SPECIAL ISSUE: TAKING THE LONG VIEW TO CREATE AG'S FUTURE

THE FURROW

FEBRUARY 2015

REDISCOVERING GRANDAD'S ROTATIONS

FARMING PUBLICLY

CAROLINA REVOLUTION

FOOD HUBS

WASTE TO WORKHORSE

A new way to tame the "big data" monster

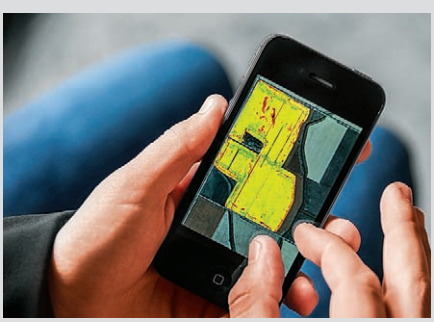
A hundred years ago farming productivity was limited by a lack of data. Our great grandparents had to be good at estimating soil fertility, crop yields, even field sizes. Today's growers may suffer from the opposite problem. Each harvest can generate an over abundance of data...and USB sticks.

Taking control. To tackle this "big data" challenge, John Deere recently introduced the MyJohnDeere Operations Center. The MyJohnDeere Operations Center is an easy-to-use website where producers can safely store all their operation's data.

"With that data secure," says Scott Brotherton, a marketing manager with the John Deere Intelligent Solutions Group, "producers can access intuitive tools to better understand and utilize that data. Simply put, the MyJohnDeere Operations Center turns data into insights, helping producers better manage equipment, crop production tasks, and agronomic decisions.

"The MyJohnDeere Operations Center also becomes the place where producers can securely share their data with trusted advisors," continues Brotherton. "This seamless data sharing can help improve decision making, optimize costs, and manage risk throughout the production cycle."

Because the MyJohnDeere Operations Center is web-based, growers can securely access and share their information through most any Internet-enabled device, whether in the field, at the office, or while interacting with one or more trusted advisors. The grower is in control, and determines who can see what information.



Learn more. To hear how growers are using the MyJohnDeere Operations Center to tame their "big data monster" go to JohnDeere.com/RealStories. Then visit your John Deere dealer to discuss how the MyJohnDeere Operations Center can turn your operation's data into useful insights.

Above: ***The MyJohnDeere Operations Center lets growers seamlessly and securely share information with their network of trusted advisors.***
Left: ***Growers can easily access stored information from any web-enabled device.***

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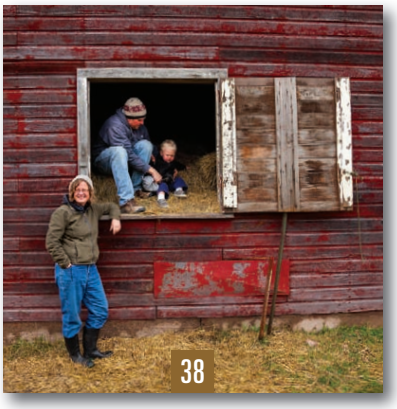

ABOUT THIS ISSUE ▸ Abe Lincoln said, "The best way to predict the future is to create it." In this special issue, "Creating Ag's Future," we're profiling farmers, entrepreneurs, and researchers who are doing exactly that. From soil science to food hubs... it's all about The Long View. Cover photo by Larry Reichenberger.

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Taking The Long View

Hardly a week goes by without an editorial warning of the latest threat to the future of ag. Whether the attacks are from environmental extremists, resistant bugs or weeds, or even from another ag sector, we're encouraged to call our representatives. Write letters to the editor. Open up our farms to visitors.

It's all sound advice, to be sure. But "talking the talk" is only half the job.

For this special issue of The Furrow, we've found operations and individuals who are "walking the walk." Who have taken control, and are taking bold steps toward the future they've seen for themselves, their industry, and the communities they serve.

Folks like Carrie Mess, known to thousands of her social media followers as "Dairy Carrie." Unlike many of you, perhaps, who were born into farming, Carrie married into her family's dairy operation, and brought an outsider's perspective to agriculture's relationship with its customers.

"As farmers, we have to tell our story or someone else will tell it for us," she says. "And they have been."

Carrie, profiled by field editor Martha Mintz in her story "Farming Publicly," has made it her mission to share her story with the non-ag public.

"Farmers who follow me get sick of seeing baby calf photos every day; but I don't do it for them," she says.

Focus on customers. A laser-like focus on customers and relationships has also helped farmers like Justin Dillingham. On his family's former tobacco acreage in western North Carolina, Dillingham, profiled by field editor Charles Johnson in "Find A Better Way," now raises grass-fed beef and pork, a wide array of vegetables, even a few table grapes.

