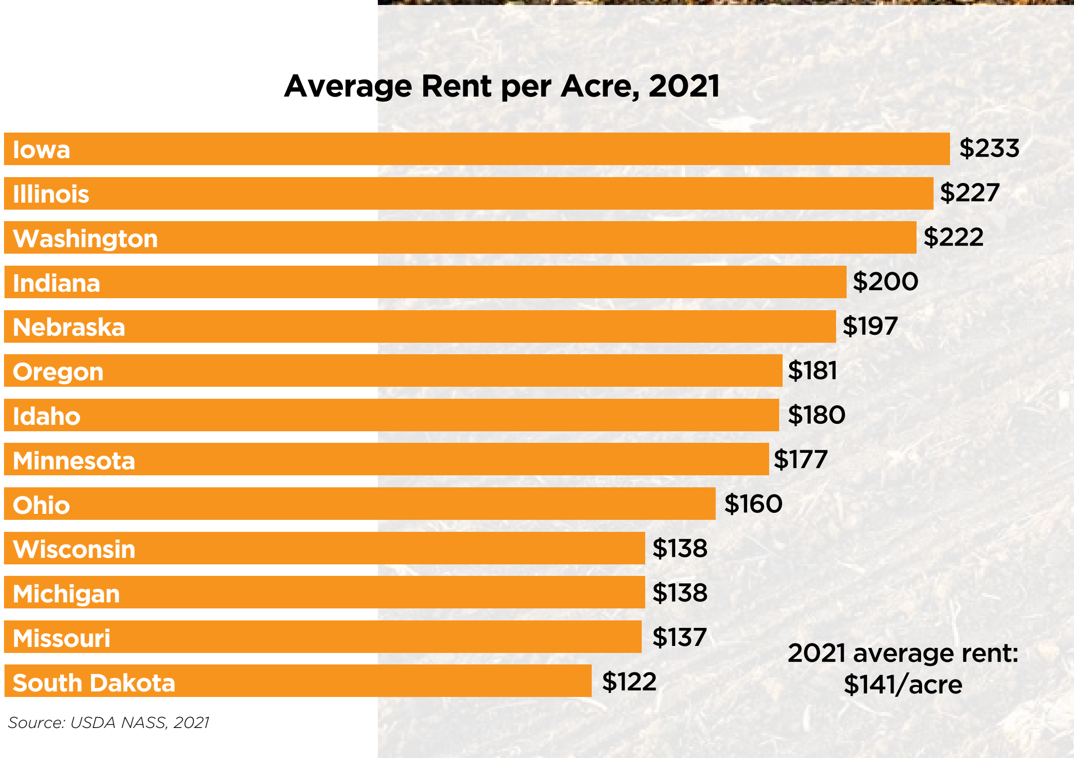
Land values are more stable

In the early 1970s, increased farm income and high inflation caused the value of farmland to climb dramatically. By the end of that decade, the Federal Reserve Board had raised interest rates to fight inflation. Real farm income fell from $92.1 billion in 1973 to $8.2 billion in 1983, according to a report by the Federal Deposit Insurance Corporation (FDIC), and land prices began a steep decline.

Average U.S. Cropland Value 2007–2021



Source: USDA NASS, 2021



Though land values are high now, too, Langemeier points out a couple of key differences compared to the high farmland values in the 1970s. Unlike in the late 1970s and 1980s, he says, today's interest rates are still very low. That's positive for land values and asset values in general.

Low interest rates also lead to demand from nonfarm investors, such as large retirement pension companies looking at long-term investments.

"There's not a strong correlation between land values and the stock market, so that's attractive to nonfarm investors," says Langemeier. "They want to hold assets that are not identical in their reactions to the U.S. and world economy."

