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JOEL REICHENBERGER



ON THE COVER

American companies battle China's drone production prowess as the popularity of sky-high sprayers climbs.

PHOTO BY JOEL REICHENBERGER

Spray drones offer opportunities to optimize applications and improve ROI.

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EDITOR IN CHIEF Katie Dehlinger

MAGAZINE PRODUCTION

ART DIRECTOR Brent Warren
PRODUCTION MANAGER/EDITORIAL Barry Falkner
SENIOR COPY EDITOR Tara Trenary

DIGITAL CONTENT

DTN/PF CONTENT MANAGER Anthony Greder
DTN/PF ASSOCIATE CONTENT MANAGER Elaine Shein
DTN DIGITAL MANAGER Chris Hill

DTN CONTRIBUTING EDITORS

AG METEOROLOGIST John Baranick
SENIOR LIVESTOCK EDITOR Jennifer Carrico
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LEAD ANALYST Rhett Montgomery
ENVIRONMENTAL EDITOR Todd Neeley
SOCIAL MEDIA AND YOUNG FARMERS EDITOR Susan Payne
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FERTILIZER EDITOR Russ Quinn
SENIOR CROPS EDITOR Pamela Smith
LIVESTOCK ANALYST ShayLe Stewart

CONTRIBUTING COLUMNISTS

TAX COLUMNIST Rod Mauszycki
VETERINARIAN ADVISER Ken McMillan
EQUIPMENT SPECIALIST Steve Thompson
FAMILY BUSINESS ADVISER Lance Woodbury

SALES & ADVERTISING

PUBLISHER Jackie Cairnes (205) 335-3593 jackie.cairnes@dtn.com
SALES Mitch Hiatt (217) 278-0794 mitch.hiatt@dtn.com
SALES Doug Marnell (806) 790-0456 doug.marnell@dtn.com
SALES Steve Mellencamp (312) 485-0032 steve.mellencamp@dtn.com
SALES Jaymi Wegner (406) 321-0919 jaymi.wegner@dtn.com
PRODUCTION MANAGER Tony Green (205) 414-4733 tony.green@dtn.com

MEDIA OPERATIONS & DIGITAL STRATEGY LEAD Jackie Cairnes

ADVERTISING OPERATIONS SPECIALIST Megan Meager
ADVERTISING OPERATIONS SPECIALIST Kacie Reuss
ADVERTISING OPERATIONS SPECIALIST Adrienne Ramage

CIRCULATION DIRECTOR Veronica Denson

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EDITOR IN CHIEF, EMERITUS Gregg Hillyer

EDITORIAL OFFICES

PO BOX 430033, Birmingham, AL 35243-0033
(205) 414-4700

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FREEDOM: America's Most Important Farm Input

Words starting with “F” are plentiful around the Fourth of July—fireworks, food, family, friends—but the most important one is freedom.

As our country celebrates 250 years of independence, and I near a milestone birthday, I find myself reflecting on freedom far more these days. Many of my core childhood memories are Fourth of July celebrations or family vacations taken that week.

These memories are part of my personal history, but now that I'm a parent, I'm responsible for creating memories for all of us. We like to host our friends, family and neighbors for a party, complete with a fireworks show. It's flashy, and it's busy—but it's also quality time with people we care about on our terms.

That's freedom, and that's why this issue's “Our Rural Roots” columns made me misty. I realized that I'm not alone in experiencing this sensation, that others struggle to fully comprehend the powerful force of freedom in our everyday lives.

After 250 years of freedom on America's terms, it's hard to genuinely, personally understand the magnitude of the American Revolution, and yet the story of America is woven deeply into our personal narratives. The common thread is freedom.

America's founding fathers were much more than just revolutionaries. They were lawyers, businessmen and farmers. It's easier to remember details of their public lives rather than their private lives and pursuits.

George Washington is arguably the most revered founding father, but few remember his agricultural bona fides. That's why DTN Farm Business Editor Chris Clayton's article on George Washington's Mount Vernon estate and his farming philosophies is a refreshing read (see “America's Founding Farmer” on page 40). As a farmer, Washington paid remarkable attention to the details of both production and markets, and made business decisions based on economics, soil health and moral convictions.

Farmers haven't changed much in that regard in the past 250 years, but Washington wouldn't recognize the world they operate in today.

Between the competitors vying to grow their share of global exports and the buyers who can



KATIE DEHLINGER

decimate on-farm profits with their purchasing decisions, Washington would hardly conceive of the global grain market today.

He'd also be struck by the dramatic change in, and reliance upon, global trade flows for crucial inputs. The disruption in the Strait of Hormuz has made fuel expensive and fertilizer downright unaffordable. Washington relied on animals for both. Tariffs have pushed up the prices of tractors, parts and other implements. Washington relied on enslaved labor.

He wouldn't grasp how software can pose a risk to national security, how crop chemicals can be applied by a flying object or how those two factors could interact to create an opportunity for American businesses to innovate and compete. Yet, here we are, as *Progressive Farmer* editor Joel Reichenberger explains in “The Race for the American-Made Drone,” on page 20.

I imagine that if George Washington was a farmer today, he'd navigate these circumstances with the same attention to detail, creativity and boldness he demonstrated throughout his public and private careers.

Washington farmed through uncertainty, adapted when conditions changed and never stopped experimenting. Today's farmers do the same: navigating volatile markets, geopolitical disruption and technological transformation with grit and ingenuity.

The pressures of a global market are complicated, but the freedom to compete, innovate and build something lasting is still intact. That's the American advantage. If Washington's example tells us anything, it's that farmers who lean into that freedom will be the ones who define the next 250 years. //

Katie Dehlinger

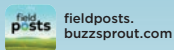
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Katie Dehlinger
Editor In Chief

► Email Katie Dehlinger,
katie.dehlinger@dtm.com



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Which Social Security Age Is Right for You?

As the farming community continues to age, one question comes up every year during tax meetings: When should I take Social Security? Like most things, there isn't a cut-and-dried answer. It involves many factors, such as age, health, how much (or how little) you could receive and if you plan on working after you start receiving benefits.

Let's get into the basics and discuss some of my thoughts.

The earliest age you can begin collecting Social Security retirement benefits is 62. However, receiving benefits early will reduce your monthly benefit compared to waiting until your full retirement age (FRA), which ranges from 66 to 67, depending on when you were born. At FRA, you get 100% of the benefit. For those who delay benefits past FRA, increased payments are available up to age 70. The increase from 67 to 70 can be up to 24% more in benefits for waiting three years.

If you plan on taking Social Security before you reach the FRA, Social Security benefits may be subject to reductions if your income exceeds certain limits. The IRS uses a formula to determine how much of your benefits may be reduced based on your earnings from work, pensions or other sources. For 2026, the Social Security benefit gets reduced by \$1 for every \$2 you earn over \$24,480. Keep in mind that the \$24,480 is looked at separately, so one spouse might not get any reduction, while the other spouse may get some or all benefits reduced. Once you reach FRA, there is no reduction for additional earnings.

A spouse can elect to receive up to 50% of the other spouse's Social Security retirement benefit at FRA, provided the other spouse has already filed for his or her own benefit. The earliest a spouse can claim these benefits is age 62, but claiming early results in a reduced benefit. When a spouse passes away, the surviving spouse can elect to receive the deceased spouse's Social Security benefit if it is higher than their own. The earliest age a survivor can start benefits is 60 (or 50 if disabled), but the amount is reduced if claimed before FRA.

Taxation of Social Security benefits often comes as a surprise. The IRS uses a combined income method to determine how much of the

Social Security benefits are taxable. Combined income means your adjusted gross income plus one-half of your Social Security benefits. If your income is less than \$25,000 single or \$32,000 married filing jointly (MFJ), then zero percent of the benefits are taxed. If your combined income is \$25,000 to \$34,000 single or \$32,000 to \$44,000 MFJ, then 50% of the benefits are taxed. And, if your combined income is above \$34,000 single or \$44,000 MFJ, then 85% of the benefits are taxed. Most states do not tax Social Security benefits, but a handful do. As of recent years, states that tax Social Security benefits include Colorado, Connecticut, Kansas, Minnesota, Montana, New Mexico, Utah, Vermont and West Virginia.

Now, here are some of my thoughts. Most of my clients have pushed farm income down to avoid tax. This has left them with little earned income to receive much from Social Security. That may persuade them to wait longer to get a decent Social Security payment. Also, my farmers mostly work into their 70s, so taking Social Security at 62 is typically a waste. However, if you have health issues or have financial needs, you have to consider taking Social Security prior to FRA.

My suggestion is to discuss your decision about when to take Social Security with your tax professional or a Social Security expert. This is not a one-size-fits-all determination. ///

TOOLS FROM THE PAST

Livestock stayed where they belong when this tool is used. What is it?



Answer:

This is a wire stretcher to keep fencing tight. A clevis attaches through the hole at one end, while the ridges on the circular piece hold the wire in place as you push down on the handle to secure it.



Rod Mauszycki

*Tax Columnist
Rod Mauszycki,
J.D., MBT, is a tax
principal with CLA
(CliftonLarsonAllen)
in Minneapolis,
Minnesota.*

► Read Rod's "Ask the Taxman" column at **ABOUT.DTNPF.COM/TAX**

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WHAT'S TRENDING @ DTNPF.COM

► Cattle continue to be a bright spot in agriculture. Despite high beef prices, consumers' appetite for burgers and



steaks remains strong. Cattlemen, meanwhile, enjoy robust market prices as the nation's herd size continues to be tight. Despite the promising outlook, risks remain.

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June 11 & July 10: WASDE Report: As the 2026 season progresses, commodity markets will closely monitor the latest data on world supply and demand. Join DTN Lead Analyst Rhett Montgomery as he breaks down the numbers and provides insights on what it means for grain prices.

BLOGS & COLUMNS



RUSS' VINTAGE IRON

Nostalgic histories of yesteryear's farm equipment

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Fertilizer Editor
@RussQuinnDTN



MACHINERYLINK

Industry news on equipment and technology

► **Dan Miller**
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Wheat's 2026 Turnaround: A Song of War and Weather

When I stood in front of an audience of producers in February 2026 at the National Farm Machinery Show, in Louisville, Kentucky, I didn't have many bullish things to say regarding the wheat market. After all, 2025 had featured one of the most incredible supply-side pushes in recent memory, with almost every significant wheat-producing and -exporting country reaping a record or near-record crop. As a result, even with a modest rally in futures from October 2025 lows, most active wheat futures at that point remained in the bottom 20% of observed prices (adjusted for inflation) going back to 1990. As it turned out, had that presentation been only a few weeks later, the discussion would have been a much different one, and likely much longer. Wheat price action in spring 2026 was a testament to how quickly market shocks can throw a wrench into even the most thought-out marketing plans and how crucial it is to be adaptable in the modern trading era.

In past installments of "Inside the Market," I've talked a few times about how market fundamentals (supply and demand) often don't tell the full story of price action. Wheat is, of course, no exception to that. In fact, since 1995, U.S. ending stocks-to-use ratios, derived from the monthly "World Agricultural Supply and Demand Estimates" (WASDE) report, only explain roughly 26% of the variation in most-active Chicago wheat futures over the same period. The relationship is even weaker for world stocks relative to use. Of course, crop conditions and weather forecasts carry a high degree of influence. However, being such a widespread crop globally, wheat is also much more sensitive to outside influences relative to corn and soybeans. While there is

little denying that, at the time of writing this in late April, the current fundamental situation around the globe remains comfortable on paper. A fearful outlook for future production is a potent factor in price discovery.

In the U.S., wheat plantings are expected to hit their lowest point on record (back to 1919). And, widespread drought across the Plains could ultimately combine with the low acreage to cut winter wheat production by 15% from 2025, if not more. Meanwhile, for the second time in five years, the wheat market is also facing wartime uncertainties, with crucial fertilizer supplies stranded in the Strait of Hormuz and sending farmgate nitrogen costs to their highest point since the start of the Russia-Ukraine conflict four-plus years ago. USDA recently forecast a 10% decline in Canadian wheat production as well as a 19% year-over-year drop in Australia for 2026–27, very likely driven by less acreage as producers opt for less-fertilizer-intensive crops. In a world where wheat demand continues to grow at a steady annual rate, production slips in three major exporting countries is not an insignificant storyline.

Time will have to tell for certain where 2026 production will land, how world trade may shake up as a result and, ultimately, how prices will fair through the latter half of 2026 and into 2027. When markets face war and weather risk, price volatility may be about the only certainty. However, with the chance for rapid price swings also comes opportunities, from a marketing standpoint, for producers to capitalize on higher prices. ///



Rhett Montgomery

Lead Analyst

► Read Rhett's blog at [ABOUT.](#)

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MARKETS

► You may email Rhett at rhett.montgomery@dtn.com



GETTY IMAGES



New SCN Diagnostics Lab Opens This Summer

Farmers soon will have a modern ally in their battle against the most destructive soybean pest in the United States.

This summer, a new soybean cyst nematode (SCN) diagnostic laboratory is slated to open at the University of Missouri (MU). The 3,200-square-foot facility replaces an outdated space on campus and will modernize the lab while expanding nationally recognized diagnostic services.

SCN is a soilborne microscopic roundworm that feeds on and damages soybean roots. According to The SCN Coalition, this yield-limiting pest can cause up to 30% yield loss without causing noticeable aboveground symptoms, leading to annual losses that exceed \$1.5 billion.

Mandy Bish, MU Extension state plant pathologist, says the SCN diagnostic lab conducts plant and nematode screening for the biotech industry, researchers and farmers. Demand for these services has more than doubled in recent years as more farmers engage in SCN management in their fields.

The new lab's design includes dedicated zones for handling and processing before transitioning into a "clean zone," equipped for microscopy and molecular diagnostics. Modernization will streamline processes to deliver results more efficiently, improve molecular testing capabilities and create hands-on opportunities for students and researchers, Bish explains.

The new lab was made possible through a \$4-million state appropriation.

"Investing in a modern nematode clinic strengthens Missouri's ability to address soybean cyst nematode and other yield-limiting challenges while delivering practical research and diagnostics," says Casey Wasser, CEO and executive director of Missouri Soybean Association, in an MU Extension press release.

Construction is expected to be completed by July 2026. Learn more at <https://www.scndiagnostics.org>



JASON JENKINS

Farmers Share Cab Views From Maryland, Minnesota

For the 22nd year, two farmers are chronicling their growing seasons through DTN's "View From the Cab" series. In 2026, those views will come from Chris Weaver, of Finksburg, Maryland, and Tyler Rath, of Belgrade, Minnesota, as they share growing conditions, farm life and rural issues from two agriculturally distinct regions of the country.