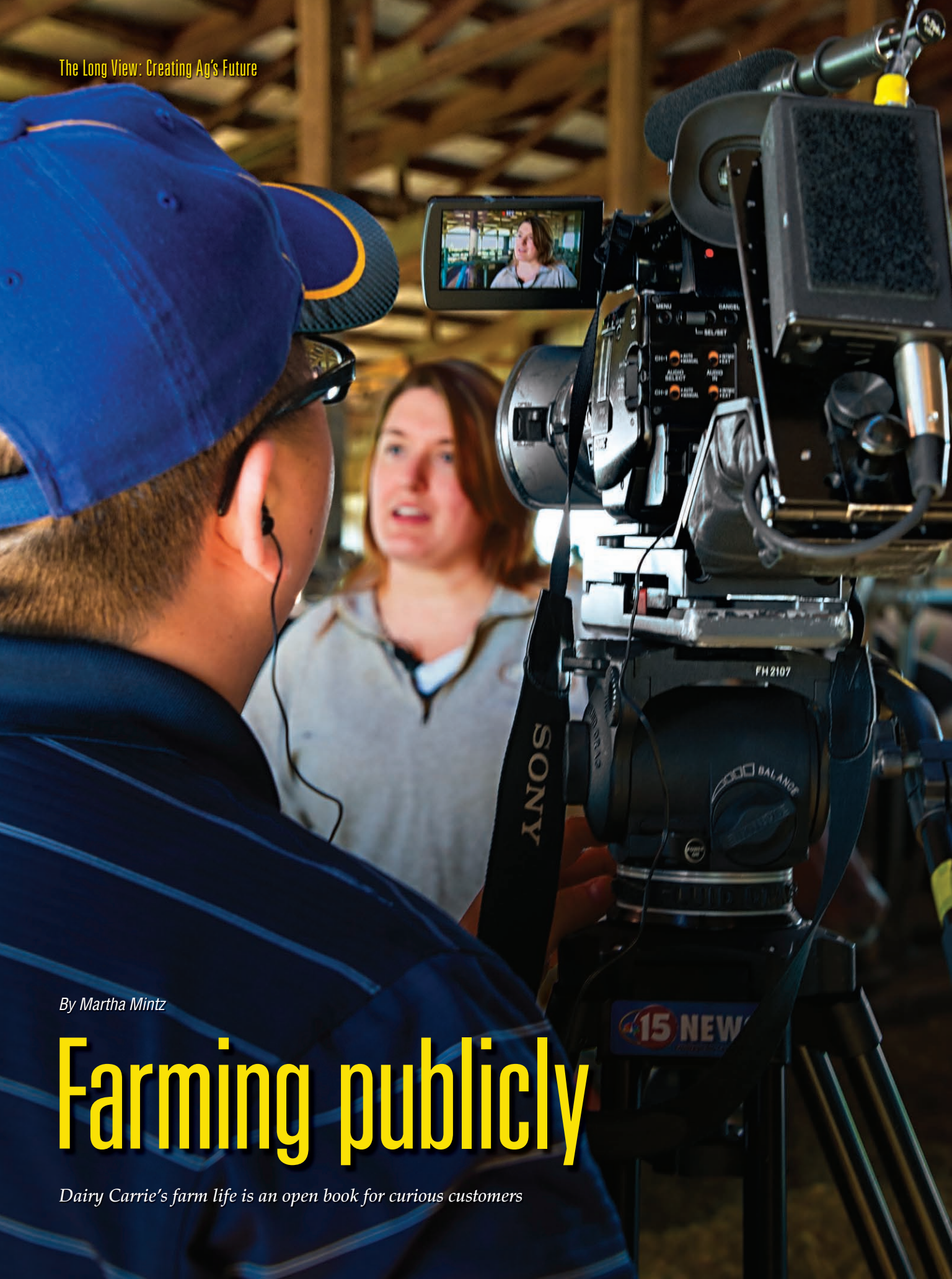
"It's opened so many doors for us," says Justin's mother, Brenda. "We value our relationships with our customers. We have gotten to know their families. We pack for the market with our customers in mind. I know them well enough to bring what they need."

A focus on the future has also driving a new understanding of the value of diverse crop rotations. Field editor Larry Reichenberger examines this trend in "Crop Rotation Revival."

Attica, Indiana, farmer Dan DeSutter says adding wheat to his corn and soybean rotation has opened "...a window of opportunity for cover cropping, and that is emerging as the fast track to a healthy soil," he says.

Abe Lincoln said the best way to predict the future is to create it. So take a look through this issue of The Furrow, and take a cue from some of the folks who are doing just that. The future...your future...depends on it. ■

By David G. Jones, Editor



By Martha Mintz

Farming publicly

Dairy Carrie's farm life is an open book for curious customers

When making the rounds at Mess family dairy near Lake Mills, Wisconsin, it doesn't take long to catch Carrie Mess, aka "Dairy Carrie," snapping a photo and tapping out a quick caption on her ever-present cell phone.