Production ag doesn't follow the stock market

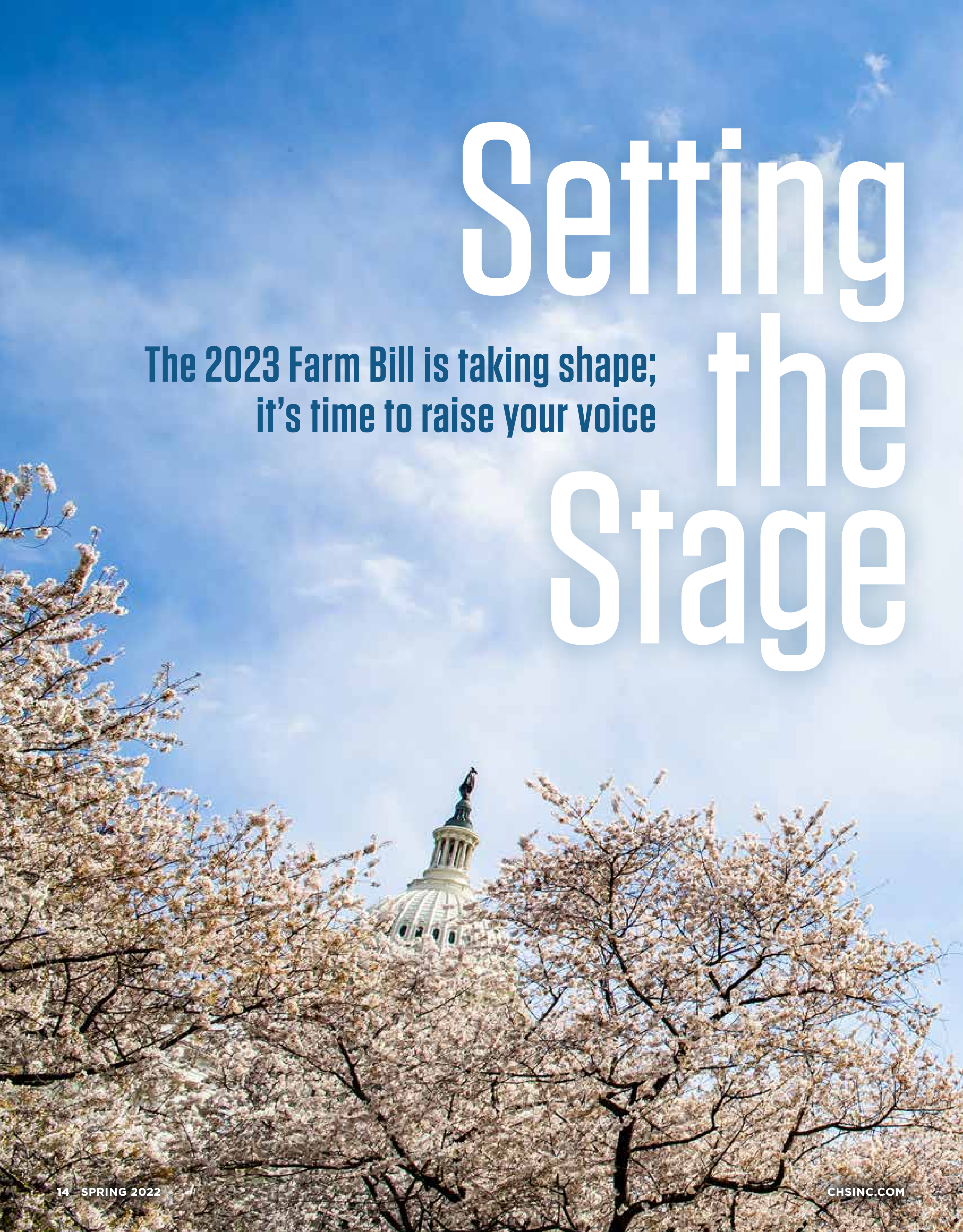
One common worry now is that inflation will lead to higher interest rates, which could lead to a recession, says Langemeier. But he points out that production agriculture can thrive even when the stock market doesn't. In 2008, for example, when the U.S. economy was suffering from what economists called a "correction," agriculture was doing well, he says.

"The fundamentals are very positive for agriculture right now," he says. "We have very tight supplies, especially for corn and soybeans, in the U.S. and around the world, and that's only made worse by the war in Ukraine. And we have high demand, especially from China and other countries in Asia. There's certainly a chance the U.S. economy could go into a recession, but even if that happens, production agriculture may not follow." ■

> "The fundamentals are very positive for agriculture right now."
>
> *— Michael Langemeier*

Setting the Stage

The 2023 Farm Bill is taking shape; it's time to raise your voice



By Will Stafford

Agriculture policy in Washington, D.C., tends to be thought of in five-year intervals — that's how often Congress is tasked with passing a piece of legislation that touches almost every aspect of agriculture and nutrition policy: the farm bill. First passed in 1933 as part of Franklin D. Roosevelt's New Deal, farm bills authorize policies on commodities, conservation, crop insurance, nutrition, rural development and more.

The most recent farm bill was signed into law in 2018 and is due to expire in September 2023. While that may still seem a long way away, Congress has begun the process of creating the next farm bill, which will impact CHS owners well into the latter part of the decade.

Hearings by the House and Senate agriculture committees are already happening in Washington and around the country to examine the agricultural economy and determine what needs to be included in the next farm bill. Your representatives in Washington, D.C., are looking for input from their ag constituents and, through CHS and its government affairs team, cooperative owners will have a voice in the process.

Here are three things to watch as the next farm bill works its way through Congress.

Midterms will dictate direction of the bill

The midterm election in November 2022 has the potential to change the party in control in both chambers of Congress, which could have a drastic impact on elements of the next farm bill.

Agriculture committees in both the House and Senate are tasked with crafting the bill, with a member from the majority party chairing each committee. Democrats now control both the House and Senate, with Representative David Scott (D-Ga.) and Senator Debbie Stabenow (D-Mich.) as chairs of each committee, respectively. With current polling suggesting Republicans will likely win back the House and possibly the Senate, control of each committee could change before a new farm bill is signed into law. If either the House or Senate flips to Republican control, the new chairs would likely be Representative G.T. Thompson (R-Pa.) for the House and Senator John Boozman (R-Ark.) for the Senate.