Weaver is a sixth-generation farmer and the first Maryland farmer to participate in "View From the Cab." He and his family grow corn, soybeans, hay, barley and rye on their central Maryland farm. Rye is sold to the distillery industry. They also run a cattle-finishing operation and sell beef off the farm directly to consumers. In addition to the farm, Weaver has branched into agronomic consulting and seed and fertilizer sales.

Rath is a third-generation farmer in central Minnesota. Corn, kidney beans (white, light red, dark red), sweet corn, English garden peas, soybeans, navy beans, snap beans and hay for cattle make up the crop portfolio. He raises most of these crops in conventional and certified organic systems. A Black Angus cow/calf operation and direct-to-consumer beef sales round out the family farm.

While slightly more than 1,200 miles separate the two farms, similarities are emerging this season. Both farmers have aggressive production efficiency goals, for example. Growing more with less ranks high on the list of topics that Weaver wants to address. Rath hopes the series will allow the public to see it is possible to raise a family in rural America and provide high-quality products to consumers.

Visit DTNPF.com throughout the growing season for the latest "views." ///



Chris Weaver

JASON JENKINS



Tyler Rath

ASHLEY RATH

Celebrations That Last The Years

BY Meredith Bernard

My favorite childhood memories are woven along the shores of the Pamlico River, in eastern North Carolina. At various times, as many as 14 family members would pile into my grandparents' two-and-one-half-bedroom, one-bath house (with porch beds everyone fought over).

At first light, I'd help my dad pull in the fish net and see what treasures we had caught overnight. Days were full of swimming, and my Granny made sure we never missed a meal. Special nights were spent rocking on the screened-



MEREDITH BERNARD

in porch watching flashes of lightning frame homes and the tree line across the river.

But, the ultimate nights on the river were when the sky lit up with fireworks on the Fourth of July. If you've never experienced fireworks over water, add it to your bucket list, and thank me later.

Besides the major fireworks display, my brother, cousins and I had our own fun with bottle rockets and sparklers—exploding gifts that arrived each year with family from Florida. During the day, we'd throw watermelons back and forth in the river, then slice them over a newspaper-covered picnic table in the front yard and get back in the river to “clean” our sticky faces and hands. As the sun set over the water, we'd enjoy hot dogs and hamburgers with all the fixin's for supper before settling in for the grand finale in the sky.

I wouldn't trade those Fourth of July celebrations for the world. As our family has grown, and time has changed traditions, those memories come back every year as sweet reminders of important yesterdays.

This year marks 250 years of our country's freedom. While all of our celebrations may look different, at the heart of our independence lies the chance to observe what matters most to us all. I hope we all take the time to do just that. ///



Meredith Bernard writes, photographs and celebrates her rural roots from North Carolina. Follow her on social media @thisfarmwife and visit her website at thisfarmwife.com

Free To Be Me: 250 Years Later

BY Jennifer Campbell

This year, America—the land of the free and the home of the brave—turns 250 years old. That milestone reminded me of when I was 6 years old, in first grade, celebrating the 200th Anniversary.

My elementary school put on a big patriotic program. We waved flags, sang all the patriotic songs and probably came just short of shooting off fireworks in the multipurpose room. My mom made me a blue-and-white gingham dress, and let me tell you, if that thing still fit, you better believe I would wear it.



COURTESY OF JENNIFER CAMPBELL

But in all honesty, I am confident at that tender age, I didn't understand what and why we were celebrating.

Fifty years later, I'm still not certain I fully understand or comprehend the sacrifices that were made 250 years ago so I can live the life I do today. And, if I'm being even more honest, I'm not sure any of us completely get it. The weight of history, the decisions, the courage—it's bigger than what fits neatly into a school program or even into words.

What I do understand is that my “now” looks a lot different than it did back then.

I won't be on a stage this year. I'll be working—maybe in a tractor, maybe feeding cattle or maybe sitting on my front porch—doing the everyday things that make up a life I love.

And, maybe that's the best kind of celebration there is, because freedom doesn't always look like fireworks. Sometimes, it looks like the ability to wake up and choose your life. To work hard. To stay. To build. To keep going.

I may not fully understand it all, but I am beyond thankful.

Thankful for the freedom to be me and always proud to be an American. ///



Jennifer (Jent) Campbell waves her flag, writes about agriculture and tends crops and livestock from a seven-generation Indiana family farm. Follow her on X @plowwife. Find her Farm Wife Feeds blog at farmwifefeeds.com



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Super El Niño Expected to Bring Favorable Summer Weather for Much of the U.S.

Variable weather gripped the spring as we swung from hot and dry to cool and wet, and everywhere in between. Pattern changes were extremely noteworthy, with record heat for the Southwest and Plains in

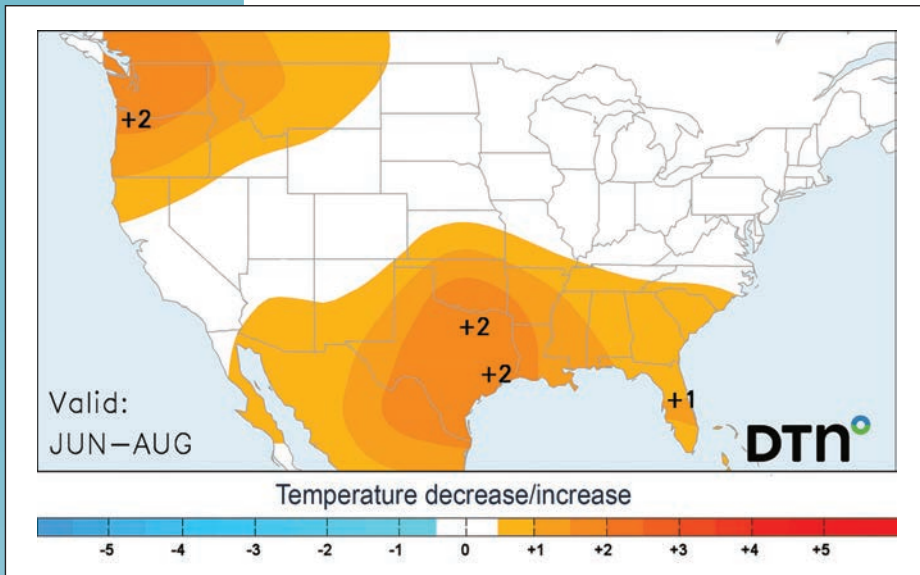
Pacific Northwest (Idaho, Oregon and Washington):

In general, it was warmer this spring, but precipitation was variable, as some areas saw decent moisture while others did not. Coming off a disappointing winter season where snowfall in the mountains was below normal, drought is gripping much of the region for the summer. Despite this, soil moisture in early May was somewhat favorable, and crops are off to a decent start. Summers during El Niño are quite variable with precipitation, making the outlook uncertain. Above-normal temperatures are favored, though, which may bring extra stress.

Southwest: A few larger storm systems early in the spring helped to push back the drought a bit, but late-spring dryness and extra heat have pushed the drought back into much of

the region again. This year's El Niño may bring a more favorable rainfall pattern and increase the monsoonal rain in the interior, but California is a bit more uncertain. Though there is no significant signal for warmer or colder temperatures, regular summer heat is likely to dry out vegetation and make for a busy fire season.

Northern Plains: This region tried to stay active during the spring and largely succeeded. However, big-time winter storms and widespread precipitation events were rare. Drought eased slightly in Montana but grew in South Dakota. Early in May, drier conditions in North Dakota were a concern, as well. But, the bigger story was the more persistent cold, which caused spring planting to start off slowly. This region is expected to be on the edge of busier weather to the south and quieter weather to the north. That could mean some extra stress in terms of both heat and dryness, especially early in the season. Late-season rains may increase, however, which could save some areas.



DTN GRAPHIC

Above-normal temperatures are likely in the Pacific Northwest, South and, especially, Texas.



John Baranick
Ag Meteorologist

► Read John's blog at ABOUT.DTNPF.COM/WEATHER

► You may email John at john.baranick@dtn.com

March, and late frosts and freezes for the Plains and Midwest in May. Such extremes can sometimes indicate that the major climate drivers are in a state of significant change, and indeed they are.

After a weak and fairly brief La Niña this past winter, we are well on our way to perhaps a record strong El Niño by this fall or winter. In the process of building this likely “super” El Niño, history suggests that the weather pattern will be quite active, with an overall beneficial rainfall pattern for much of the country.

That is good news when looking at the most recent Drought Monitor picture, which has had some detrimental effects this spring. It also means that temperatures this summer should be milder, especially for the middle of the country.

That combination provides optimism for U.S. agriculture this summer. But, it should be noted that even in a favorable overall pattern, some areas of the country will not see the rainfall and temperatures that many others will, leading to areas of drought that may have some ill effects.



Central and Southern Plains: Though an active pattern meant drought reduction over eastern Texas and Oklahoma this spring, the western and northern ends of the region found it hard to find much moisture, leading to increasing drought for much of the region. Occasional precipitation in May softened up some areas, but long-term deficits are large, and late-season frosts in early May may have caused significant damage, as well. However, the pattern is likely to start picking up in late May and through much of the summer. Though above-normal rainfall and near-normal temperatures should be favorable, thunderstorms in the Plains tend to miss some areas. Those caught on the dry side could have unfortunate stress.

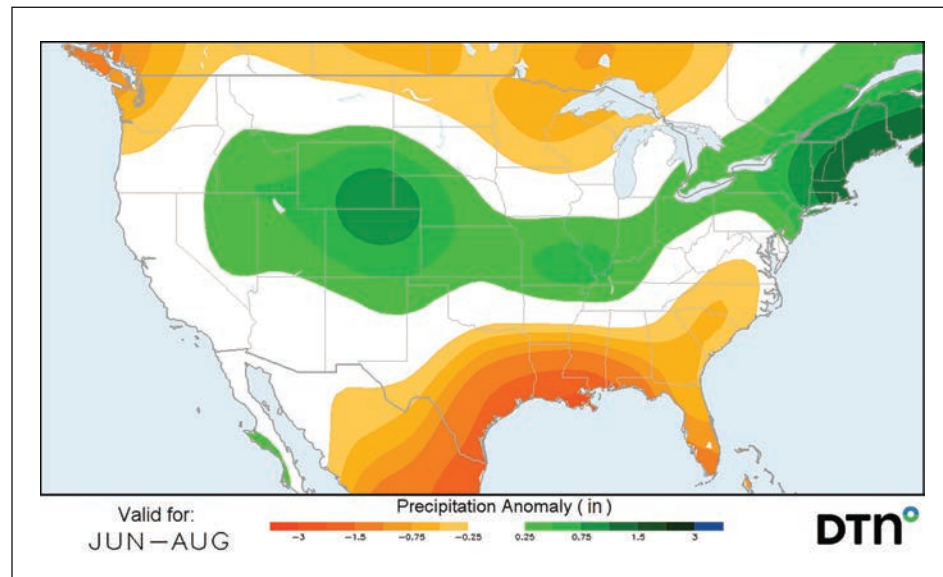
Coastal Texas and Louisiana:

An overall busy spring pattern led to large-scale drought reduction, though it was still present in early May. That may be a significant issue. While much of the country is expected to see a busy pattern, this area is not as likely to do so. Extra heat and lower precipitation are likely to cause drought stress for crops this summer. If there is any good news, the risk for hurricanes is lower this year.

Midwest: Drought was a major problem in the beginning of the spring, but an extremely active pattern has all but eliminated drought from the region, and more areas have had problems with dampness and flooding than drought. Temperatures have been extremely variable, and some late frosts in May may have caused damage and delays to planting. The summer is expected to be quite favorable for most of the region. El Niño typically produces frequent precipitation and mild temperatures. Though there may be some regional dryness, the outlook is quite favorable. We will have to watch out for an increase in severe weather, though.

Delta/Lower Mississippi Valley: Early-spring dryness meant an extreme increase in drought coverage and intensity, but rainfall in late April and May helped to soften soils and build moisture. There

were still some dry pockets in early May, but the area is much improved heading into summer. This will be needed, as the region will be on the edge of more frequent precipitation to the north and dryness toward the Gulf. Northern areas may see better conditions, but toward the south, rain may be less frequent, while heat would be more frequent, inducing stress.



Mid-Atlantic and Northeast:

Spring precipitation favored the Northeast over the Mid-Atlantic, as northern areas saw drought improvement, while the south has seen drought degradation. Like the spring, summer may be variable in the region, producing more precipitation across the north and less-frequent precipitation farther south. Seasonal temperatures are expected to be fairly mild, with fewer heat waves, but stress may still increase for southern areas.

This year's El Niño may bring a more favorable rainfall pattern by this fall to some parts of the country.

Southeast: Drought increased significantly for the first two months of spring. Late-April and early-May precipitation events have helped, but long-term rainfall deficits remain extremely large heading into summer. El Niño tends to favor hotter and drier conditions in this region, but there is more uncertainty in the historical record here. Variable conditions may allow for timely rains in some areas and heat stress in others. What may be missing is hurricanes, which are less likely during El Niño. ///

REVITALIZE Unproductive Salty Soils

Following specific soil-health and management practices can remedy salinity areas.



JOE DICKIE PHOTOGRAPHY

Tilling and planting through salt-crusted soils in hopes of gaining some yield is mostly a fool's errand, especially in the Dakotas. It just expands nonproductive acres.

North Dakota crop consultant Lee Briese talks of high-salinity areas as “lean acres.” He compares these inefficient, barren soils to keeping workers who consistently fail to show up to work. Both are inefficiencies that shouldn't be tolerated in a farming operation. These lean, unproductive acres persist across 14 to 15 million acres in the Dakotas.

Fortunately, farmer experiments and on-farm soil data research show that these salty sea remnants can be pushed deeper into the soil, allowing plants to begin to grow again.

To succeed with recovery, soil salinity areas require patience, salt-tolerant perennial plants and a soil-health mindset. “Given the proven results we've seen on the Cain Creek farm, I believe more producers will reclaim their land if they latch onto this opportunity,” says Kent Vlieger, state soil health specialist, NRCS South Dakota.

> PREHISTORIC BEGINNINGS

These ancient salts were left behind in shale and sediments when the Western Interior Seaway that split North America receded 65 to 70 million years ago. The natural salts can rise from deep in the soil profile to the root zone and the soil surface during dry periods because of capillary rise and evapotranspiration.

To reduce capillary rise of salts, it's critical to maintain plants with root depth diversity and growth beyond the corn/soybean cropping cycle—one of the principles of building soil health.