With a swipe of the submit button, more than 21,000 Facebook fans—city dwellers and farmers alike—are updated on the latest calf birth, an amusing note from the AI technician, the completion of a seasonal farm chore, or a sentiment on a farm issue. Or, just as likely, a profession of Carrie's love of cheese, music, or Rumchata. It's all part of her story, a story she's willing to share as an ag advocate.

"As farmers, we have to tell our story or someone else will tell it for us. And they have been," Carrie says.

Farmers have perhaps dropped the ball in customer relations because they raise commodities, not products.

"Just as a customer might think milk comes from the store, a farmer might think, 'The milk is on the truck and it isn't my problem anymore,'" says Cathy Mess, dairy owner and Carrie's mother-in-law. But, as Carrie sees it, even commodity farmers need to connect with customers if they're going to be successful in the future.

"There aren't too many businesses that cannot do customer service and stay in business," Carrie says. "As farmers we need to think about that."

Today's consumer wants to know who's raising their food and how. And there are plenty of people working to erode trust in agriculture. "If I want to keep my customer base, I need to make sure my customers know and trust me," she says.

Surpassing the choir. Carrie lives and works on a 100-cow dairy that she runs in partnership with her husband, Patrick Mess, and his parents, Cathy and Clem Mess.

In an effort to get to know and educate people that consume milk products that may have originated on her farm, Carrie posts the comings and goings of the dairy on Facebook, her most active form of social media. She posts one to four times daily.

For tasks or events that she feels require more explanation, she takes to her blog, *dairycarrie.com*, which has amassed more than 2.2 million page views since she started it in 2011. Her posts range from *What is High Moisture Corn?* to *Sometimes We Are Mean To Our Cows*. In these posts she provides a simple, informative, and transparent look into farm life.

"Carrie didn't grow up on a farm. So when she started working on the dairy she asked a lot of simplistic questions about things many of us take for granted," Patrick explains. The result is a blog that even those generations removed from the farm can understand and find interesting. And that is who she's trying to reach.

Carrie estimates about 60 percent of her followers are involved in agriculture production while the remaining 40 percent are non-ag. It's the 40 per-

►**Left:** Social media has gained Dairy Carrie attention in traditional media, too. A visit from a Madison news crew helps extend her message.

►**Below:** Followers of Dairy Carrie will soon learn that she loves her job and her cows, especially Milktruck, one of the herd matriarchs.

►**Above:** Dairy farmer Carrie Mess builds customer trust by sharing farm life and opening a direct line to a real farmer through social media.

cent that receive the most attention.

"Farmers who follow me get sick of seeing baby calf photos every day, but I don't do it for them. Every time I post a new baby calf photo, I always get new followers and a lot of likes," she says. Hundreds of likes.

That's also why Carrie posts about more than just farm life. She celebrates her passions just as any other casual Facebook user might.

"I talk about beer and cheese and music because that's what I'm into," she says. "Every time I talk about something like that it brings in a new set of people, and then they go on to read other posts and engage."

It's also why Carrie is still Facebook friends with people from high school whom she hasn't spoken to in years.

Engaging people. "You hope they will read one of your posts and share it with others outside of the ag world," Carrie says. On especially important issues, Carrie even specifically asks her off-farm friends to share posts.

As the whole point of social media is to engage others, Carrie not only posts, but entertains questions and enters into all levels of debate with those who visit and comment.

Some posts spark conversations on products and practices between other agriculturists. Many bring additional questions from off-farm readers. Carrie does her best to respond, but not all posters are friendly.

"Activists, people who are against me and my life and are disruptive, they aren't my customers and I don't waste time on them," Carrie says. "I'm not out there to change the minds of vegans or animal rights activists. I'm out there to be a trustworthy source of information for my customers."

She does engage those who ask genuine questions and show interest.

Social media also has connected Carrie with a group of people she calls her 'Ag Ninjas.' They're bloggers and experts that represent a diverse slice of agriculture.

"When I get a question about battery hens or gestation crates, I don't have to be an expert on that," she says. Instead, she directs them to people like Janeal Yancey, meat scientist and *Mom at the Meat Counter* blogger; Jude Capper, a livestock sustainability consultant; Ryan Goodman who blogs about beef cattle and ag at *AgricultureProud.com* and many others.

While it's tempting to spout facts, like that the vast majority of farms are family owned, Carrie feels it's important for farmers to realize they not only need to educate their customers, they need to influence them.