A shift in power could mean major changes for where funding within the bill is directed, such as agriculture versus nutrition policy. Geography could also play a role, with members of Congress from different regions of the country having different farm policy priorities due to key commodities in their respective states or districts.

It is also important to note that in the House, a simple majority can pass legislation. However, in the Senate 60 votes are needed to pass legislation. Bottom line: No matter which party controls the Senate, bipartisan support will likely be needed to pass a new farm bill.

It will be evolutionary, not revolutionary

New farm bills are intended to be written every five years for good reason — the agricultural economy can change a lot in five years! Our economy certainly looks different now than it did in 2018.

In some farm bills, we see large policy shifts that can have a dramatic impact on farmers, ranchers and consumers. Consider the 1938 Farm Bill that established the Federal Crop Insurance Program; the 1973 Farm Bill, which was the first to combine agriculture and nutrition programs; and the 2014 Farm Bill, which ended direct payments and introduced the Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC) programs.

Other farm bills focus on making small improvements to established programs. The current version of the farm bill made improvements to programs like ARC and PLC, allowing farmers to reelect which program they wanted to enroll in during the life of the bill.

Early discussions regarding the 2023 Farm Bill seem to point to it being evolutionary, not revolutionary.

Conservation and sustainability will matter

Conservation and sustainability seem to be buzzwords in almost every aspect of life these days and could play a role in the next farm bill. Congressional Democrats have tried to increase funding for agriculture conservation programs through other legislation, such as the stalled Build Back Better Bill. That bill's funding would include direct payments for farmers who plant cover crops. It is possible there may be additional efforts to increase conservation funding prior to passage of the next farm bill, but whether or not that happens, it is evident the conservation title of the 2023 Farm Bill will be debated.

CHS has urged members of Congress to make sure that any new conservation or sustainability programs are voluntary for farmers and ranchers and equitable across regions and crops, and that farmers and ranchers who already employ these practices are rewarded for early adoption, not left out of new programs.

Offer your input now

As Congress begins to craft a new farm bill, make sure your voice is heard by talking to your local cooperative, commodity organizations and members of Congress. Tell them which farm programs are important to you, which work and which aren't meeting your needs. It is much easier to enact changes to legislation early in the process than waiting until decisions are made. You have a voice in Washington, D.C., through the CHS government affairs team. We are working every day to represent our owners. ■

Will Stafford is a Washington, D.C., representative with CHS.


STOP

WINDING ROADS

Adventurous travelers wind their way through Badlands National Park as dusk falls. Surrounded by both ranchland and fertile soil that produces a variety of crops, this region in the southwest corner of South Dakota is a gem.

The park is home to bison, bighorn sheep and wily prairie dogs, which can often be seen scampering across the majestic roads that wind throughout the park.

Nearly a million visitors arrive each year to marvel at the eroded buttes, colorful pinnacles and sacred prairieland within the park's 244,000 acres.

— Adam Hester

Bryan Brazee, left, and his brother Steve have cut propane deliveries to their farm in half during the drying season with an increase in their on-farm storage and help from their local Certified Energy Specialist Lisa Effert.

GL

PROPANE GOES GLOBAL

As strong export markets restrict U.S. propane inventory, how can you protect supply and manage risk?

By Megan Gosch

Propane buyers are no strangers to the ebbs and flows of market shifts and dips. But while seasonal swings have long been a driving force in purchase decisions, propane supply is no longer seasonally dependent.

"There's a hope that supply availability will loosen up and we'll again see the seasonal price shifts we're used to," says Ben Lyden, director of propane commodity risk for CHS. "But we're not emerging from the COVID-19 pandemic to business as usual. The market has changed."

At 2.4 million barrels per day, domestic propane production has rebounded from a mid-2020 dip to near-record highs. But U.S. inventory is at a five-year low. Why? More propane than ever is being exported to customers in other countries.

"The U.S. is producing enough propane," says Lyden. "Production is growing, but more than 50% of that propane is being pulled overseas. Even though CHS does not export propane, growing demand from global customers is creating tight supply and shaping a new normal for everyone in the industry."

Driving Forces

Two key factors have accelerated how much propane is leaving the U.S.

First, recent investments in U.S. propane infrastructure, including new pipelines and export terminals, have added capacity to move more product. "Local product isn't staying local. The ability to move as much propane volume as we can today just didn't exist four years ago," says Lyden.

Additional pipelines from North Dakota's Bakken oil and gas fields to the Conway underground storage facility in Kansas and on to the Mont Belvieu export facilities in Texas have made it easier to move more propane to the Gulf Coast and into the export market.

Current U.S. infrastructure has the capacity to export up to 75% of the nation's domestic propane production — roughly 1.8 million barrels a day. In 2021, exports averaged 52% of the nation's production.

"The U.S. produces 2.4 million barrels of propane per day," says Lyden. "If exports get closer to 2 million barrels, that doesn't leave much for domestic buyers who need propane to fuel their operations and heat their homes. There's not much of a cushion for a demand surge of any kind."