Without plants to use and transpire moisture, salts will rise and accumulate, turning once-productive soils into dying, barren nonproductive acres. And, without healthy soils with reasonable infiltration rates, even rainfall can't push salts back down the soil profile.

> RESEARCH PROVES SOLUTIONS

Most farmers know precisely where these salty, unproductive areas exist in their fields, especially if they're only seeing weeds that tolerate higher saline levels, like kochia, prairie cordgrass or foxtail barley. Such was the case on the 400-acre Cain Creek Demonstration Farm, owned by the Beadle County Conservation District, near Huron, South Dakota.

Beadle Conservation District bought this degraded cropland to showcase grass pasture and no-till crop plot rebuilding projects. Vlieger has worked with the district board and the producer to remediate a low-production 12-acre area.

“In 2015, we began to reseed this 12-acre plot with salt-tolerant hybrid green wheatgrass (AC Saltlander) and alfalfa (SalinityMax) knowing it may take up to

Jeff (above) and Scott Hamilton seed multiple salt-tolerant forages to overcome salinity and sodic soils on their South Dakota farm.



YEAR 1



YEAR 3

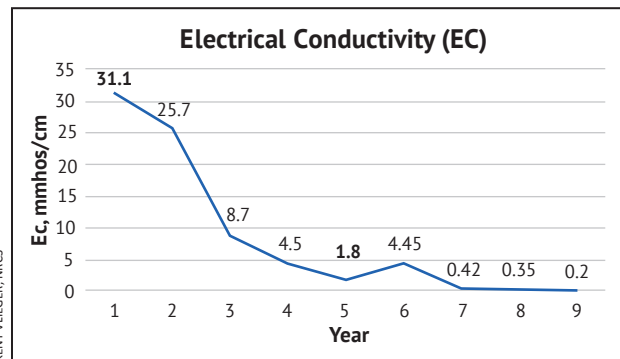
PHOTOS: JOE DICKIE PHOTOGRAPHY

Saline soil restoration seeding, AC Saltlander wheatgrass and alfalfa, Year 1. Note the thin stand of grass and sparse alfalfa in the area of high salinity.

a decade to push the salt down in the soil profile,” he says. “The plan was to use it as hay ground. The challenge was that nothing was growing, and the soil tests in the top 6 inches showed extremely high salinity. The electrical conductivity (EC)

reading was 31, almost eight times higher than a 4 EC, which is considered a saline soil.”

Just four years later, the extreme salinity had dropped from 31.1 EC (see chart, below) to 1.8 EC. As plant growth and root depth improved soil health each year, alfalfa/grass production increased from 1,400 pounds per acre (one 2015 hay cutting) to 15,400 pounds per acre (three 2019 cuttings).



“The plant growth success achieved on saline soils at Cain Creek provides hope for many producers with saline issues. By adopting this practice, soils, crops, livestock and wildlife can benefit,” Vlieger says.

To learn how the salt moved within the soil profile, soil samples were collected from the zero- to 6-inch and 6- to 24-inch zones. Over the years, Vlieger watched as the perennial plants’ establishment and growth used more water, improved soil structure and increased water infiltration.

“As salt levels in the zero- to 6-inch layer decreased, the subsequent years saw increased salts in the 6- to 24-inch zone. Several years later, the salt levels were even moving deeper than 24 inches where we were testing,” Vlieger says. “Essentially, we’ve watched in slow motion how these salts were pushed down below the crop germination and growth zones. Today, the plot could realistically return to row crops if cover crops are used to armor the soil and keep roots growing between cash crops.”

Saline soil restoration, Year 3. Note the grasses established and filled in the high-salinity area.

> GROWERS BEAT SALINITY

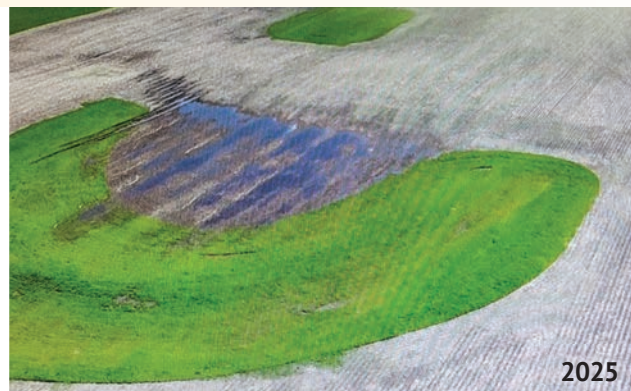
Thirty miles northwest of the demo farm, brothers Jeff and Scott Hamilton began 20 years ago their journey to reduce saline soil.

They couldn’t raise any crop in their saline spots, and the areas kept expanding on their farm, near Hitchcock, South Dakota. ➤

Restored (with perennial vegetation) soil profile from demo farm. Salts are shown at depth, where they’re supposed to be, instead of at the soil surface creating production issues.



JOE DICKIE PHOTOGRAPHY



PHOTOS: JOE DICKIE PHOTOGRAPHY

Rather than continue to invest valuable input dollars across these nonprofit acres, the Hamiltons started seeding a saline-tolerant wheatgrass mix in 2016. Given the slow emergence, they decided to add Garrison creeping foxtail and SalinityMax alfalfa.

This new mix became so prolific in saline soils that nearby Millborn Seeds named this blend “The Hamilton.”

“Multiple species really helped us overcome salinity and sodic soils, high pH and saturated soils,” Jeff Hamilton says. “After three years, we were cutting 3 to 3.5 tons per acre of quality forage in areas that hardly grew weeds.”

Another critical piece learned along this journey to reduce these white desert areas is to seed beyond the edges of salinity. “We had the best success when we made several drill passes upland from the low saline spots to intercept and use the water before it drains into and expands the low saline spot,” Hamilton says.

These two images of the same field area, show the conversion from barren high-salinity soils in 2021 to displaying a revitalized soil biology in 2025, where living roots from perennials have reestablished plant growth.

The brothers believe their system has overcome the broken water cycle caused by the monoculture corn/soybean rotation, which uses water for only five months of the year.

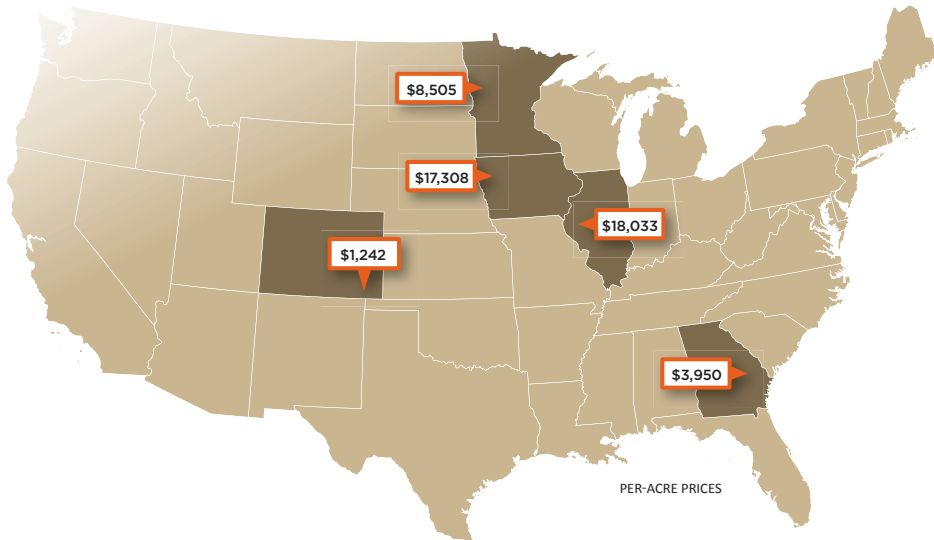
“Having living plants/roots/biology, and allowing the plants to be removed with periodic haying or grazing is very important in the remediation of these areas,” Hamilton says. “We have seeded Japanese millet, cereal rye, Italian ryegrass, barley and have even let kochia grow and then cut it while vegetative. All these plants tolerate salt well and speed up the remediation process.”

Hamilton admits it took a mindset change and realizing longer-term thinking was needed to overcome some of the short-term ag policies that have contributed to the expansion of these areas. “We encourage other producers to apply management that needs to go beyond the scope often limited by acres that are covered by crop insurance or CRP [Conservation Reserve Program],” he says. ///

Soil-test readings show dramatic soil improvement between 2015 and 2023. KENT VUEGER, NRCS

Beadle County Conservation District: Cain Creek Saline Sodic Soil Reclamation Demo Plot							
Year	pH	EC	Ca ppm	Mg ppm	Na ppm	SAR	Notes
2015	8.2	31.1	465	2726	8054	31.3	Salinity Max Alfalfa and AC Saltlander Wheatgrass planted 4/10/2015. Dry spring, good precip rest of year. One cutting mid summer. 10 lbs Alfalfa, 5 lbs grass/acre
2016	7.8	25.7	450	1274	1335	29.6	Wet May (6”), very dry rest of year, < 6” precip for next 11 months. 3 cuttings, 3 bales/ac 1st, then 2, then 1.
2017	7.6	8.7	448	687	459	9.2	Dryness from previous year carried over to a dry spring and summer. Only one cutting, one bale/ac.
2018	7.6	4.5	422	313	351	3.1	Late April blizzard, dry May, avg June. 3 bales/ac 1st and 2nd cuttings
2019	7.5	1.8	198	104	154	2.2	4.5 1400lb round bales/ac 1st & 2nd cutting. 2 bales/ac 3rd cutting. Record setting precipitation. Water flowing from adjacent field all summer/fall. Alfalfa drown out in some areas.
2020	7.4	4.45	462	285	326	2.9	Heavy rainfall in June, avg. otherwise. 3.8 bales/ac 1st cutting, 3.1 2nd, 2.5 3rd.
2021	6.8	0.42	190	90	57	2.6	Extremely Dry! One cutting .8 bales/ac
2022	6.9	0.35	203	92	43	1.2	3.2 bales/ac 1st cutting. 2.8 2nd. No third due to drought.
2023	6.9	0.2	188	90	23	0.4	Dry April through mid-June. Hot mid-May through mid-June. Poor first cutting, .8 bales/ac. Second cutting excellent, 3.8 bales/ac. Did not take 3rd cutting due to heat and drought.

Recent Farmland Sales



COLORADO, Baca County. A 1,288-acre farm sold at auction in three tracts for \$1.6 million, or an average of \$1,242 per acre. Tract 1 includes two irrigation wells, an 18-tower Zimmatic sprinkler, a PSI NG motor and generator on 635 acres. The tract includes 244 dryland acres, 147 Conservation Reserve Program (CRP) acres, 252 base wheat acres with a 39-bushel-per-acre (bpa) yield. It also includes 40 base corn acres with a 160-bpa yield, 68 grain sorghum acres and 50 base sunflower acres. The 330-acre Tract 2 includes 250 irrigated acres and about 82 CRP acres. The third property is 325 acres of CRP land. On tracts 1 and 2, the buyer was to pay \$75 an acre on planted acres and will receive 100% of the 2026 wheat and other crops. **Contact:** Travis Weaver, Farm and Ranch Realty Inc.; travisweaver@hotmail.com, 719-342-2997 <https://www.frmail.com>

GEORGIA, Washington County. A 120-acre farm sold for \$474,000, or \$3,950 per acre. The recreational tract of land suitable for hunting includes food plots and deer stands already in place. The land features pine timber, mature hardwoods and creek bottoms known for strong waterfowl potential, a habitat for white-tailed deer, turkey and

other wildlife. **Contact:** Andrew Harvey, Plantation Properties and Land Investments LLC; andrew@LandandRivers.com, 478-357-3078 <https://landandrivers.com>

ILLINOIS, McDonough County. A 244-acre farm sold at auction in four tracts for \$4.4 million, or an average of \$18,033. An 80-acre property that sold for \$1.5 million has a productivity index of 140.9 with an average corn yield of 189.6 bpa, a soybean yield of 61.6 bpa, a wheat yield of 75.7 bpa and oats at a yield of 99 bpa. The farm also includes an 81-acre tract with a 137.9 Crop Productivity Index (CPI) with an average corn yield of 185.6 bpa. The 79-acre Tract 3 that has a CPI of 141.9 sold for \$18,600 per acre. The sale includes a 4-acre plot with a farmhouse, machine shed, grain bin, detached garage and another outbuilding. It also includes a Soil Productivity Index of 142.4. **Contact:** Michael Sullivan, Sullivan Auctioneers; Sold@SullivanAuctioneers.com, 309-333-0916; or Louie Zinn, Sullivan Auctioneers; Sold@SullivanAuctioneers.com, 319-795-2314 <https://sullivanauctioneers.com>

IOWA, Sioux County. A 156-acre farm sold in two tracts at auction for \$2.7 million, or an average of \$17,308 per acre. The first 71-acre tract produced 238-bpa corn in 2024 and 68-bpa soybeans in 2025 on a property that has 64 tillable acres. The second 85-acre tract includes about 81 tillable acres that produced 74-bpa soybeans in 2024 and 218-bpa corn in 2025. **Contact:** Blake Zomer, Zomer Company Realty and Auction; blake@zomercompany.com, 712-460-2552; or Bryce Zomer, Zomer Company Realty and Auction; Bryce@zomercompany.com, 712-451-9444 <https://zomercompany.com/site/>

MINNESOTA, Clay County. A 388-acre farm sold at auction in three tracts for \$3.3 million, or an average of \$8,505 per acre. Tracts 2 and 3 include 200 total base acres, including 152 soybean acres with a 33-bpa yield, 37 wheat base acres at 58 bpa and 12 corn base acres with a 144-bpa yield. The two tracts combined sold for \$2.6 million. A 78-acre property includes 50 base acres divided between 38 soybean base acres, three corn base acres and nine wheat base acres, selling for \$9,350 per acre. **Contact:** Jack Pifer, Pifer's; jack@pifers.com, 701-261-4762; or Kevin Pifer, Pifer's; kpifer@pifers.com, 701-238-5810 <https://pifers.com>

These sales figures are provided by the sources and may not be exact because of rounding.

Submit recent land sales to landwatch@dtm.com

Find previous Landwatch listings at www.dtnpf.com/agriculture/web/ag/magazine/your-land



Workwear That Does THE JOB

No two days are alike on the farm or ranch. Daily tasks can be as variable as the weather, while the days stretch from dawn to dusk. With such a demanding schedule, farmers and ranchers require workwear that stands up to the job.

For more than 75 years, STRAUSS has been designing and manufacturing durable workwear in Germany, becoming Europe's leader in this category. The company has brought that same renowned reputation for field-tough workwear to the U.S. to outfit the country's hardest workers.