►**Above:** Dairy Carrie is able to quickly and easily post updates of farm happenings from her cell phone and challenges others to do the same.

"If they watch a PETA video, there's no fact, no science. There's emotion and that's why it works," Carrie explains. "We have to connect with our customers on a personal level."

Carrie recalls Clem extending a work-weathered hand to a stranger loaded down with gallons of milk on her way out of the store. "He said to her, 'Thank you! I'm a dairy farmer,' and shook her hand. That woman will think of him every time she buys milk. And when she watches a PETA video, she'll think of that local farmer who thanked her, and that's what's going to make the difference."

Speaking up. Carrie extends her hand to the public through social media and hopes others will follow suit. She's often thanked by other farmers for working so hard to share the farming story for everyone. She's quick to correct them that it's only her story she's sharing with the public.

"Everyone needs to tell their own story," she says. While more frequency is beneficial with social media venues, she concedes not everyone has to take it to the level she does.

"It takes no time at all to take a picture and write a couple sentences," Carrie notes. "Anyone can do it." ■

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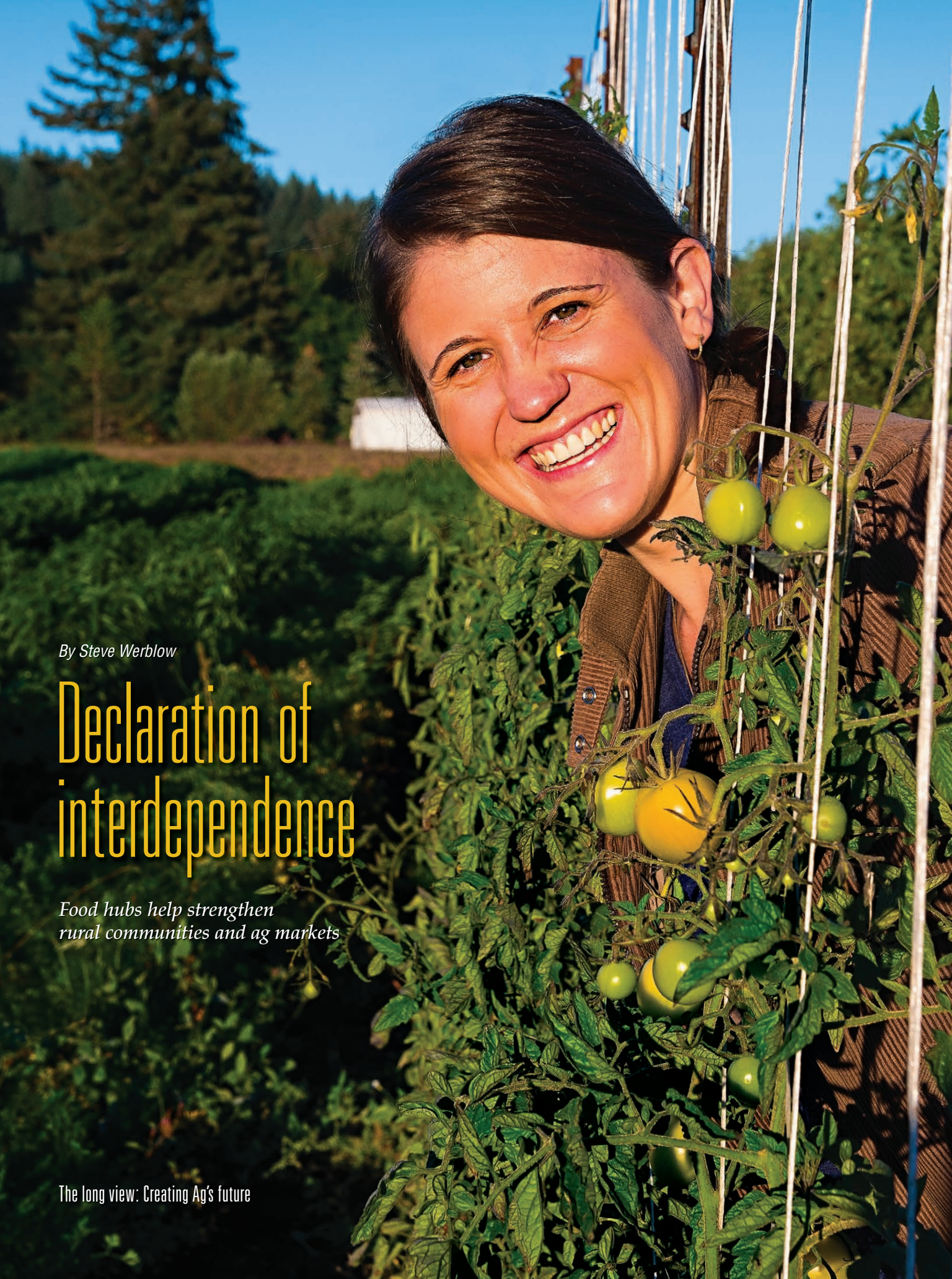

By Steve Werblow

Declaration of interdependence

Food hubs help strengthen rural communities and ag markets

In more than 200 communities across North America, a new future is taking shape. Cities accustomed to shipping out commodities and trucking in food from far-flung suppliers are finding food much closer to home, building connections with area farmers to create "food hubs" designed to sustain local agriculture, stimulate entrepreneurship, and tap into nearby sources of good, nutritious food.