Second, increased plastic use has triggered exponential growth in propane demand. At the start of the pandemic, as online shopping skyrocketed, the need for plastic packaging grew as well. As a result, demand spiked from petrochemical producers who use resin from natural gas products like propane to make plastic packaging. And there's still more to come, says Lyden, since additional Chinese petrochemical plants are expected to open over the next two years.

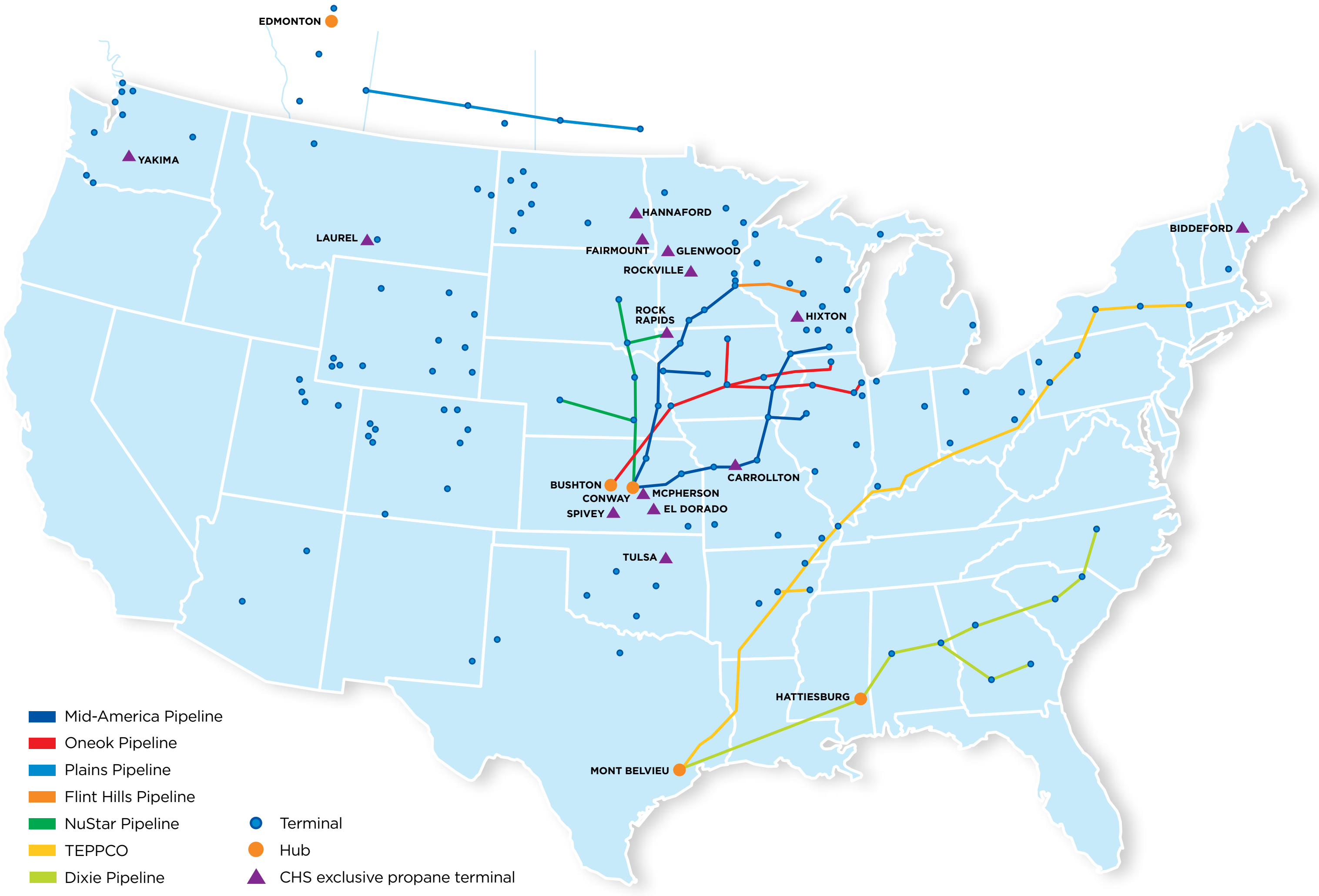
"We've seen increased international appetite for propane matched with an ability to move much larger volumes abroad," says Lyden. "It's a perfect storm."

Navigating the New Normal

This change means U.S. farmers are in direct competition with international markets for the propane they need.

"If a major demand event were to happen today halfway across the world, U.S. farmers would feel it in price and supply availability tomorrow," says Lyden. >

Propane Pipelines and Terminals



"The same goes for day-to-day market dynamics. While farmers are working to secure supply in advance of peak seasonal demand, global markets are buying 24/7 and influencing price and supply in the process."

With domestic propane customers more vulnerable to external market factors, Lyden advises a reset in expectations.

"We are used to seeing prices drop in the summers, and seasonal customers are accustomed to having access to last-minute supply to get them through their tightest spots. But if we don't see an even larger increase in production, propane suppliers are going to have a problem sourcing physical supply during high-demand periods," he says.