STRAUSS teamed up with DTN/*Progressive Farmer* to put their products to the test. Three couples were provided a wide array of apparel and work boots and asked to share their observations after using them for at least a month.

Meet The Testers

■ **Lillie Beringer-Crock and Brian Crock**
*Beringer Family Farms, Cascade, Iowa
Corn, Soybeans, Hay, Cattle, Direct-To-Consumer Beef Business*

■ **Sarajane and Travis Snowden**
*Brinker Creek Ranch, Toponas, Colorado
Cattle and Direct-To-Consumer Beef Business*

■ **Emily and Taylor Nelson**
*Nelson Farms, South Sioux City, Nebraska
Dryland and Irrigated Corn and Soybeans*

All six testers were impressed with the versatility and comfort of the clothes, as well as attention to details like extra deep pockets.

"I'm in work clothes the majority of my life so they have to be comfortable and stay comfortable all day long," stresses Taylor Nelson. "The Power Denim 5-Pocket Jeans had a nice fit, not too loose where it poses a safety hazard when climbing around equipment, but flexible enough to move around freely."

Brian Crock gives high marks for the workwear's comfort, too. "The work pants move with you to the point where you don't feel constricted. The material tends to be more flexible and feels lighter and softer than conventional denim. The elastic Flexbelt® waistband is also a plus."

Designed For Durability

Comfort, however, does not come at the expense of durability. STRAUSS Pocket-Protected Work Pants e.s. iconic, for example, are made with triple-stitched mainseams. Each pocket is reinforced with 100% polyamide to stand up to the toughest tasks.

"As soon as you put on the cargo pants, you not only feel the quality, but also the durability," notes Lillie Beringer-Crock. "You just know they are going to last a long time."

For Sarajane Snowden, it's all about the pockets. She says her Double Front Ripstop Cargo Work Pants e.s.e:pic featured a dedicated cell phone pocket. "I was always afraid of losing my cell phone because it often fell out of my other pants. But the pockets in these cargo pants are big and deep. It's one of my favorite features."

It's attention to such details that adds exceptional functionality and value to STRAUSS workwear. For example,



multiple pockets are strategically placed on pants for easy access. Features include hidden tool pockets for tape measure and knife, ruler pockets with reinforced openings, zippered and snap fastener closures, hammer loops and more. Many pants come with knee pad compatibility.

Work Boots

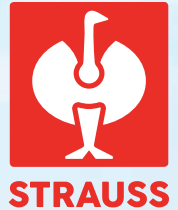
Everyone touted the convenience of the BOA® Fit System on the Woodside and Murcia safety toe work boots they tested. Users turn a dial to tighten the laces and pull to release. No worries about laces coming untied.

Travis Snowden is a big fan of the work boots. "I'm on my feet every single day, oftentimes stomping in mud, water and rocky terrain. Not once did I have to worry about my footing or getting my feet wet. The boots are extremely comfortable and water resistant. I can't say enough good things about the footwear."

Finally, STRAUSS high-performance workwear doesn't sacrifice style, something that didn't go unnoticed by the group. "The pants, jacket and shoes don't look like I'm wearing my husband's clothes," points out Sarajane Snowden. "They hit a perfect balance between a style a woman appreciates to wear into town or putting them on to go to work." ■



Emily and Taylor Nelson



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The Race For The AMERICAN★MADE Drone



With new Chinese equipment banned, U.S. companies scramble for advantage.

The future lies down a mile of crumbly blacktop on the farthest edge of the Houston metro area. Go past the suburban chain restaurants and the gated neighborhoods to where manicured lawns start to give way to pastures.

Hang a right at The Flying Cow.

Maybe it's hyperbole to say what awaits is the

future. It's a steel building that would look familiar to many a farmer, perfect for sheltering the combine. Instead, it shelters the manufacturing headquarters of Hylio AgDrones, an American aerial drone sprayer company.

The future of agriculture? A future of agriculture, perhaps, but one that has become evermore important

Hylio AgDrones embraces both its roots in Texas and in the United States. Its Houston-area plant can churn out 5,000 drones a year.

through the last decade, as autonomous aerial drone spraying has crept along from theory to experiment to, in recent seasons, practical use in many parts of the country.

The burgeoning drone industry got a major jolt last December when the Federal Communications Commission (FCC) enacted a ban on the sales of new foreign-made drones. That decision rocked the pipeline that was launching thousands of Chinese-made drones into the Midwestern sky and further complicated a supply chain that was already dealing with hurdles in the form of tariffs and other import difficulties.

Frustrating for some, others see a window for which they've been waiting.

"We've been seeing this writing on the wall," says Arthur Erickson, CEO and a cofounder of Hylío. "We've been ready."

Aerial drone use has exploded in the U.S. ag sector in the last five years, but the ban on foreign equipment could usher in radical change for an industry still in its infancy. For the right players, it could mean a world of opportunity. The race is on to seize it.

"It's created quite an interesting environment," says Lukas Koch, a Kansas-based drone advocate and CEO of Kelly Hills Unmanned Systems. "This is the most exciting and opportunistic time ever for American drone companies."

➤ BUILDING A FUTURE

The dusty pastures around the Hylío drone manufacturing plant don't scream high tech, but everything does inside the building, which is designed to pump out as many as 5,000 drones a year.

An assembly line runs down the middle of the facility, where many of the company's roughly 40 employees transform the skeletal steel tubing of a drone into a robust machine powered by electric motors and capable of hauling—for Hylío's Atlas drone, its largest—as much as 250 pounds of cargo.

There's radar and lidar, spray nozzles and computer chips.

A separate production line runs along the back wall of the building, piecing together the 13.3-inch joystick-laden tablet computers used to control the machine. One large garage door is often rolled open for drone test flights. Once they're proven ➤



airworthy, they're carted to another room where large plywood boxes wait for shipment, fully stocked with an instruction binder and a Hyllo ball cap.

The company is facing its big opportunity now, but it's been preparing for the moment for more than a decade, since its founding as an idea kicked around by friends still then enrolled at The University of Texas at Austin. Erickson was just 22 years old.

"I could see the writing on the wall even when I was a young, dumb kid," he says. "It was clear China was fast dominating the market, and we could see how powerful and revolutionary that technology was. So, we've known."

Knowing is, as they say, only half the battle.

Drones aren't exactly complicated, and a standard form has emerged—between four and eight propeller-equipped motors connected by tubes to a central area with a cargo tank and all the necessary computers, cameras and sensors. Many drones, whether built by American manufacturers or otherwise, follow those same rules and seem indistinguishable at a distance (and in some eyebrow-raising cases, up close, as well).

Simple enough, but building that machine and doing it without relying on imported elements has been nearly impossible.

> SOURCING STRUGGLES

The December FCC ruling doesn't require current users of foreign-made drones to stop using their machines or restrict the sale of previously approved drones. Citing threats to national security, it promises not to authorize any new foreign-made drones for use in the United States, and, surprising some in the industry, not to allow the use of many foreign components.

"Critical components, including data transmission devices, communications systems, flight controllers, ground control stations, controllers, navigation systems, batteries, smart batteries and motors produced in a foreign country could enable persistent surveillance,



Arthur Erickson was a student at The University of Texas at Austin when he helped start Hyllo, which is now among the leaders in U.S.-built drones.

data exfiltration and destructive operations over U.S. territory," the FCC document says.

Some components were easy to source through U.S. suppliers. Others have proven far more difficult, and none more so than motors and batteries.

"There's really nobody else globally that's producing motors that are as efficient and cost effective as China is right now," says Kelley Wittenberg, national accounts manager at Central UAS Technologies, a company building ag drones out of Daytona Beach, Florida.

Central UAS was known as Leading Edge Aerial Technologies before it was acquired in late 2024. It's been working with aerial drone sprayers since 2012 but initially focused first on mosquito spraying. It launched its first ag-focused sprayer drone, the PrecisionVision 100X, in September 2025 and followed up quickly. It announced the PV100X Pro in May, promising a larger tank, enhanced sensors and a better tech stack on drones shipping this fall.

The company goes to great lengths to source its materials in the United States. A 2023 ban in the state of Florida prohibiting using Chinese drones and components for use in state government work pushed the company to innovate. A headache then is paying off now.

"It's tricky because 80% of the lithium in the world comes from China," Wittenberg says. "It's hard to get around that, so we have invested heavily in an American battery company so that we can get that ball rolling. We are also working with motor companies that are based in the United States to get to that point where we have an American alternative. >

VERSATILITY THAT SAVES



PrecisionVision® X series drones are designed for granular, liquid and ULV applications.



PrecisionVision® - 100X



DROPVISION®: Droplet analysis technology to ensure EPA regulatory label rate compliance

PRECISIONVISION®: Flight control software for multiple payload solutions

MAPVISION®: An easy-to-use geospatial web-based data management system

ELEVATED CUSTOMIZATION

Our PrecisionVision® Drones deliver unrivaled versatility and precision with our proprietary granular spreader and a liquid spray boom that supports nozzles from leading manufacturers. Any droplet size. Any application. We've got you covered.



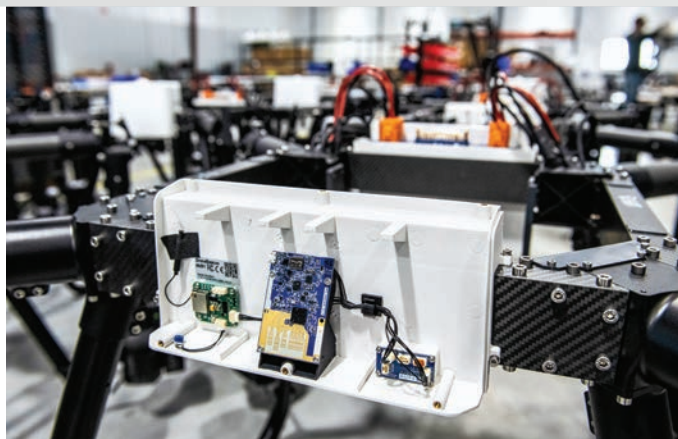
MADE IN THE USA WITH GLOBAL & DOMESTIC SOURCED COMPONENTS



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SCAN TO DISCOVER DRONE SOLUTIONS FOR ROW CROP AND LEARN MORE AT CENTRALUASTECH.COM





Our engineers, at least half of them are veterans, so they're passionate about it, and we're passionate about it, as well."

Hylio, too, is trying to work with American companies and announced a partnership with KULR Technology, another Houston-area tech startup, to focus on designing and building batteries appropriate for the mission.

Partnerships and sourcing are a critical strategic element for a young company, maybe even as important as the drone's actual performance.

"Some drone companies have no problems finding compliant motors, and some really struggle," says Koch, who's served as an adviser for many early phase drone outfits. "It's all about who you know. Some companies have decided just to build their own motor. This is all painful right now, but I think this is all very good in the long term. The companies that are working through it are seeing massive opportunity."

> FILLING THE GAP

Chinese manufacturers may account for as much as 90% of the U.S. aerial drone market as it stood in late 2025, and it's not clear how soon they'll fade away, if they even do.

Models introduced before December can be sold in the U.S., and many in the industry question to what degree some distributors will repackage or rebrand Chinese equipment as "assembled in the United States."

No matter how that unfolds, there's a quickly growing line of American companies vying for the chance to fill the gap.

Speaking last summer at a field day at Heinen Brothers Agra Services, in rural northeastern Kansas, Koch compared the growing drone market to the earliest days of tractors.

"By 1910, there were 156 tractor manufacturers in the United States," Koch told the attendees. "Today, we're having our tractor moment. Companies are doing

□ *Sensors like radar and lidar (left), or tablet controllers (right) are easier to source outside China than motors and batteries.*

it from their barns, and they're building these systems. They're coming out of the woodworks every day."

The field day drew a large crowd—farmers and elected representatives, university researchers and drone company CEOs—all packed along a testing area to see the latest public demonstrations from

many of the field's most innovative companies. They saw a wide variety of aircraft, shattering the idea that drones need to look like the supposed standard form or be bound by perceived industrywide weaknesses.

A drone from SiFly, based in Silicon Valley, hovered over the field for three hours, demonstrating unparalleled endurance. Meanwhile, one from Pyka offered standout capacity as it buzzed a nearby corn field.

Pyka is more than three years into real-world use of its electric autonomous airplanes. Pyka's Pelican 2 can carry up to 80 gallons, more than twice the payload of most quadcopter drones, and it has much greater endurance. It's more akin to a small version of the common Air Tractor piloted sprayer aircraft but is hamstrung in some of the same ways, as it requires a runway.

"On the road map long term, three or four years down the road, is the design of a much larger airplane that actually competes with the full-blown Air Tractor," says Volker Fabian, chief commercial officer at Pyka.

Other takes on the "bigger is better" line of thinking come from the company Rotor, which converts full-sized helicopters into autonomous drone sprayers, and Surgeon Drone, based in Louisiana, which is working to find a more robust version of the quadcopter concept. The company hopes to use an onboard gas generator to power electric motors that can ultimately hoist as much as 250 pounds.

Then, there are some potential players who haven't shown their cards yet, companies like John Deere, AGCO and Case IH.

Deere showcased green-painted drones in the past as a part of a futuristic concept, including at the

2019 AgriTechnica show, in Hanover, Germany, but none of the major ag machinery manufacturers have brought anything to market.

They may not, industry advocate Will Dawson says, until the dust starts to settle.

“They’re doing what I call the Facebook approach,” says Dawson, who heads up the Agriculture Drone Initiative, an industry lobbying group working in Washington, D.C. “They’re doing a lot. Everyone gets a call. Everyone’s getting an exam, and I think they’re waiting because it’s a heck of a lot easier for them to let investors waste their money, and they just want to pick a winner.”

> DELIVERING THE GOODS

Koch can rattle off 15 American companies at various stages of development with their drones, and that doesn’t count those companies that have yet to go public with plans.

There could eventually be dozens, by his estimate, and many could find some ability to stick around.