Food hubs are as unique as the communities that build them. They focus on local challenges, from building infrastructure scaled for small- and medium-sized farms to channeling produce into "food deserts" that lack access to much but fast food.

Commercial scale. The key word is "community"—a commitment to mutual success. As grocery entrepreneur Lisa Sedlar of Portland, Oregon, says, "We all have to hammer out some sort of Declaration of Interdependence."

Food hubs go beyond the direct-sales approach of farmers markets. They connect buyers and sellers at a commercial scale, though typically at a size far smaller than the huge networks that serve the national food industry. They operate on the principle that buyers and sellers each benefit from the other's success. That requires a radical rethink of supply chains.

"We have to move beyond the 'supply chain' model—it's too linear," says food system analyst Ken Meter of the Crossroads Resource Center in Minneapolis. "When I think about a linear chain, I think one person with power can yank the guy at the other end of the chain. What's building around the country are 'value networks.' "

A lot of learning. Farmers learn to meet buyers' expectations for food safety or basic processing, like cleaning and cutting produce in particular ways. Buyers learn that crops are seasonal and unpredictable. And because few schools, corporations, or other big buyers want to deal with dozens of individual farms, middlemen can provide vital support by streamlining the purchasing and billing process.

That's one of the ways Cherry Capital Foods is shaking up the traditional distribution model. The five-year-old company offers a suite of services well beyond trucking to Michigan farmers.

"What we want to do is create a more transparent system, to move it from being merely a supply chain to being a value chain," says Evan Smith, senior operations manager for Cherry Capital Foods. In addition to aggregating loads for more cost-effective hauling in trucks, the company offers cold storage and help with pricing, scaling up, positioning and marketing, and even compliance with food safety and certification rules. "We don't beat farmers up on price," Smith adds. "We say, 'Tell us what you need and we'll tell you how much we're going to mark it up, then we'll see where it can go in the food chain.' "

Americans spend about $1.2 trillion per year on food, according to Meter. Focusing even a small portion of that huge buying power on local farms could revive ailing economies.

Five dollars. A study he conducted in four northeastern Oregon counties revealed that by buying crop inputs and food from outside the region, residents exported more than $500 million per year while local farms struggled.

"If everybody in the region spent $5 a week buying food from a local farmer, they would generate $28 million of new farm income," he says.

Directing money back into Indiana farms inspired Gerry and Geff Hays to look at a crumbling old factory in downtown Indianapolis and envision a bustling incubator for start-up food businesses in the Heartland.

►**Left:** Gianna Banducci says a virtual food hub helps her find wholesale customers for Our Table Coop that share the farm's values. ►**Below:** A pair of Indiana entrepreneurs is refurbishing a building on Indianapolis' former Tinker Street to create an incubator for new food companies.

►**Below:** Gerry Hays (right) reviews plans for the Tinker Flats project with Jacob Brown. Shared and private spaces will give businesses a boost.

When the Tinker Flats building is remodeled, it will be headquarters to the brothers' own food company, Better Retail. But it will also feature 400- to 1,000-square-foot manufacturing stalls for food production, a shared commercial kitchen, meeting rooms, and even an on-staff research chef.

In short, it has everything a food entrepreneur needs to develop, scale up, and start merchandising a new product without the costly infrastructure.

In Silicon Valley terms, the Hays brothers are building an accelerator.

"You get your basic traction in 500 to 600 square feet and we're hoping you can grow out of that," says Gerry Hays as he explains the plan. "And you can build your business through customers, not investors."

It's a revolving-door concept.

Hays says, "I would hope that within 24 months you'd be ready to move on to bigger and better things. We're not trying to become landlords. We're trying to raise the tide."

As the tide rises, a burgeoning food industry can tap into Indiana's bounty, Indianapolis' transportation options, and a crowd of chefs and

►**Right:** London's Sheffield Market is a food hub that's brought together producers, wholesalers, and buyers since the Victorian era. ►**Below:** Amanda Oborne says food hubs help "redevelop the agriculture of the middle"—mid-sized and small farms that struggle in large-scale systems.

consumers looking for local food.