Recent warmer winter weather may have created a false sense of security for seasonal customers.

"We saw a relatively mild winter this year, so American inventory was higher than expected," says Lyden. "With more typical cold-weather demand, our supplies could have reached historically low levels.

"The tight supply shaping our new normal could mean we are one weather event away from being short of physical product."

Plan for the Unpredictable

While it's impossible to predict the full effect of the complex factors driving the propane market today, Lyden recommends working with cooperative propane experts to plan ahead and strategize storage and contract options for protection from volatile supply swings.

Using fixed price contracts can help manage risk because it doesn't leave customers open to market spikes in price at times when supply is tight, he says. But additional storage is also a critical asset.

"Having more on-farm storage is one of the best ways to reduce risk during periods when inventory is extremely tight and supply is tough to find," Lyden says. "Additional storage can also help lock in low prices at optimal times to buy."

Steve Brazee, who grows corn and soybeans with his brother and son on his family's 1,600-acre farm in Neenah, Wis., opted to increase propane storage when he upgraded his grain-drying system. He knew having more propane on hand would deliver multiple returns on investment.

"During the drying season, we were getting propane deliveries every day before upgrading our storage," Brazee says. "Now I don't have to stop what I'm doing to go check the propane tank all the time. I know I have more storage to pull from and I'm not hanging on the next delivery. I've cut propane deliveries in half."

Increased on-farm storage has also opened up new cost-saving opportunities for Brazee. With more flexibility between deliveries, he's been able to fill up when prices drop. He works with Lisa Effert, a certified energy specialist with Country Visions Cooperative based in Brillion, Wis., to secure lower pricing.

"It's been great to have Lisa as a partner to help get us the best bang for our buck," says Brazee. "We can make the most of our storage and avoid some of the fluctuations in the market today. It's one less stressor for me and frees me up to tackle other work on the farm." ■

Top Propane Export Destinations, 2021

Japan	28%
Mexico	13%
China	11%
South Korea	8%
European Union	3%

INVESTING FOR LONG-TERM ROI

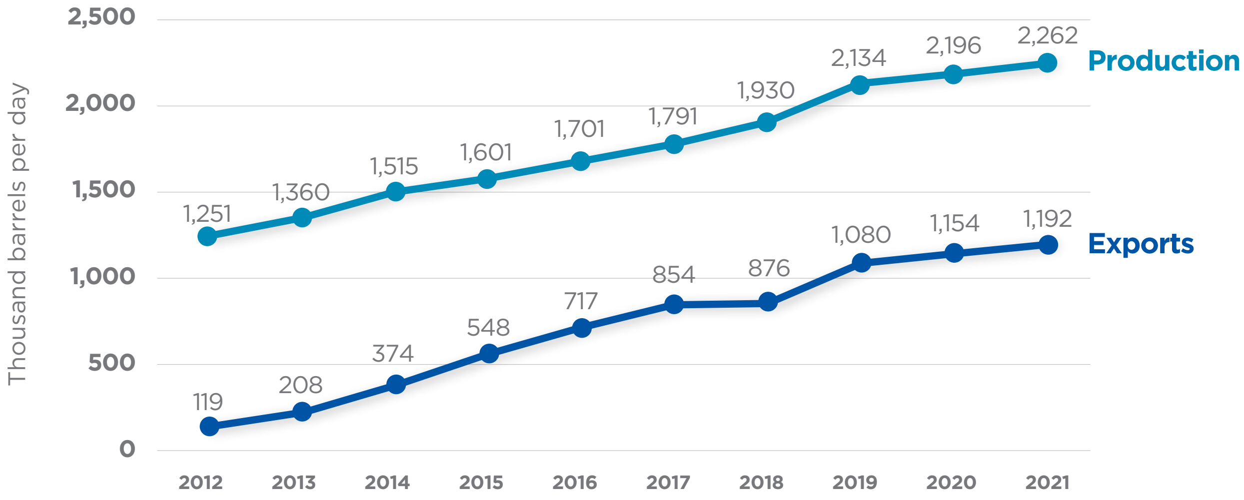
Investing in additional propane storage is a significant investment. To help manage costs, financing is available through the CHS Storage for Pennies program.

The program includes a lease-to-own option on bulk fuel storage and equipment, including propane tanks. Operations can lease tanks and begin receiving bulk propane deliveries right away, then pay for the equipment over time with payments included in the price of propane purchased from CHS.

Working with CHS, cooperative energy experts can help with equipment selection and sourcing equipment, then line up installation with reliable vendors.

Propane Exports Exceed 50% of U.S. Production

U.S. propane exports have increased nearly 50% in the last five years, from more than 800,000 barrels per day in 2017 to about 1.2 million barrels per day today.



Source: U.S. Energy Information Administration

LEARN MORE: To prepare your operation for your propane needs, talk to your local cooperative energy expert about fixed price contracts and supply planning.

FROM NEED

TO FIELD

The nine-step process for developing new crop protection products begins in your fields

By Peg Zenk

The world of weed control unloads new challenges every season. More herbicide-tolerant and -resistant species mean constant adjustments to herbicide selection, application rates, control techniques and adjuvant choices.