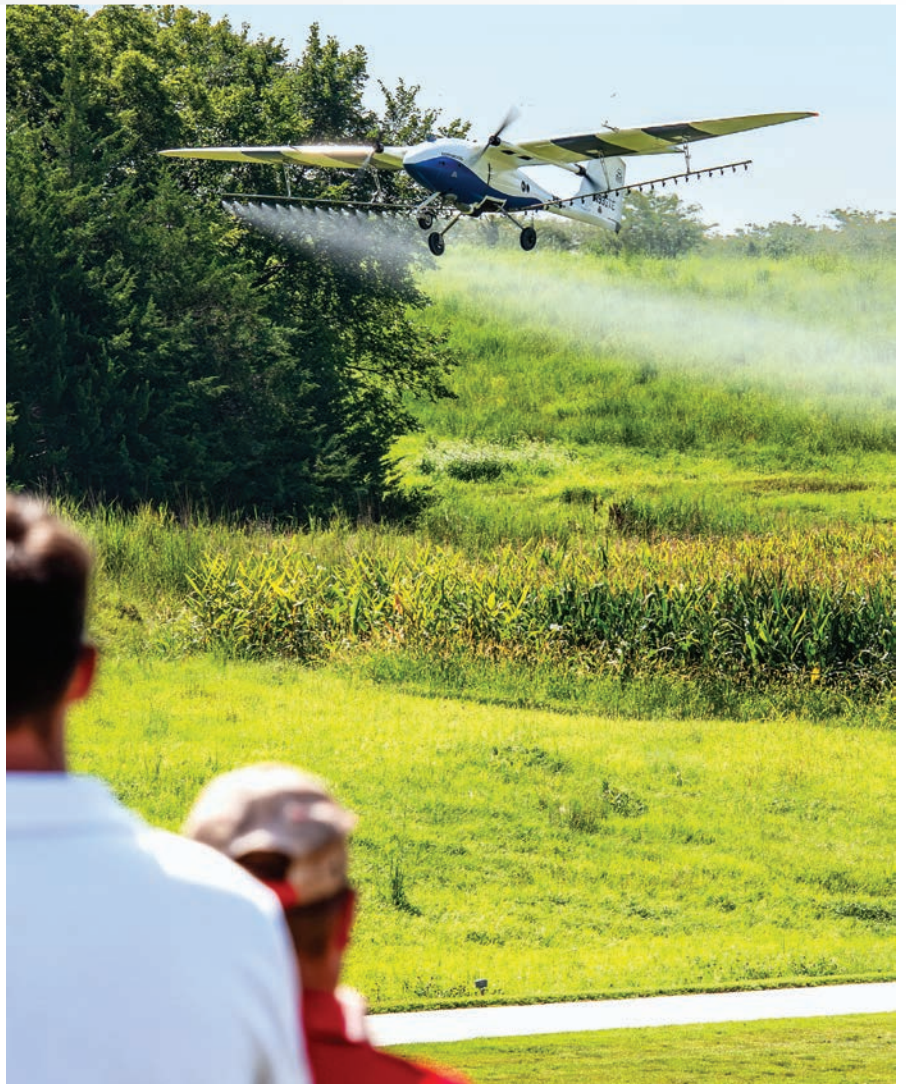
“Less than 2.5% of farmers own an ag drone, so that means 97.5% are still waiting,” Koch explains. “The opportunity exists.”

The dream has already died for some, including well-funded efforts. Guardian Agriculture, based outside of Boston, pulled in more than \$50 million in investment and built the massive SC1 drone. It came with a claim it could cover 40 acres an hour thanks to fast-charging batteries.

Yet, the company announced in September it was permanently grounded.

And, no matter what presence Chinese drones have going forward, American companies are cognizant they’ll need to be able to compete with the best equipment in the world.

“The perception that’s out there, because it’s been true, is American drones have not been winning on technology,” Central UAS’s Wittenberg says. “They haven’t been winning on affordability, and they really haven’t been winning on service and support. So, with the PV100X Pro, we really want to win on technology. We’re going to win on service and support. The price differential has dropped dramatically. It’s gotten much closer, and now that Chinese drones are not allowed in the country, that technology gap is going to make it so you can say, ‘Chinese drones are cheap, but an American drone is better.’”



From Michigan to Texas, from the East Coast to the West Coast, companies are chasing that same plan: Take advantage of this lull in Chinese drones to build competitive, and eventually, superior products.

That’s the goal down that crumbly blacktop road outside of Houston, close to The Flying Cow, a burger shack tucked into an RV park. It actually shares something in common with its neighbor, as it, too, is a steel building that may look more at home sheltering farm machinery.

Inside, The Flying Cow, too, seems positively space-age as a robot rolls along the concrete floor to deliver food to diners.

Across the street at Hylio—and around the country—more than a dozen companies are vying to seize the moment, hoping to deliver a lot more than cheeseburgers and milkshakes. ///

▣ *The Pyka Pelican 2 electric autonomous spray drone can carry up to 80 gallons, more than twice the payload of most quadcopter drones.*



Aerial Agronomics

Farmers take to the sky to improve ROI.

There was a time not long ago when having a drone on the farm was a novelty. The same was once said about tractors, as well.

Whereas it took more than a half-century before most farmers put their horses and mules out to pasture in favor of tractors, agricultural spray drone adoption is moving at light speed.

“Farmers and the ag industry are taking this technology seriously. It’s not a ‘toy’ anymore,” says Taylor Moreland, founder and CEO of Missouri-based Agri Spray Drones. “In the next five to 10 years, the majority of farmers will have their own drones on the farm. Within five years, we’ll see the technology and the regulations come together, and actually enable completely autonomous operation with drones to where you don’t even need to have to be at the field.”

This adoption is driven by a singular reality: Drones allow farmers to do their jobs better.

“What’s a farmer’s end goal? It’s to produce the most crop with the least amount of inputs,” Moreland says. “Farmers have seen that this technology is proven, and they want to spray when, where and how they want without relying on someone else. Custom applicators get paid by the acre, not by the outcome.”

> BEST ZONES FOR DRONES

While Moreland sells and services spray drones and accessories, he acknowledges they aren’t always the best tool for applying crop-protection products. However, there are situations when using drones makes more agronomic sense and delivers improved return on investment.

“Drones need to be thought of less as a replacement for ground rigs and more so as doing what air applicators like helicopters and airplanes do, which is low-volume applications, typically 2-gallon (per acre) rates,” he explains. “In other scenarios with higher volumes, if you can get it done with a ground rig, that’s probably the way to do it.”

Fungicides, insecticides, biologicals and foliar fertilization products are all good candidates for drone application for several reasons. The first is timeliness.

“What are you potentially losing in yield potential by not applying certain products when you should be applying them because you’re waiting for the crop duster or it’s too wet for a ground rig to roll?” Moreland asks. “The drone allows you to apply at the optimal time.”

Canopy penetration is also improved thanks to the drone’s rotor downwash—the powerful, downward-moving, swirling column of air generated as the rotors spin.

“If you can blow fungicide through 10-foot-tall corn down to the ear leaf, you’re going to have better control of disease,” Moreland says. “The spray penetration will even cover the underside of leaves, and you’re not tearing up the crop in the process by driving through it.”

While research from the University of Missouri found that ground-based sprayers demonstrated superior herbicide spray coverage, uniformity and less off-target movement than a drone, there are scenarios where drones can excel in controlling weeds. Spot-spraying herbicides is one example. A survey drone can scan a field and make a map of weedy locations, which is then loaded into the spray drone.

“It then knows where it needs to go and can move laterally across the field. The drone doesn’t have to go up and down the rows,” Moreland explains, noting that a similar strategy can be employed to address nutrient-deficient spots in a field or to only apply insecticide at field borders to protect against advancing pests. “This saves time, and again, you’re not running over the crop with a ground rig.”

Thanks to their narrow swath width, drones also are well-suited for conducting on-farm product field trials.

The cost of spray drones also makes them attractive. Today’s most popular models cost only a fraction of what farmers would pay for a traditional sprayer.

> CAVEATS TO CONSIDER

Despite these advantages, there are some considerations to address when incorporating a spray drone into a farm’s operations.

Training, licensing and insurance are all mandatory. The Federal Aviation Administration requires that anyone operating a drone obtains both a Part 107 Remote Pilot Certificate and a Part 137 Agricultural Aircraft Operator Certificate. A 44807 exemption is also necessary because these drones weigh more than 55 pounds. A commercial pesticide applicator license is also required, along with liability insurance.

Moreland says farmers need to consider the time commitment, not just in training and licensing, but also in what it means overall for farming operations.

“If you’re bringing a drone onto the farm, you’re typically not replacing something you’ve done before,” he says. “Instead, you’re now doing something you used to call somebody to do,” and that usually happens in the thick of summer, when farmers take vacation or are busy with the county fair.

> ADDING AERIAL

Last summer, Tyler Ediger, of Meade, Kansas, decided it was time to add a drone to his family’s farming operation.

□ *The downward column of air from spray drone rotors moves crop-protection products deeper into the canopy, improving disease control.*



COURTESY OF AGRI SPRAY DRONES

“We wanted to be ready for what’s next, because I don’t think they’re going away,” he says.

It didn’t take long for the drone to prove its worth. A wet August in southwest Kansas idled the Edigers’ ground rig just as it was time to desiccate their sorghum crop.

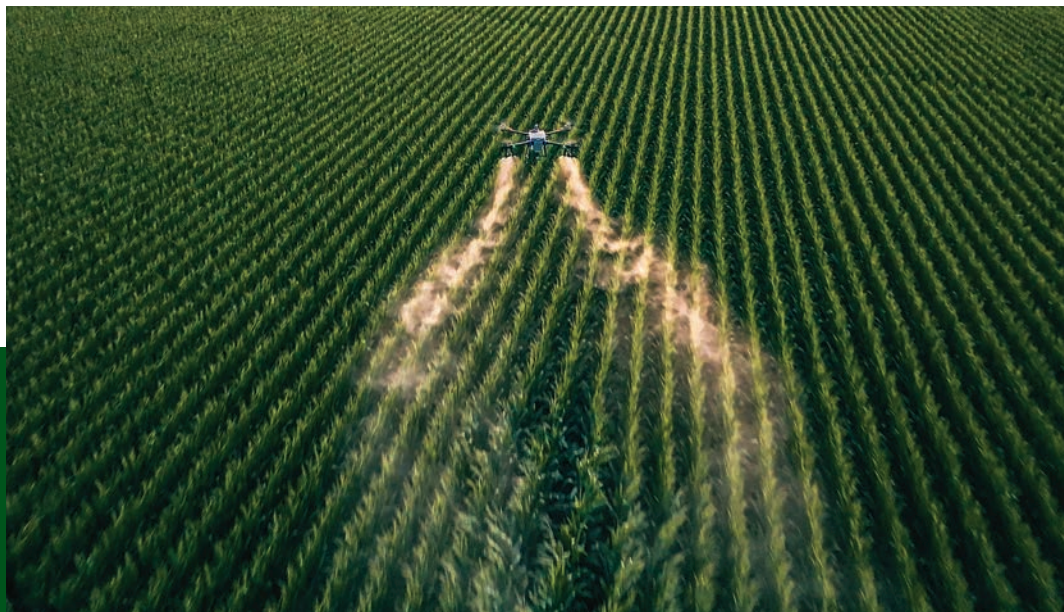
“We didn’t want to compact the ground, so we decided to use the drone,” he recalls. “We actually sprayed an entire section (640 acres) with it, 28 feet at a time.”

Ediger says that in the past year, they’ve employed the drone for both fungicide and herbicide applications. They’ve also started using it for their on-farm trials.

“Being timely with applications is really nice,” he explains. “For herbicide application, you can catch weeds right after a rain when they’re most vulnerable. And, you can also fly at night or early morning when you’ll get better plant intake than you would with an airplane in the afternoon.”

He says learning the routine necessary for drone spraying is almost like a dance. It takes time to master the steps, but with practice, it eventually clicks.

“The other reason for the drones is the next generation,” says Ediger, whose sons, Jackson and Carter, are 14 and 11 years old, respectively. “Drones are the future, and so are they.” ///



COURTESY OF AGRI SPRAY DRONES

Postseason Maintenance Puts Bushels in the Bin

Yield is never an accident.

Shortly after field activity slows down and his corn is sidedressed, Iowa no-tiller Kevin Smith has an annual maintenance date in the shop with his planters.

“I like to get the planters ready to go again as soon as we quit using them for the year while everything about the planting season is still fresh in my mind,” Smith explains. “I’ve developed my own postseason maintenance routine and try to keep the planters as close to factory specifications as possible.”

An ardent proponent of precision agriculture, Smith says he wants a “picket fence” corn stand, and keeping his planters in top shape is the way to ensure his investment in precision-farming tools translates into consistent corn yields in the 240-bushel-per-acre (bpa) range. Last year, he binned 242 bpa of corn on his 6,100-acre farm, near Knoxville, Iowa, where he splits his production 50/50 with no-till corn and soybeans. His soybean yield average was 73 bpa.

For corn planting, he uses a 24-row Harvest International toolbar decked out for high-speed operation with a full complement of Precision Planting systems, including DeltaForce Downforce Control, SpeedTubes, FurrowForce Closing System and frame-mounted Reveal residue managers. Soybean-planting chores are split between a 40-foot Case IH 2140 16/32 split and a 60-foot Case IH 2160 set up to plant 36 20-inch rows.

“The 2140 has Precision Planting’s CleanSweep and DeltaForce so I can plant corn if I get in a bind, but it’s not a high-speed planter,” he says. “The 20-inch planter has in-cab-controlled pneumatic downforce but otherwise is a basic Case IH setup.”

> MAKE THE INVESTMENT

Smith says he’ll spend a minimum of about two days each and, on average, \$1,000 to \$5,000 per planter



JIM PATRICO

Kevin Smith says a strict maintenance regime cuts down on the number of surprises at planting and helps him leverage the yield potential he buys in every bag of seed.

for parts each year, depending on whether he must replace disc openers.

“It may seem like a lot to some people, but to ensure a uniform stand emergence, all systems on the planter have to be running as they were designed,” he says. “I know how important it is to have a planter running at 100%. If it’s not, it’s costing me yield.”

Smith says his maintenance routine changed significantly when he replaced planters equipped with roller chains for those with electric meters and singulation.

“Now, we remove all the seed discs to clean and inspect them before spraying them with dry graphite. We also check the rubber seals on the meters and singulators.

“We check all the closing wheels and their linkages for play and alignment, and check all trash wheels for bearing wear,” he continues. “While we’re at it, we inspect all hydraulic hoses, then check disc openers, looking for the proper gap and diameter measurements, along with disc scraper condition as they wear.”

> CHANGE IN TIME

“Disc openers are 15 inches new and can wear down to 14.5 inches before they are out of specs,” he explains. “We tend to replace them before they get to that 14.5 measurement. Normally, we inspect them throughout the planting season, but whenever we replace a disc opener, we always include new scrapers with it.

“After planting, we also take special pains to make sure certain gauge wheels are tight and within specifications to disc openers while we’re working under the planter.”

Smith says his motto is: “If you’re not sure if you should replace something on a planter, you probably better replace it during the off season.”

His maintenance list includes careful inspection of all row-unit parallel linkages and repairs, where needed.

On the high-speed planter, Smith looks at each SpeedTube for wear or damage, and replaces them, as needed.