In Portland, Oregon, Ecotrust bought an old building in hopes of creating some sort of similar space for the city's vibrant food industry.

But Ecotrust's most notable contribution to the food hub movement so far has been *food-hub.org*, an online forum that connects buyers and sellers in the Northwest. Over the past five years, the site has built a user base of more than 5,600 buyers and sellers.

Online dating. Amanda Oborne, Ecotrust's vice president for food and farms, likens the site to an online dating service for the local food industry.

"We're all about making the connection," she says. "Our top three types of users are chef-owned or chef-operated restaurants, which can take full advantage of variability and seasonality; small value-added processors that can both source ingredients and sell their products on FoodHub, so they get a double-edged benefit; and school food service directors, who are often operating under specific Farm to School mandates or have a preference to source from farms, but they don't know any farmers."

FoodHub user Gianna Banducci markets produce for Our Table Cooperative in Sherwood, Oregon, which serves as a miniature food hub outside Portland. Our Table fills its truck—and its new kitchen and farm store—with its own harvest as well as products from local partners.

"We're looking to see what gives us a new offering and what fits with what we can't grow on this piece of land," Banducci says. She uses FoodHub to connect with similarly compatible outlets for surplus harvest.

"It's almost like a mix and mingle or a networking event," says Banducci. "It lets me see who might be a good partner for us—who shares our values."

Shared values. Shared values are at the heart of food hubs, says John Fisk, director of the Wallace Center at Winrock International, which has become a hub for food hub insight.

Capital is still tough to attract because banks still aren't familiar enough with the model, Fisk observes. And though a 2014 study by the Wallace Center and Farm Credit found the top 25% of food hubs had margins averaging a respectable 3.76%, many were still working toward profitability. Still, successes are emerging, and so is a bright future for communities with this new method of production.

"If there's a legacy to food hubs, it's democracy," says Fisk. "They give people choice. They give people command over their food and economy." ■

More images at JohnDeere.com/Furrow

►**Below:** Enthusiasm abounds as Jen Tobener (left) Gianna Banducci (center) and Our Table founder Narendra Varma (right) compare notes.

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The long view: Creating Ag's future

By Larry Reichenberger

Building on healthy soils

The farming practices that improve soil quality are also helping revive rural communities

Rural communities seem to be constantly competing to lure businesses or secure grants and loans as a way to boost their economic development. In the U.S., nearly 20,000 cities, towns, and villages and 3,000 counties could be pitted in that competition. However, there's a growing realization that another way to revive the rural economy may lie in the soil directly under foot.

There's a new appreciation for the role soil plays in agricultural production and environmental quality. In recent years, a growing cadre of farmers and researchers have shared their conviction that healthy soils—created under a no-till strategy that includes crop diversity and livestock integration—can increase farm profits and make agriculture more sustainable. Many believe those attributes can also have an impact beyond the farm gate.

"Improving the health of the soil—

►**Large photo:** Rick Bieber believes healthy soils can help revive rural communities if farmers are willing to share information and opportunities. ►**Left:** Cover crops build healthy soils by keeping live roots transferring carbon underground.

►**Left:** Gabe Brown says soil health that cuts production costs and improves profits on the farm can also add opportunity to a community.

its ability to function as a vital living ecosystem that sustains plants, animals, and humans—addresses many pressing natural resource needs," says Jason Weller, chief of USDA's Natural Resources Conservation Service. "And, because farmers tell us healthy soils also increase their profitability, it also strengthens the rural economy."

Bird in hand. The relationship between soil health, the environment, and the local economy hits home in Delta County, Colorado, where the area's economic development commission boasts a soil health committee and sponsors an annual soil quality conference. "It's a concern that ranks with broadband internet service and rural health care—we clearly understand that our soil is a treasure," says board chairman Brad Harding, president of First Colorado National Bank. "We don't have the money for tax rebates and incentives to attract new industry, but the soil is a huge asset and it's already here."

Firsthand knowledge of the benefits of soil health is allowing farmers at the head of the movement to also see opportunities. "When you get the soil working for you by cycling water and nutrients, it can be very profitable so—aside from greed—there's little reason for farms to continue to expand. Instead, we could have more neighbors, and that's something in short supply," says Trail City, South Dakota, farmer Rick Bieber.

Bieber explains that the healthy soils he's developed with 20 years of no-till, diverse crop rotations, and cover cropping "...has simply made corn plants more efficient. The 90 pounds of nitrogen per acre that we apply used to grow 90 bushels of corn but now it produces 160 bushels, our water use efficiency (bushels of corn per inch of rainfall) has tripled, and our input costs have been cut in half.

"Healthy soils are a way to put wealth back into a community," adds Bieber. "If more farmers were focused on it we could limit the control big business has over our operations and make it easier for young people to stay and grow our communities."