For Brian Kuehl and his agronomy product development team at CHS, finding the best way to tackle those adjustments is a management challenge of its own.

Some years, the list of possible product solutions seems very long. To whittle the list of options to a manageable number and help prioritize the greatest crop protection needs for the coming years, the team turns to a group of hands-on experts: cooperative agronomists.

"Every December, we hold a product discovery meeting with agronomists from around the country to discuss major crop protection product issues," says Kuehl. "We ask them which adjuvants are working well, which aren't and what's missing in the current product lineups. And we have them vote on which products they'd most like to see. Then our development team focuses on the top five." >

After identifying which adjuvant active ingredients have historically been most effective with certain herbicides and helpful for resolving specific spray application issues, Kuehl and the team begin developing new formulations.

That's the process they've been using for years, and it produced the latest addition to the CHS line of adjuvants: CHS Level Best™ Pro. Available for the 2022 season, Level Best Pro is formulated to increase uptake, translocation and efficacy of herbicides, Kuehl says. "Level Best Pro offers a low use rate, provides excellent handling characteristics and improves weed control of many herbicides, including glyphosate and glufosinate. Those were all things agronomists told us they really wanted to see."

Testing the Best

The original Level Best formula, introduced in 2018, was developed to help herbicides be more effective on tough weeds with herbicide tolerance or resistance issues, explains Kuehl.

"Growers needed to use higher herbicide rates to control weeds, so originally we focused on identifying which adjuvant active ingredients were most effective, especially with glyphosate. The result was Level Best, a nonionic surfactant, water conditioner and deposition aid that significantly improves spray coverage, penetration and adhesion," he says.

The adjuvant has impressed growers in the central South Dakota trade area of CHS River Plains, says agronomist Ryon Berry. "They now ask for Level Best by name for use with glyphosate. Level Best has consistently improved the effectiveness of glyphosate on weeds, including kochia, that have been showing some herbicide resistance."

Level Best also seems to improve herbicide activity in less-than-ideal spraying conditions, says Interior, S.D., farmer Mike Amiotte. "Spring here can be cool and windy. Using Level Best with glyphosate has definitely improved our burndown weed control. With the current high cost of glyphosate, I wouldn't spray without Level Best."

Broader Uses

"We were also looking for an active ingredient that worked with the herbicide glufosinate," Kuehl says. "An 'aha moment' came to us one year later, when we identified an active ingredient that worked

9 STEPS TO LAUNCH

1. Agronomist survey identifies needs
2. Top needs named
3. Compounds selected for field trials
4. Field data reviewed/top compound chosen
5. Brand name and product positioning created
6. State registrations submitted
7. Marketing plan developed
8. Production and packaging determined
9. New product launched

Grower Mike Amiotte, left, Interior, S.D., works with agronomist Ryon Berry to choose adjuvants that help herbicides perform well in cool, wet spring conditions.

BEYOND ADJUVANTS

The growing portfolio of proprietary crop protection products offered by CHS contains more than adjuvants. The offering includes seed treatments, additives and soil amendments formulated to help make the most of a grower's investment in seed and crop protection products.

Adjuvants

Surfactants; penetrants; deposition aids; wetting, drift control and antifoaming agents; spreaders; water conditioners; and crop oil concentrates

Seed treatments

Fungicides, insecticides and micronutrients

Nutritional supplements

Chelates and chelated solutions and additives that make key nutrients and micronutrients more available to the plant

Biologicals

Naturally derived plant growth regulators and enzymes

Growers are probably most familiar with spray adjuvants and seed treatments, says Ryan Hageman, CHS technical specialist and business development manager for the western United States, but the area with the most growth potential is biologicals. "We had more than 20 biological products on our list for field-test consideration last year. After looking at crop use, practicality and potential value of each, we rated them and put five in field trials this year."

with both glyphosate and glufosinate. That's when we started to work on formulas with different active ingredient ratios for what would become Level Best Pro."

Six formulations were tested during the 2019 growing season in a large number of field trials conducted by CHS and third-party researchers at universities and private companies around the country, under a wide variety of growing conditions.

"We had minimum parameters for many adjuvant characteristics and were specifically looking to increase leaf cuticle penetration and reduce surface tension to improve herbicide efficacy on tough weeds, including Palmer amaranth, common ragweed and common lambsquarters," says Kuehl. "From all that data, we chose the formula that performed the best across most conditions and had no major weaknesses."

That formula went through two years of widespread field trials in 2020 and 2021 across the Upper Midwest. CHS River Plains, with 15 locations in central South Dakota, was one cooperative that hosted trials.

Kochia, marestail and lambsquarters are big weed challenges in the cooperative's trade area, says agronomist Connor Seaman, who works around Selby, S.D. "Preemergence herbicide applications don't always work here due to our limited rainfall. We've also seen a lot of glyphosate resistance develop in those key weed species, especially kochia.