“We normally replace them once a year, but we always check to make sure they aren’t missing any flights and that the feeder wheels are in good condition,” he explains.

On the other planters, Smith pulls all seed tubes to remove debris and dirt, and to inspect them for wear or replacement.

> OFF-SEASON ROUTINE

Postseason maintenance also includes oil and filter changes on air compressors and systemwide checks for air leaks and potential problems developing with electrical wiring.

“On the planter equipped for liquid application, I always clean all the screens, flush the tank and winterize it before we store the planter,” he says.

Before the seasonal planter maintenance session ends, Smith ensures each grease fitting will take grease and checks a host of “little things”—from fasteners to flex points right down to the proper air pressure in the tires.

“The strict maintenance regime cuts down the number of surprises we have at planting and helps us take advantage of the yield potential we buy in every bag of hybrid,” he says.

“When we take the planters out of the barn in the spring, all I have to do is do monitor updates and check the tire pressure,” he says.

Smith’s preplant routine on his monitor updates includes deleting all seed prescriptions, along with old boundaries and nutrient application maps.

“I start fresh each spring, even if nothing’s changed, I reload all of our field boundaries and prescriptions so the planter won’t be planting where it is not supposed to plant. If we add new farms or boundaries, we add those before planting.”

> MAINTENANCE ROI

Phil Jennings, service manager at Kinze Manufacturing, says growers have become more aware that the

mechanical condition of their planters has a direct bearing on their bottom line. He cites the significant number of growers taking advantage of off-season maintenance plans and parts sales.

“Looking at off-season planter maintenance from a dollars and cents standpoint, it’s pretty easy to sit down with a dealer and do the math about the cost of rebuilding a planter,” he explains. “I can easily spend \$300 to \$400 per row to install disc openers, tube guards and work the meters, and that’s nearly \$7,000.

“But, when we look at what that costs over the number of acres farmed, you have a different perspective on the cost of that overhaul,” he says. “If I’m amortizing that \$7,000 over 2,500 acres, that’s nearly \$3 per acre. What’s my risk if I don’t make that expenditure?”

Jennings says growers can easily amass a 3 to 5% yield reduction because of inconsistencies in seed-to-soil contact, seed spacing and depth control—all directly attributable to the mechanical condition and adjustment of the planter.

“Even at today’s prices, a 5% yield loss costs far more than the \$7,000 investment in your planter to correct those problems,” he says. “It just shows planter maintenance is cheap insurance.”

Jennings says growers should use their own experience along with manufacturer maintenance guides to develop a “hitch pin to closing wheel” year-end maintenance routine—and follow it.

> CHECKLIST

“Following a set checklist will help combat complacency,” Jennings explains. “Let’s face it, no matter what color planter you’re pulling, there’s been no major changes recently in terms of general mechanical design and soil-engaging technology. It’s easy to start thinking, ‘We’ve had this planter five to seven years and are very comfortable with it.’ But, did you check the bearings on the transport wheels? Are your row unit openers within specifications? Are the lights and flashers working? What about flex points and pivot points?”

Similarly, David Brennan, planter marketing manager for CNH, says a planter’s job is to put seed in the ground as consistently as possible across its width to ensure the plants in every row emerge at the same time.

“As soon as that expensive hybrid is placed in the seed slot, it’s being dinged by risk factors which cost yield. For a crop to get the best start, consistency is a must,” he says.

“If you have worn openers, replace all of them across the planter to maintain consistency in performance of all your row units,” Brennan continues. “Also, when you’re working on row units, index them. If you have unit No. 1 set at 1.5-inch seeding depth, make sure Rows 2 through 16, or 24 are indexed to it. If some are shallower than others, you won’t have a consistent emergence.” >

> THE DIGITAL CHECKUP

Since a big part of a planter's performance in precision agriculture comes from electronic controls, "digital checkups" are also important, Brennan and Jennings agree.

"Various electronic and digital components of the tractor/planter unit should be checked for proper function, as well as ensuring one is using the current versions of operating software," Jennings says. "Most

precision companies are providing regular updates, so visit with your dealer to stay current."

Brennan says the digital revolution has rapidly changed the way growers, dealers and software companies interact. Card-swapping and tech visits have been largely replaced by wireless data transfers.

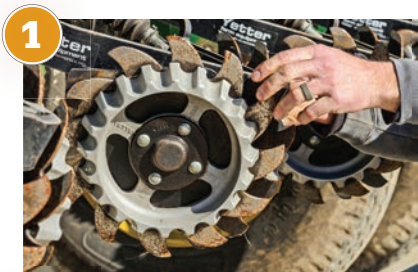
"Our operating manuals, Case IH Productivity Guides and the local dealer are always great resources; however, virtual help from sites like YouTube are how

we are communicating service tips to growers today," he explains. "We have a very effective 'How-To' section on our Case IH YouTube channel for each and every subsystem on the planter, as well as for display operation."

Brennan says advancements in precision agriculture have placed increased attention on the work of the planter.

"We're essentially farming by seed today," he explains. "If you're planting 34,000 seeds per acre over an 80-acre field, that's 2.7 million seeds. We're no longer farming 80 acres. We're farming 2.7 million seeds.

"To do that on a cost-effective basis with today's very slim margins, every component of the planting process must be working properly." ///



PLANTER MAINTENANCE CHECKLIST

- 1 Check for bearing play, and ensure hardware is tight.
- 2 Check seal on vacuum meters.
- 3 Update planter operating system.
- 4 Check meters for wear.
- 5 Check planter drive components, if applicable.
- 6 Check for wear and adjustment to ensure proper seed singulation.
- 7 Check seed discs for wear.
- 8 Check for seed firmer wear.

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4 Steps for Effective Weed Control in Soybeans and Cotton

How to adapt your herbicide program to seasonal challenges

Every season, soybean and cotton growers try to choose a herbicide program that fits their operation, but weather doesn't always cooperate. Lack of activating rainfall or excessive moisture can affect the performance of even the best herbicide programs.

By June, the results are already visible: clean rows, or weeds breaking through.

"Weed control in soybeans and cotton requires a comprehensive, flexible program," says Kelly Liberato, Technical Marketing Manager at BASF. "It's not just a single herbicide that's going to be the solution."

Here are four practical steps to building an effective, flexible weed control program:

Step 1: Start Clean and Stay Clean

A clean start is the most effective way to manage early-season weed pressure. That starts with a strong burndown or tillage program. Match residual herbicides to your local weed spectrum to prevent early flushes and reduce pressure on post-emergence applications.

"The best time to control a weed is before it ever sees the light of day," says Liberato.

Staying clean also means managing how weed seeds move between fields. Soil on planters, tillage tools and tires can carry seeds, so cleaning equipment regularly helps limit spread.

Step 2: Take a Comprehensive, Layered Approach

Weed control can break down when there are gaps in protection, either through insufficient sites of action or breaks in residual coverage.

"Your herbicide program should include multiple effective sites of action and overlapping residuals," Liberato says. "You don't want to wait until one herbicide runs out of gas before the next takes over."

Layering residual chemistries pre- and post-emergence helps extend control during critical periods.

Step 3: Scout and Adjust

Scouting helps monitor residual activation and identify escapes early. That timing matters because post-emergence applications are most effective when weeds are small, typically four inches tall or less. Weather trends can also influence program adjustments.

Seasons with high rainfall may require earlier post applications and drier seasons may benefit from a residual like Outlook herbicide that easily activates with minimal rainfall (1/4 inch). Engenia herbicide also provides broadleaf residual activity and can help bridge the gap between post residual applications and activating rainfall.

Step 4: Power in Post

For soybean and cotton growers, post-emergence programs are highly trait-system dependent. In dicamba-tolerant soybean and cotton systems, Engenia® herbicide* fits into early-post timing, with strong activity on Palmer amaranth, waterhemp, kochia, morningglory and ragweed.

"Engenia herbicide is the most powerful dicamba formulation on the market, ounce for ounce,"¹ says Liberato.

Engenia herbicide is built for the way farmers work, with a straightforward rate — 1 gallon for every 10 acres. That makes it easy to measure and manage during application season when you're busy mixing, loading and moving between fields.

Looking Ahead

The goal isn't a perfect plan. It's a program that's built for the way you farm and built to hold up through the unexpected. For help building your effective, adaptable herbicide program, contact your local agronomist or BASF representative.

Recommended Dicamba-Tolerant Herbicide Programs

	PRE	Early POST	Second POST
Soybean ²	<ul style="list-style-type: none">• Zidua PRO herbicide or Zidua SC herbicide	<ul style="list-style-type: none">• Engenia herbicide with approved Volatility Reduction Agent (VRA) and Drift Reduction Agent (DRA)	<ul style="list-style-type: none">• Liberty® ULTRA herbicide
Cotton ³	<ul style="list-style-type: none">• Prowl® H2O herbicide	<ul style="list-style-type: none">• Zidua SC (soybean) or Outlook herbicides (both)• Glyphosate	<ul style="list-style-type: none">• Liberty ULTRA herbicide• Outlook herbicide• Ammonium Sulfate (AMS)



Learn more about Engenia herbicide today

Reach out to your local BASF representative or authorized dealer for a customized weed control solution to meet your farm's needs.

BASF
We create chemistry

*Engenia herbicide is a U.S. EPA Restricted Use Pesticide. All Engenia herbicide applications must be made in accordance with all applicable Federal and state label requirements. In the event a state implements a more stringent Engenia herbicide application restriction, that state restriction will apply. Every application of Engenia herbicide requires the use of a Volatility Reduction Agent (VRA) (visit www.engeniaherbicide.com/VRA for a list of approved VRAs and required rates) and the use of an oil emulsion Drift Reducing Agent (DRA) at a rate of 0.3% v/v.

¹Engenia herbicide offers the highest concentration of active ingredient compared to other dicamba-tolerant alternatives labeled for cotton and soybeans.

²Alternate program options include Zidua SC herbicide instead of Zidua PRO herbicide in PRE application, depending on crop rotation restrictions and soil type

³Alternate program options include using Zidua SC herbicide either impregnated on dry fertilizer or in a post-directed application

Always read and follow label directions. Engenia, Liberty, Outlook, Prowl and Zidua are registered trademarks of BASF. Copyright ©2026 BASF Agricultural Solutions US LLC. All Rights Reserved.

Tied Up In No Knots

I have a 4570 Hesston inline small square baler that I have had for several years. It has been a wonderful baler, and I thought I knew all about it. I needed to replace the left side knotter because the knotter pinion jumped time and cracked the casting. It was my fault for not taking care of the slack between the billhook pinion gear and the big gear that turns it. Of course, I had to remove all the pieces on the left side to remove the knotter assembly. I was careful to make sure that I kept everything stacked in the same order that it came off, and I even marked the knotter drive chain, so it went back in time. Everything went back together as planned, but when I ran the baler through to thread it, the knotter twine disc would not take the twine, and it seems that the needles are out of time with the tying system, and the plunger hits the plunger stop. I can't seem to find anyone to help me with this problem. All contacts that I have, including my owner's manual, can't seem to help me. Everything that I removed looks just like every picture and information that I can find on the 4570 baler. Have you got any ideas?

Steve: You will bale with your Hesston 4570 this year, but first you need to do one little thing. This is a simple fix, and you will be surprised how quickly you can fix it. You have done what many good techs do, and that is to overlook something simple. I was once told that the best mechanics always overlook the easiest fix. Your problem can show up on other balers, too. What you did wrong is before you attached the outside plate that attaches to the needle lift rod (two cap screws with nuts)



to the tying system main shaft (see photo), the tying system was not in home position, and it was 180 degrees off when you attached it. So, with that wrong, when you attached the needle lift rod to the lift plate, that left the tying

system out of time with the needles. All you need to do is remove the two cap screws and rotate the plate down (180 degrees) while the tying system is in home position (see arrows), which will put the needles in time with the tying system. I have made several trips to the field for this same problem on other balers like the JD 336 and 346.



Have a mechanical problem you can't resolve? Email Steve Thompson at askthemechaniccolumn@gmail.com

Please include your contact information and phone number.

Light My Fire

I read with interest in one of your previous columns about the danger of cutting or welding on a fuel tank that has been used. The amount of fuel vapor still floating around in the tank must be small because I have seen people throw a match in a bucket half full of gas, and there was no explosion but only a harmless flame burning on top of the gas.

Steve: You are correct. The flame burns without an explosion because the top of the bucket is open (will not contain expanded pressure), and only a small amount of vapor from the top of the liquid gas in the bucket can find oxygen to create a burn. The only thing that allows for such a massive explosion of a tank is that the tank contains the growing pressure after ignition until the tank explodes when the fuel vapor surrounded by oxygen is ignited with the torch. Oxygen is a big player with any burn. The gasoline engine in your truck requires around 10,000 gallons of air to properly burn 1 gallon of gas, so a little bit of gas vapor that can find plenty of oxygen with an igniter will blow. This is exactly what happens in your truck's gas engine. When the spark plugs spark, the cylinder area contains the explosion, providing the force to blow the piston down, creating power to move the truck.

SAFETY TIP



Mower Blade Danger

When removing and installing lawn mower blades after sharpening or replacing, two areas need special safety precautions. One is to always remember to put safety stands under the deck after raising or jacking it up (see photo), and the other is to be careful not to cut your hands when handling and installing the blades. Always place a board between the blade and deck when tightening so the blade won't have a chance to turn. Taking a few minutes to do these two things, and putting on a good pair of gloves is also a good idea. ///



Be Cautious Grazing Johnsongrass

Q We have a problem with johnsongrass in our hay field. We were fortunate to get enough hay early this year, and the johnsongrass got pretty tall after the last cutting. Before we could graze it, we had an early frost. I have heard this can be dangerous. What do we need to do?

A **DR. McMILLAN:** Johnsongrass is a member of the sorghum family (*Sorghum halepense*) that includes grain sorghum, Sudangrass and Sudex (a hybrid of sorghum and Sudangrass), among others. It's closely related to corn. I mention this because the potential issues with johnsongrass are also present with these other plants.

All of these plants can accumulate nitrates, especially with heavy nitrogen fertilization. In this case, I would be most concerned about cyanide or prussic acid toxicity. Any stress, including drought, herbicide application or frost or freezing, can increase the cyanide in these plants. Immature and rapidly growing plants have the highest potential to be toxic, which is what you probably had.

Cyanide in these forages exists as a harmless compound known as cyanogenic glycosides but is converted by rumen microbes and enzymes to hydrogen cyanide. This is rapidly absorbed into the bloodstream and blocks cellular respiration in the mitochondria, the power plant of the cell. The blood has a bright-red color because it has high levels of oxygen, but the cells can't use it. The brain and heart are the first to be affected.