Soil health advocate Gabe Brown believes that the soil quality he's fostered is allowing him to "stack enterprises" on his Bismarck, North Dakota, farm. "We've worked with others to build a meat processing plant that employs four people, and my son Paul and I market branded products under our *Nourished by Nature* brand. Our focus on soil health has drawn a point of distinction for the products we produce and it's paying off in opportunities for us and jobs for others."

In recent remarks to a congressional hearing on *The Benefits of Soil Health to Rural America*, NRCS's Weller added resilience—reducing the boom or bust cycles that have plagued rural areas—to the list of soil health benefits. "Farmers and ranchers in nearly all parts of the country, across a wide range of climate zones and cropping systems, report more consistent yields, higher profit margins, and more resiliency. Those are tangible benefits for the producer, the environment, and the public," he said. ■

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By Lorne McClinton

Taming your data

Replacing the pen and pencil with technology

Farm technology is changing at a blinding pace. In just a few short years producers have seen it evolve from light bars to full GPS guidance systems. They now have a full collection of yield mapping solutions at their fingertips. Equipment now comes with wireless capabilities. It can communicate directly with either the farmer or the dealership using integrated 4G cellular-based telemetry solutions. All this technology is generating reams of data, yet many farmers don't have a clue what they could be doing with it.

"Corn growers have the capability to collect 0.5 kilobytes of data per plant, about 26 megabytes per acre per year," says John Fulton, an associate professor at Ohio State University in Columbus. "Current projections are that 80% of all the data farmers are collecting still resides on the machines, or on data cards," he adds. "It's not in usable locations such as on a desktop or in cloud storage."

"You can put sensors on things all over the place and collect tons of data," says Rachelle Thibert, Integrated Solutions Manager with John Deere in Olathe, Kansas. "But there's no point in doing this if you don't have a plan about what you are going to do with it once you have it."

Goal driven data. Dairy farmers for example, particularly those in Canada, have been keeping meticulous records about their cattle for generations, Thibert says. They record everything from when the cow was bred to the amount of milk they produce daily. The work is justified because it helps them select the right sires to build a herd that produces more milk and has higher levels of milkfat and protein too. The data they collect is used to achieve their goals.

"You can generate, buy or source data for free off the Internet on just about everything," Thibert says. "It's easy to get lost in it. The simplest way to avoid this is by picking a starting point. Begin with the decisions you are currently making on just a wing and a prayer; the ones where going 'eeny-meeny-miny-moe' will produce results just as good as what you are doing now. After you identified them, figure out which information you would like to have to be able to make better decisions then go and get it."

Despite how fast farm technology has changed in the past decade, the changes have barely started, Fulton says. Farmers need to understand we are really just seeing the leading edge of the digital agriculture revolution. Expect to see it accelerate.

"Variable-rate everything is coming," says Rob Saik, CEO of the Agri-trend Group in Red Deer, Alberta. "We are going to see variable rate

►**Top left:** Murray Schaeffer has been diligently collecting data for two years to integrate variable rate technology into his operation. ►**Top:** Variable rate everything, from planting to irrigation, will soon be common. ►**Above:** The only difference between the data you are gathering on your memory cards or in your grandfather's notebooks is the technology that's used to collect it.

seed, fertilizer, herbicide, insecticide, fungicide, and irrigation technology."

Right now, Saik says, he is seeing a split developing between farmers who are figuring out how to make this technology work and those who aren't. Since there are long-term studies that shows current variable rate technology is consistently producing anywhere between $35 dollars and $40 extra dollars an acre, it won't be long before the ones who adopt it will be buying out the ones who don't.

Playing catch-up. "I want to be in the forefront," says Murray Schaeffer, a grain and oilseed producer from Stonewall, Manitoba. "I don't want to be in the back trying to catch up."

Schaeffer has been meticulously collecting data on his operation for the past two seasons. He records seeding and fertilizer rates and dates as well as mapping yield data. Chemical usage and application dates are also documented. At the moment, his equipment isn't set up to automatically upload his data to via telemetry, so he relies on flash drives to transfer it to his home computer first.

His goal is to use the information he's collecting to make variable rate decisions. He is also taking part in a pilot project with the Canada-Manitoba Crop Insurance program to show how well yield monitor data and production information will work to document crop insurance claims. Another goal is to have a system in place to document his production protocols in case buyers one day demand it.

"It's important to me to make sure that it is done right," Schaeffer says. "Because in the future, the people who are buying products made from our grain at the grocery store are going to want to know more about it. You already have to record what chemicals and fungicides you are using on identity preserved crops."

There is no reason to be intimidated by the technology, Thibert says. The only thing different between information you store on data cards and what your grandfather wrote down in his notebook is how it's been gathered.