"Our initial co-op trials with the original Level Best formulation showed it consistently helped herbicides work faster, so weeds died several days sooner," compared with other herbicide mixes containing other adjuvants, he recalls. "In last year's trials, Level Best Pro performed equally well in the field, but also had better handling characteristics."

Data-driven

Hundreds of research trials yield millions of data points to be analyzed and combed through each fall.

> "We were looking to increase leaf cuticle penetration and reduce surface tension to improve herbicide efficacy."
>
> *— Brian Kuehl*

"We always compare a new experimental product to those in our current lineup," says Ryan Hageman, CHS technical specialist and business development manager. "Did it outperform current products? Did it do well across multiple geographies? Does it have a unique fit? If the answers are 'yes,' that formula will probably go through another year of field trials. Fully 90% of crop protection products go through two to three years of field trials before graduating to cooperative test plots."

After three or four years of field tests, one product often stands out, says Kuehl, "although sometimes it takes a fifth year of data before we feel confident enough to begin commercialization."

Name, Label and Package

Before a new product can be registered and offered for sale, it needs a name.

"Everyone can offer suggestions, but the final decision falls to the marketing staff and product manager," says Kuehl. "Writing the label comes next, complete with all instructions for use, which can take weeks or months, depending on the product."

The state registration process is often lengthy, with requirements varying by state. "Some states act relatively quickly and are easy to work with, while others may require label rewrites to satisfy state-specific rules and regulations, as well as interpretation of those rules and regulations," he says. "That can add months to the process in some states."

Meanwhile, a product management team works with chemical suppliers and formulators to determine ingredient and manufacturing costs, how and where the product will be made and how it will be packaged.

When everything finally comes together and a new adjuvant is put to work controlling weeds in farm fields, it's often the culmination of a four- to six-year process, says Kuehl. "In the case of Level Best Pro, we were able to compact it into under three years, which is pretty amazing." ■

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CHS REPORTS SECOND QUARTER EARNINGS

CHS Inc. has released results for its second quarter, which ended Feb. 28, 2022. The company reported second quarter net income of $219.0 million and revenues of $10.3 billion, compared to a net loss of $38.2 million and $8.3 billion in revenues for the second quarter of fiscal year 2021.

For the first six months of fiscal year 2022, the company reported net income of $671.0 million and revenues of $21.2 billion, compared to net income of $31.4 million and revenues of $17.0 billion in the first half of fiscal year 2021.

"The U.S. agricultural industry continues to experience strong demand for grain and oilseed commodities. This strong demand combined with global market volatility contributed to higher earnings in the quarter," says Jay Debertin, president and CEO, CHS Inc.

"The Russian invasion of Ukraine in February 2022 has caused significant uncertainty and instability in global commodities markets, including agricultural commodities and crude oil," Debertin adds. "Despite these factors and inflationary pressures, CHS remains well positioned to continue to maximize value for our local cooperative and farmer-owners through our integrated global supply chain network."

CHS INC. EARNINGS* BY SEGMENT (in thousands $)

	Three Months Ended Feb. 28		Six Months Ended Feb. 28	
	2022	2021	2022	2021
Energy	$10,832	$(54,690)	$80,021	$(121,867)
Ag	55,181	14,044	341,606	97,053
Nitrogen Production	154,257	11,165	250,840	15,635
Corporate and Other	10,557	22,791	25,023	47,529
Income (loss) before income taxes	230,827	(6,690)	697,490	38,350
Income tax expense	11,931	31,668	26,651	7,339
Net income (loss)	218,896	(38,358)	670,839	31,011
Net loss attributable to noncontrolling interests	(104)	(129)	(122)	(431)
Net income (loss) attributable to CHS Inc.	**$219,000**	**$(38,229)**	**$670,961**	**$31,442**

**Earnings is defined as income (loss) before income taxes.*

CHS PARTNERS WITH 4-H TO EMPOWER YOUTH

The CHS Foundation has announced a $1 million grant for the 4-H True Leaders in Equity Institute, which will train up to 100 youth and adults to serve as equity leaders in their communities. The grant will also help launch the What I Wish People Knew program to support 4-H youth in sharing their passion for diversity, equity and inclusion.

"Inclusion is a core value at CHS. We want to remove barriers and create an environment in agriculture where everyone feels welcomed, respected and empowered to succeed," says Erin Olson, CHS senior director, talent management. "4-H has a unique ability to reach and empower youth from rural, suburban and urban areas. We look forward to seeing the impact youth can make through the True Leaders in Equity program."

Since 1947, the CHS Foundation has been dedicated to cultivating a new generation of agriculture leaders by supporting high-impact ag programs that create future champions and build a strong talent pipeline for agriculture.

2023 COOPERATIVE LEADERSHIP CONFERENCE ANNOUNCED

Plan now to attend the 2023 CHS Cooperative Leadership Conference, Jan. 8-10, in San Diego, Calif. The conference is designed for cooperative leaders and boards who want to gain leadership strategies, gather insights from inspiring speakers and connect with other leaders. Don't miss this opportunity to build skills and knowledge to help your cooperative organization grow and thrive.