Early signs include hind leg weakness, salivation, rapid breathing and a bright-red color to mucous membranes. Death is the first sign seen because of rapid progression.

Your veterinarian can treat affected animals if caught early, but that is often not possible. The best plan is to avoid the problem. The good news is unlike nitrates, cyanide rapidly breaks down in forage or hay. Avoiding grazing the affected pasture for two weeks should allow this breakdown to occur.

To avert this issue in the future, there are good herbicides that selectively kill johnsongrass. Remember, too, that

Email Dr. Ken McMillan
at vet@dtm.com



johnsongrass is extremely palatable and a high-quality forage. Cows love it and will select it over most grasses. So, grazing pressure can also eliminate it for a lot less than herbicides, if this is an option.

While talking about cyanide, the most common issues with cyanide poisoning I have seen involved ingesting wild cherry leaves after a storm or when they have been cut down in the pasture with cattle.

Q In a previous column, you mentioned nitrate toxicity in johnsongrass but then focused on cyanide. I have always been more concerned about nitrates than cyanide. Am I wrong?

A **DR. McMILLAN:** No, you are spot on. Nitrates are very dangerous, and they do not break down in forages or hay like cyanide does. Unlike cyanide, where certain plants are most commonly involved, many common forages can accumulate dangerous or deadly levels of nitrates. Besides hay and forage, water high in nitrates can lead to toxicity in cattle, too.

Any stressor, including drought, herbicide application, hail, high temperatures or frost and freezing, can increase the nitrates in these plants by interfering with the plant's ability to convert nitrates into plant protein.

Clinical signs of nitrate toxicity include weakness, tremors, staggering, rapid breathing and a characteristic chocolate-brown blood color. Dead animals are often the first sign.

When cattle consume forage or hay high in nitrates, they are converted to nitrites in the rumen and then rapidly absorbed into the bloodstream. The nitrites convert hemoglobin into methemoglobin, which is very inefficient in carrying oxygen to the cells. This causes the blood to be a chocolate color.

Your veterinarian can treat cattle with nitrate toxicity if caught early with some success, but avoidance is the best practice. Soils low in potassium and phosphorus increase the possibility of toxic levels of nitrates, so this is just another reason why soil testing is so important. Proper application, fertilizer blend based on the soil test and good technique can avoid many problems and save money.

Since nitrates persist in forage and in hay, testing for nitrates in any questionable forage is important. By knowing the nitrate level, your veterinarian or a nutritionist can create a plan on how to feed the hay. Good management can minimize or eliminate any problems. ///

Please contact your veterinarian with questions pertaining to the health of your herd. Every operation is unique, and the information in this column does not pertain to all situations. This is not intended as medical advice but is purely for informational purposes.

These are only my thoughts and general guidelines. Please get with your veterinarian and together develop the best program for your herd.



Producer Co-Op Opens Meat Processing Plant

Farmers band together to boost local livestock industry for future generations.

If you're in the cattle business, more than likely one of your favorite pastimes is bashing packers. Not so in northeast Tennessee. Producers are the packer.

In May 2025, the first cattle, sheep and hogs were processed at the Appalachian Producers Cooperative (APC), a meat processing facility owned by local producers. These owners are setting their sights on keeping livestock income in the area, stemming the loss of farmland and supplying local consumers with locally raised meat.

You're probably thinking it's another COVID-inspired deal. No doubt, the pandemic helped bring in grant money, but these folks started kicking around ideas in 2017. A feasibility study by The University of Tennessee (UT) answered the question whether a plant was needed. "When I was writing these grants, the census numbers of cattle within a two-hour drive of Washington County was about 400,000 head," says Lexy Close, administrative manager for the Telford, Tennessee, plant.

At the time, there were no packing plants in the county and only a few small facilities within that two-

hour drive. Most of the cattle in the area leave as feeders and are finished in the Midwest.

"UT studies have shown that only about 6% of the animals born in Tennessee are processed and eaten in Tennessee," Close says. There is also the suburban sprawl part of the equation. "I've heard we have the third fastest rate of farmland loss in the country."

› CAPITAL CHALLENGES

While statistics showed the plant was a good idea, there was the money hurdle. "A couple of investors were interested, but when they realized it was long term getting their money back, and there wasn't huge profitability, they backed out," says cattleman and APC board member Mike Southerland. "So, we started pursuing the co-op side of it."

Close, who worked for the Appalachian Resource Conservation and Development Council (ARCD) until

John Abe Teague,
Appalachian
Producers
Cooperative board
member, hopes the
plant can help keep
farmers in business.

the plant opened, was the key to writing and getting grants for the plant. “A lot of these grants were not accessible for privately owned businesses,” she explains. “However, farmers’ cooperatives could qualify.” Like Southerland, she says, “I think the other impetus was there wasn’t anyone sitting around with bags of money.”

Forming the board was the simple part. “It was a meeting of producers, Extension folks, ARCD and some local consultants,” Southerland says. “We went around and asked who wanted to be a board member. Nine people volunteered.” Today, that nine-member board meets monthly and serves on a three-year rotation. “Every year, we’ll have nominations and vote on new directors, so farmers have a voice. That’s the way we want it.”

Memberships are also available. There is a \$50 annual fee, and members are required to use the plant for at least one animal equivalent, which is one beef, two hogs or four sheep. “Once we get where we’re profitable, we will pay patronage back to our members based on their amount of usage of the facility,” Southerland says.

> BUILT FROM GROUND UP

Though the co-op structure did help bring in money, it also slowed the process. Tennessee is farm co-op

country, but the APC was the first farmer-owned co-op started in 50 years. There was a learning curve. Anthony Shelton, then county Extension director in Washington County and now a UT marketing specialist, says that forming a cooperative and writing bylaws probably took an extra year and a half.

However, it was worth the wait. “It allowed the county government to give \$2 million of COVID relief funds toward the project,” Shelton explains. “That was the first win and spun it in gear.” There was also the added push of COVID, which created the wait for processing to two years in the existing packing plants.

While the money-gathering took place, the group was fortunate to find an architect, Luther Cane, who is also a cattleman. “He cut us a very good deal because he understood the vision,” Close says.

Next, Cane and the board members toured plants in Kentucky, Tennessee and West Virginia. The plant they patterned after the most was Buzz Foods, in Charleston, West Virginia.

“Our harvest equipment and harvest floor pattern is the same as theirs,” Southerland says. “They were so good to us, they gave us their plans and talked to us for hours. They told us the things we needed to know, >



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and they were always available if we needed to ask questions.”

Buzz Foods also allowed the new employees of APC to spend five weeks working in the plant to get hands-on experience with their new equipment. “That was really, really helpful,” Close says.

Still, there were other challenges. Flooding from Hurricane Helene derailed the waste management system and shut construction down for months while a new septic system was designed and built.

> LESSONS LEARNED

One hurdle, that of finding and hiring employees, wasn't quite as difficult as predicted. “Unbeknown to us, the Tennessee College of Applied Technology (TCAT) at Elizabethton was starting a meat-cutting program,” Close says. Now, the plant provides on-the-job training for one to three students a semester. They also paid for the furnishing of a classroom at APC.

In addition to TCAT interns, Close and the board members were able to recruit employees who had at least some experience working at a meat processing plant.

Close says they try to provide the best working conditions possible. “The equipment in the plant is



Lexy Close and Mike Southerland hope the Appalachian Producers Cooperative will help keep livestock income in the area.

designed to do the work so the human body isn't having to do the bending and lifting.” Even then, they've still had labor turnover but have managed to fill the vacant spots.

The plant is also designed to be as stress-free as possible for livestock.

Most producers bring animals in the day before they're harvested to give them time to settle in. The pens are all under roof and have automatic waterers and fans. The slaughter floor is state of the art, especially when it comes to humane handling.

However, there is the challenge of running the plant by committee. While the day-to-day management is done by Southerland, Close and plant manager, Rudy Rodriguez, Shelton says, “Sometimes, it takes extra time to get multiple minds together.”

He says the APC board is still a plus. “They are the folks that go out in the community and are the biggest advocates for the facility.”

> THE ROAD AHEAD

Currently, the biggest hurdle comes under the category of a mixed blessing: high cattle prices. While none of the board or members want to see prices come down, local producers are not taking the added risk and investment of finishing their cattle. As a result, the plant is only processing around 30 head a week of cattle and hogs. While it's designed to handle 125 head, Close says their immediate goal is 50 head.

“The custom processing has helped us limp along, but we need to be in a position of where we can start buying cows and having retail to sell,” says John Abe Teague, board member, cattleman and sheep producer. “We need cattle. We need money.”

They're working on it. Recently, the plant passed a third-party audit that allows it to harvest animals for producers who sell to specialty markets such as Whole Foods. They are in negotiations with a producer who has the capability to bring 20 head a week to the plant.



The certification also allows APC to sell directly to those markets.

APC has worked through a zoning glitch that kept it from keeping a stocked display cooler in the plant and selling directly to consumers. It also plans to offer meat to local restaurants and grocery stores.

The dairy industry's demise in Washington County is another mixed blessing for APC. The county once had around 200 dairies; only two are left. "A driving force to a lot of these grants was the ability to transition some of these older dairy farms to feeding out cattle," Shelton says.

Shelton says they are working with UT animal scientists to help producers learn the basics of finishing animals, as well as using carcass EPDs more in their selection.

Remote grading is hopefully also going to be part of the progress on the genetic side. Currently, meat at APC is USDA inspected. However, like a lot of smaller plants, USDA grading isn't yet available. "USDA has started a pilot program," Southerland says. "You have to have a special camera, but you can cut and expose the rib eye, take a picture, send it and get it graded. They charge so much an hour." The commercial Angus breeder, who markets his grain-on-grass-finished beef directly to consumers, hopes both purebred and commercial cattlemen will take advantage of the service.

Pork, which only takes a fraction of the per-head investment for producers and consumers, is another bright spot. "We have folks who are farrowing, buying

and finishing out feeder pigs," Shelton says. "They are providing a really, really good product. It is going to take APC some time to build up their wholesale and retail customer base, though."

While they're working toward a bigger weekly slaughter, Close says they're keeping the focus on helping producers, not only in Washington and surrounding Tennessee counties, but also neighboring southwest Virginia and western North Carolina. "One of the things we hope we can do is get to a point where we provide very reliable incomes to farmers," she says. "Right now, the market's really high, but we all know it's going to go back down. We can still provide an outlet and good incomes, regardless of what the overall market is doing. Having that kind of stability makes this industry more attractive to younger folks. There are still people out there who want that lifestyle if they can make it work financially."

Teague, who sells his grass-finished South Poll-Angus beef directly to consumers, says, "I'm heading into my 76th year of life. I know my sons are not interested in my farm. I've spent 25 years getting it set up so somebody, even if they don't own the land, might be interested in working the farm. We want to keep farmers farming." ///

For More Information

- ▶ Appalachian Producers Cooperative
<https://www.apctn.org>





SHOO FLY!

>By Jennifer Carrico, @JennCattleGal



Fly-control measures improve cow herd economics.

Fly control does more than keep cattle comfortable; it plays a direct role in a herd's performance and health, and can significantly affect an operation's bottom line.

David Boxler, a University of Nebraska Extension livestock entomology educator, says the three main fly species that annually cause more than a \$1-billion impact on grazing cattle are the horn fly, the face fly and the stable fly. All flies are a nuisance and can drive economic losses by reducing grazing efficiency, slowing weight gain, spreading disease and lowering milk production in cows.

"Horn flies are small in size and are usually found on the backs, sides and poll area of cattle. During a warm summer afternoon, they can also be found on the belly," Boxler says. "Both male and female horn flies acquire more than 30 blood meals per day."

Boxler explains that the entire life cycle of a horn fly can be completed in 10 to 20 days depending on the weather. The female horn fly will deposit eggs in fresh

manure after mating. The eggs hatch within a week. The larvae then feed on and mature in the manure. Newly emerged horn flies will search for a host, and the cycle continues.

Face flies are another annoying pest similar to a house fly but slightly larger and darker. "The face fly is a nonbiting fly that feeds on animal secretions, nectar and dung liquids," he adds. "These are the main source for pink eye and other eye inflammations." Peaking in the hottest summer months, face flies cluster around an animal's mouth, eyes and muzzle. These flies are more abundant near waterways, especially in areas with abundant rainfall.

A face fly's life cycle lasts about 14 to 21 days, with females laying eggs in fresh manure where the larvae hatch and feed, going through several growth stages before transforming into adult flies.

Stable flies are a blood-feeding pest found mainly on the front legs of cattle, causing painful bites. Boxler says cattle often react by stomping their legs, bunching at pasture corners or standing in water to avoid being bitten.

Female stable flies lay eggs in spoiled organic matter mixed with animal manure, soil and moisture. The



life cycle of a stable fly is typically 14 to 24 days, depending on weather conditions. “Developing sites for stable flies are around feedbunks, under fences and along haystacks,” he says. “Winter hay feeding sites where hay rings are used can be a source for larval development through the summer if proper moisture is present.”

Cleaning up these areas helps with control. Boxler says annual economic losses can add up in a herd if flies are not controlled. The irritation from fly bites can lead to less grazing, lower milk production and reduced weight gains. He notes that studies show weaning weight loss of up to 15% if flies, especially horn and stable flies, are not controlled.

> FLY CONTROL IMPROVES CATTLE COMFORT

Numerous methods can be used for controlling flies in pasture cattle. Boxler suggests back rubbers and dust bags soaked or filled with insecticides as an effective way to reduce fly numbers, if cattle use them.



The face fly feeds on animal secretions and is the main source for pink eye and other eye inflammations.
DAVID BOXLER

“Insecticide ear tags and strips are a convenient method of fly control, but some fly populations have a degree of resistance to the pyrethroid class of insecticides used in tags,” he explains. “It’s recommended to rotate insecticide classes to avoid resistance.”

Animal sprays and pour-on products are effective for 7 to 21 days, depending on the product, and must be reapplied throughout the fly season. It is important to

treat both cows and calves to ensure proper efficacy with most methods.

> ORAL FLY-CONTROL OPTIONS

Chris Cassidy, director of technical sales and research for BioZyme Inc., says if you have an adult fly population, you already have a problem, but it’s not too late to prevent more flies. “We want to interrupt the life cycle of the fly,” he says. “Flies reproduce quickly and thrive in manure-rich environments, so it’s important to get started on a fly-control plan early on.”

The use of an insect growth regulator larvicide in loose mineral supplements or mineral and protein tubs targets all types of flies causing problems for cattle. Cassidy says it’s important to keep cows grazing. “If we can get cows to social distance, then we will see fewer flies on them. This is acquired through good fly control. Ideally, this is started early on, but regardless, a producer should see coverage in three weeks or sooner by feeding the fly-control line of VitaFerm minerals,” he adds.

Cassidy says these minerals can reduce the number of flies that reach adulthood and keep populations lower throughout the season as the larvicide affects larvae in the manure before they become adult flies. This helps reduce the number of flies in loafing areas, around water sources and across grazing locations.

“Lower fly pressure improves cow comfort,” he continues. “If the cows are consuming the right amount of fly-control mineral, you will really see a difference in fly numbers, and in most cases, you won’t see flies at all.”

Reducing the overall stress of flies on cattle will provide animals with the best opportunity to thrive in a pasture environment by preventing disease, increasing weight gain and improving conception rates. Effective control measures are a key part of maintaining a healthy herd, Boxler adds. ///



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America's Founding Farmer



Mount Vernon showcases George Washington's innovative approaches to agriculture.

Before he was the father of a nation, George Washington was a farmer—a landowner who experimented with crops, soil and markets even as he led an undermanned army to defeat the world's strongest empire.

In the 250 years since the Declaration of Independence—and 237 years since he became the first president—Washington has become the standard by which each of his 46 successors is measured. His leadership helped establish a presidency not as a lifelong post but as a temporary office with a peaceful transfer of power.

Even as he secured his place in American history, Washington saw the nation's future rooted in agriculture. In 1788, a year before taking office, he wrote to the Marquis de Lafayette, “I hope someday or another, we shall become a storehouse and granary for the world.”

As America celebrates its 250th anniversary, Washington's Mount Vernon estate reflects on how he embraced his role as a Virginia farmer and landholder, focusing on

market diversification and “New Husbandry,” what we might now call “regenerative agriculture.” The estate, which is visited by more than 1 million people annually, also highlights Washington's complicated legacy, given that his agricultural operation relied on enslaved labor.

By the end of his life, Washington

had built one of the most diverse farming operations in America. From 1759 until his death in 1799, Mount Vernon grew from 2,800 acres to more than 8,000.

Mount Vernon draws more than 1 million visitors annually, highlighting all aspects of the estate during George Washington's life.

GETTY IMAGES



WASHINGTON AS A FARMER.

> WASHINGTON'S EVOLUTION AS A FARMER

Bruce Ragsdale, a fellow at the Washington Library at Mount Vernon, wrote “Washington at the Plow: The Founding Farmer and the Question of Slavery” in 2021. Ragsdale describes how a combination of policy and the president's interest in soil husbandry drove the evolution of his crop mix from tobacco to a diverse mix of crops and livestock.



CHRIS CLAYTON

Southern plantations relied heavily on tobacco, which colonists were only allowed to sell to English buyers. While that relationship gave Washington access to English merchants for

farm equipment and household items, it also suppressed prices by cutting off more lucrative European markets.

Frustration with prices and government policy—specifically the British Stamp Act of 1765—pushed Washington, then 33, to stop growing tobacco and expand wheat production, which he could sell to other parts of Europe.

“His identity as a farmer would involve far more than his choice of crops,” Ragsdale explains. “The term connoted for him a commitment to experiment and innovation, and responsible stewardship of the land under his cultivation.”

Washington believed in a civic responsibility for landowners such as himself to experiment with farm practices and focus on continual improvement of the land. He often sought new books and essays about New Husbandry farming practices being adopted by estates in England. Washington began implementing such practices on his farm while he was still in his late 20s. He would set up multiple test plots with different soil and fertilizer mixes to see how various combinations of wheat, barley and oats would yield.

In a 1788 letter to a fellow advocate of diverse crop rotations, Washington explained why large estate owners need to take the lead in adopting new innovations that increase productivity and fertility. Gentlemen, Washington wrote, have the wherewithal to experiment on their land without losing everything in the process.

“The common farmer will not depart of the old road till the new one is made so plain and easy that he is sure it cannot be mistaken, and that it will lead him directly to his object,” Washington wrote.

Over time, Washington developed a seven-year rotation to grow more than 60 crops while ensuring livestock remained a key part of the farm. He also built his own flour mill on the farm.

“New Husbandry advocates think that figuring out your rotation is the highest skill that a farmer can have,” says Sara Marie Masee, manager of historic trades at Mount Vernon. “Typically, his rotation would have two fields of wheat, two fields of grain. One was always corn for rations, and then the other would be some kind of European cereal grain—barley, rye or oats—but it would be for both human consumption and livestock. Then, there would be two



fields of pasture grass where they are going to be grazing sheep or cattle, so that the manure can be plowed in. Then, he would have a field going to green manures.”

Washington typically planted buckwheat, clover or cowpeas and turnips to improve soil health.

He maintained a herd of Red Devon cattle that reached as many as 350 head after the Revolutionary War.

Living along the Potomac River at that time also created a seasonal cash machine for Mount Vernon. Every year, his labor force would spend time during spring runs to catch shad, herring and a variety of other fish. Slaves packed and stored processed fish in barrels both to sell and provide food for his large, enslaved workforce.

“Over the course of the season, they would catch anywhere from a million to a million-and-a-half fish,” Masee says. “The income from selling the fish typically covered 40 to 60% of the operating costs for Mount Vernon for the whole year. So, this was a big business.”

In the final years of his life, Washington also built a distillery to produce whiskey.

> PRESERVING MOUNT VERNON

Many historic estates are operated by the National Park Service, but Mount Vernon is not. While he assembled more than 8,000 acres in his life, the estate rapidly fell into disrepair after his death. His heirs sought to sell the property to either the federal government or the state of Virginia, but both declined.

Instead, a group of women led by Ann Pamela Cunningham organized The Mount Vernon Ladies' Association in 1853. The group raised enough money to buy Washington's iconic home, surrounding buildings and roughly 200 acres of the estate in 1859 for \$200,000, which would be about \$8 million today. >

Sara Marie Masee (right) describes how Washington shifted his crop production over time because of both husbandry practices and a desire to stop selling tobacco to English buyers.

CHRIS CLAYTON



The Mount Vernon Ladies' Association, considered the oldest preservation organization in the country, continues to own and manage the estate.

The mansion has been restored to its condition in 1799, though portions of the mansion are undergoing a major renovation. Inside, the home reflects Washington's role as a frequent host. Most of the outbuildings and gardens around the mansion are original, including a blacksmith's shop, living quarters for some house slaves and the horse barn.

Throughout the summer, the estate offers demonstrations of Washington's farming practices and rural life in the late 18th century. The farm includes a replica of his 16-sided barn that was created to separate wheat from chaff, as well as quarters that would have housed enslaved field workers.

In 2023, a group of workers excavating a cellar at Mount Vernon also found 35 glass bottles in storage pits that turned out to hold cherry pits and some other fruits such as gooseberries. The bottles were dated to sometime between 1740 to 1775. DNA testing by USDA's Agricultural Research Service identified most of the pits as tart cherries, and researchers are studying whether the unearthed cherries can be germinated.

> ENSLAVED LABOR AT MOUNT VERNON

Hundreds of enslaved people worked from sunup to sundown at Mount Vernon, performing everything from field labor to skilled trades and domestic work.

There was a clear duality here with Washington, given his passion for New Husbandry. People had to learn new skills, but Washington also was a stickler for efficiency and strict labor management. He was meticulous in recording both daily work on his farm operations and long-term ambitions for Mount Vernon. He expected weekly production reports from his overseers.

"Washington does follow up when people do not meet expected work quotas," Masee says.

George Washington had as many as 350 cattle of different breeds on his estate, including Red Devon cattle.

CHRIS CLAYTON



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At the same time, the intellectual currents behind New Husbandry also influenced Washington's evolving views on slavery, even though his operations remained dependent on it.

"It's an enlightenment movement," Masee explains. "A lot of the same people who are writing about new farming ideas are also writing about freedom of man and liberty, and so Washington is absorbing all of these ideas. Unfortunately, New Husbandry also makes Washington more and more reliant on slave labor at the same time he's beginning to question the morality of the institution. And, that really comes down to labor economics."

He spoke little publicly about slavery, but in private correspondence, Washington suggested that slavery should be abolished over time. In one 1786 letter, he wrote, "I can only say that there is not a man living who wishes more sincerely than I do, to see a plan adopted for the abolition of it," while noting that any action abolishing slavery must come from the legislature.

On one of Washington's farms, an enslaved man named Morris served as overseer for nearly 25 years and was so trusted that Washington simply referred to the operation as "Morris's" farm.

At his death, 318 people lived and worked across Mount Vernon's five farms. In his will, Washington ordered the emancipation of 123 slaves he legally owned. Martha Washington carried out that provision in 1801, about a year before she died. But, nearly 200 "dower slaves" on the Mount Vernon farms remained enslaved because of inheritance laws from Martha's first marriage.

Today, Washington's tomb sits just a short walk from the slave memorial and cemetery. The area includes two markers, a 1929 marker and a 1983 memorial designed by students at Howard University. ///

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Stop Avoiding the Planning Conversation

Most farm and ranch owners want their businesses to continue. The land represents a legacy. The assets, both financial and reputational, offer opportunities for the next generation. The senior generation feels deep satisfaction at the prospect of seeing decades of work transfer to younger family members.

Except the conversation about how and when that transfer will happen often doesn't take place.

Plans go undrafted. Estate documents stay outdated. Roles, ownership and timing assumptions remain unspoken. Years pass, and the runway for intentional handoffs, effective tax planning and thoughtful leadership development gets shorter. The younger generation's desire for certainty about the future slips slowly away.

Why do we avoid conversation? Underneath the silence sit several questions the senior generation often hasn't answered for themselves. Until they do, the transition process stalls.

Am I confident in the next generation's ability to lead? There are two concerns at play in this question. The first is whether members of the younger generation have the skills and experience to lead. Do they understand how the business works? Are they capable? Have they internalized lessons one often learns primarily through hardship?

The second concern is whether the next generation can work together. If you've witnessed sibling rivalry or conflict among your adult children or their spouses, it's easier to imagine the partnership unraveling the moment you're no longer the glue holding it in place.

Can the business survive without me? You may believe that no one else in the family business can do what you do. The insight, experiences, skills and tactics required to steer the business exist only in you. This isn't necessarily an egotistical view; farming today faces a unique set of challenges not seen in decades. The younger generation simply hasn't been through it, and the business still needs you to lead.

Is there enough money to retire? Until the cash-flow math is run, retirement feels like a cliff rather than a path. When profits from better years have been reinvested in land, and rent on family land has been held artificially low to help with cash-flow, can the business support a retiree? And, if you haven't planned your multiyear tax strategy for retirement, stopping in any one year is almost impossible because of the

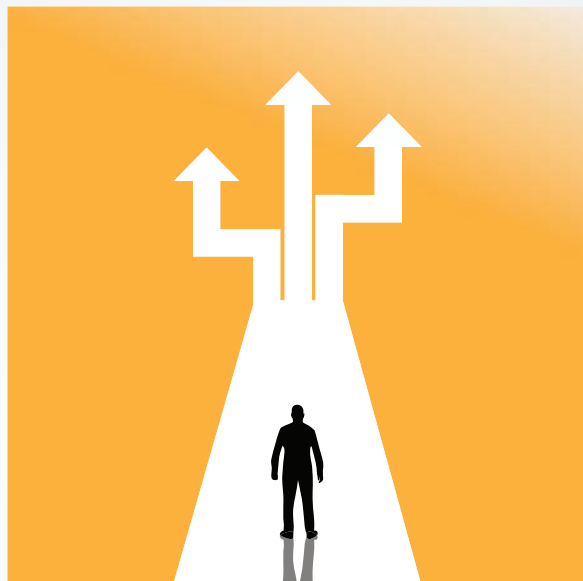
tax cost associated with the asset depreciation and income deferral strategies you've used in the past.

Who am I if I'm not farming or ranching?

Your work is a part of who you are. Being the owner and operator of a farm or ranch business is freighted with social significance and community importance. Your vocation has personal meaning and provides a purpose to your life. Stepping back can feel like becoming invisible. It's confusing, disorienting and deeply uncomfortable.

Agriculture has plenty of challenges—markets, input costs, labor and weather, to name a few. Avoiding the conversation about the future doesn't lower the risk; it adds to it. Waiting another five years to start talking only increases the pressure for the work that follows, which already takes years.

There are real business and emotional issues to address. Some will be uncomfortable. But, avoiding the talk does no one any favors—not the senior generation, not the next, not the business and not the legacy you intend to leave. Ask yourself which of the questions describes your concerns. Then, take one concrete step to help answer it. You don't have to solve everything at once. You just have to get started. ///



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January • February

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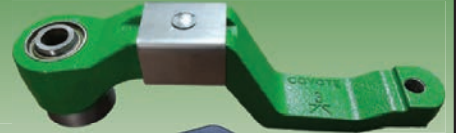
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“Good farming, clear thinking, right living.”
 — Henry A. Wallace

The farmer is the only man in our economy who buys everything at retail, sells everything at wholesale, and pays the freight both ways.

JOHN F. KENNEDY

On the farm the weather was the great fact, and men’s affairs went on underneath it, as the streams creep under the ice.

WILLA CATHER

No race can prosper until it learns there is as much dignity in tilling a field as in writing a poem.

BOOKER T. WASHINGTON

The sluggard will not plow by reason of the cold; therefore shall he beg in harvest, and have nothing.

PROVERBS 20:4 (KJV)

Farming is a profession of hope.

BRIAN BRETT

Farming looks mighty easy when your plow is a pencil and you’re a thousand miles from the corn field.

DWIGHT D. EISENHOWER

There are two spiritual dangers in not owning a farm. One is the danger of supposing that breakfast comes from the grocery, and the other that heat comes from the furnace.

ALDO LEOPOLD

To forget how to dig the earth and to tend the soil is to forget ourselves.

MAHATMA GANDHI

Regard it just as desirable to build a chicken house as it is to build a cathedral.

FRANK LLOYD WRIGHT

Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals, and happiness.

THOMAS JEFFERSON

Give fools their gold, and knaves their power; let fortune’s bubbles rise and fall; who sows a field, or trains a flower, or plants a tree, is more than all.

JOHN GREENLEAF WHITTIER

The soil is the great connector of our lives, the source and destination of all.

WENDELL BERRY

Farming, if you do one thing late, you will be late in all your work.

CATO THE ELDER

Life on a farm is a school of patience; you can’t hurry the crops or make an ox in two days.

HENRI ALAIN LIOGIER

I would rather be on my farm than be emperor of the world.

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