Registration will open soon. Watch for details at **chsinc.com/owner-events**.

GET MORE: Sign up to receive CHS press releases by email or RSS feed at chsinc.com/news.

SUPPORTING UKRAINE EMPLOYEES

CHS Ukraine employees and their families who evacuated to Romania were visited by CHS President and Chief Executive Officer Jay Debertin and John Griffith, who heads up CHS ag businesses and CHS Hedging (see photo).

When Russia invaded Ukraine in late February 2022, CHS took immediate action to keep Ukraine-based employees and family members safe. The company transported employees and family members to a town near Bucharest, Romania, and arranged hotel rooms, access to a child psychologist, legal assistance, dental and medical care, and other services.

"The safety and well-being of our employees is our top priority," says Debertin. "Our Ukrainian family knows the entire CHS family stands with them."

CHS employees based in Ukraine are part of the Europe, Middle East and Africa (EMEA) team, which sources and markets grain, oilseeds and fertilizer in the Black Sea region, Mediterranean Basin and Middle East.

OWNERS FORUM SCHEDULE SET

Olivia Nelligan, CHS executive vice president and chief financial officer, center, chats with CHS owners at a 2021 owners forum.

Seven CHS owners forums are planned for July and August 2022. Each forum will include business and financial updates from CHS leaders and the CHS Board of Directors, as well as opportunities for owners to ask questions and provide feedback.

The following forums are planned:

July 19: Indianapolis, Ind.
July 25: Omaha, Neb.
July 26: McPherson, Kan.
Aug. 1: Laurel, Mont.
Aug. 2: Pasco, Wash.
Aug. 9: Minot, N.D.
Aug. 11: Rochester, Minn.

Each forum will begin at 9:30 a.m. at the location's local time and conclude about noon. Owners can participate virtually on Aug. 11.

Register to attend a forum and learn more at **chsinc.com/owner-events**. Visit the site often to see other upcoming owner events and watch recordings of previous events.

PLANTING A SEED IN SILICON VALLEY

In late 2021, CHS and Growmark announced Cooperative Ventures, a $50 million capital fund aimed at creating breakthrough technologies for the ag industry.

The fund will focus on three core investment areas: crop production, supply chain and sustainability. In mid-2022, Cooperative Ventures plans to announce its first partnerships and provide additional details on the first round of technology solutions.

"If we are going to accelerate technology advancements that solve existing and emerging challenges in the agriculture community, we need to get closer to those in this ecosystem, the ones developing technologies," says David Black, CHS senior vice president, enterprise transformation, and chief information officer. "We also need to make sure they understand the role of cooperatives and the significant opportunities that exist in agriculture."

David Black, CHS senior vice president, enterprise transformation, and chief information officer (holding microphone), discussed Cooperative Ventures at the World Agri-Tech Innovation Summit.

ALWAYS LEARNING

Despite her success as a chapter, regional and state FFA leader, Maddie Smith has a dark secret in her past: She used to sneak forbidden poultry into Fillmore Central High School in southeastern Minnesota.

"As part of our FFA community service program, we'd take animals to visit people in the local senior center. I'd have to put my box of ducklings somewhere before I went home, so I would just sneak them into school," she says, laughing.

The University of Minnesota junior no longer brings farm animals to class but remains deeply grateful for the lessons her seven years in FFA taught her about leadership, farming and herself.

"As you grow and mature, you realize it's not the awards you receive or the speeches you make," she says. "It's really about acknowledging the issues that are facing us and having the hope and earnestness to pursue something better."

Smith learned those lessons through some personal setbacks her first two years of college, including running for national FFA office twice without getting elected. The upside, she says, is that she now has more time and freedom to focus on academics — she's majoring in applied economics and communications studies, with minors in horticulture and international agriculture. This spring, she's studying in Chico, Calif., so she can see agriculture from a different geographical perspective.

While Smith is still considering career options, she knows agriculture will always be part of who she is. "You don't have to be working in agriculture to gain value from learning about it," she says. "It's something I will always care about, no matter what my job is." ***— Amy Sitze***

This summer, Maddie Smith will be working in Washington, D.C., as a legislative intern with National Farmers Union.


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C TOMORROW

Boost for Precision Ag

The CHS Foundation, funded by charitable gifts from CHS Inc., has announced six grants totaling $829,000 to support new generations of agriculture leaders. Since 2018, the foundation has committed more than $3.1 million to support new and expanding precision agriculture programs at colleges and universities around the U.S.

Colorado State University is the largest recipient of the grants, receiving more than $250,000 to develop new precision irrigation programming for high school ag students and educators. Other recipients are Montana State University, Lake Area Technical College, Oklahoma State University, Lake Region State College and Redlands Community College.

"The CHS Foundation recognizes the continuing strength and importance of precision agriculture and remains committed to supporting education that develops future ag leaders," says Nanci Lilja, president, CHS Foundation. "The world depends on agriculture, and the industry has never been more important. We need innovation and technology advancements to drive agriculture forward and attract the best possible talent to our industry. These grants will help further that innovation."

— Amy Sitze