"The old adage that knowledge is power is just as true today as it was back then," Thibert says. "Recording what, when, how, and why you are doing things on your farm, as well as the results of what you did or didn't do, will help you discover ways to improve your farming operation." ■

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By Martha Mintz

Waste to workhorse

Manure's positive contributions may soon outweigh its negatives

In the near future manure may not just smell like money, as the old farmer joke goes, it might actually generate cash and other perks.

Livestock producers have had a love-hate relationship with the odorous by-product. A diverse team from University of Wisconsin-Madison and several Wisconsin-based companies are trying to shift that sentiment more to the love side for the future.

How does one come to love manure? By putting it to work. A $7 million USDA grant awarded to the College of Agricultural and Life Sciences Biochemistry Department is funding the development of processes and equipment to transform manure into multiple products to generate income while also providing environmental and social benefits.

Paying off. Maple Leaf Dairy in Manitowoc County, Wisconsin, is the testing ground for several of these processes. The 4,600-cow dairy has every scrap of the 30-plus tons of manure solids it produces daily, and it earns its keep in three ways: by producing electricity, being recycled into fiber bedding, and becoming a nutrient-dense sludge for field applications.

At the base of these profit-generating products is separation technology.

"Manure is a complex by-product," says Aicardo Roa-Espinosa, president of Soil Net LLC Polymer Solution. "It's a fiber and a liquid, both with value, that need to be separated."

That's especially true in the case of Maple Leaf Dairy, whose alley flush system uses about 1 million gallons of water per day to move 140,000 gallons of manure. Before 2007 they used an open system including three lagoons to separate solids and recycle flush water. Today they use a closed-loop system with a high-tech waste treatment plant and methane digester.

Separation anxiety. Tod Leiteritz, owner, has long been searching for effective separation technology, with a junkyard of failed equipment purchases as proof. He's finally found a level of success by joining ranks with the research team whose focus is on improving separation technologies so they're economical and produce viable value-added products. It's not a slam dunk, but they're getting there.

Now, raw manure and flush water are pumped into three massive rotary drums that separate out large fibers. But the cloudy liquid, or effluent, that remains is still full of small fibers. That's where Soil Net comes in. When Roa-Espinosa mixes his polymer into the effluent, it grabs the small fibers, pulling them together and netting valuable nutrients.

The lab demonstration is akin to watching a grease film retreat from a drop of dish soap, but in reverse. The fibers bind together in moments. At the farm, this polymer-treated liquid is put through a Diffused Air Flotation (DAF) machine that uses microscopic bubbles to float the separated fibers and nutrients to the surface where they can be skimmed off.

The sludge-like coagulation of small fibers is then added back to the large fibers previously separated and fed to the dairy's methane digester.

"We're not only able to create [relatively] clean water that can go right back to the flush tower fill tanks, but we're vastly increasing the quality of the product we're feeding to the digester," says R.C. Ludke, development manager for Braun Electric Inc. who manages the project equipment.

Real world performance and cost of the polymer-DAF combination are still being evaluated.

Freshening up. Keeping flush water solids content to a minimum with polymer separation also significantly reduces troublesome odor.

"With the open loop system, your nose would tell you if you were driving past Maple Leaf Dairy," Ludke says. Now odor is greatly reduced, and that helps keep the dairy's ever-increasing population of neighbors happy, too — a problem with which many Confined Animal Feeding Op-

►**Left:** Wisconsin-based researchers are transforming manure management to create valuable by-products and reduce environmental impact. ►**Below:** Aicardo Roa-Espinosa adds polymer to a manure effluent to bind together the suspended fine particles still found in the liquid.

►**Below left:** With the large fibers and water removed, manure takes an odor-free concentrated form that can be applied to fields or dried, like this, and sold. ►**Below:** Cows at Maple Leaf Dairy lounge in recycled fibers separated from manure used in the farm methane digester.

►**Above:** Farms may produce marketable products, like this bedding, but Leverich warns it may be best to keep the organic matter on the farm.

►**Above:** John Primm (left) manages and guides the effort that includes researcher Jim Leverich and a complex team of engineers, chemists, and more. ►**Left:** Termite-sourced bacteria is being investigated to break down tough manure fibers, already twice digested, to produce bioethanol.

erations (CAFOs) have to contend.

In the digester, the manure produces methane which is burned to create electricity for the farm. The digester material then goes through another set of rotary drums to again separate out large fibers. Now semi-sterile from the digester, fibers go through a specialized screw press that produces cost-saving recycled bedding.

The effluent from this secondary separation is once again full of small fibers and nutrients, which are separated out with polymer and the DAF machine. The result is a nutrient-dense sludge to be used in field applications.

The condensed material could be hauled more economically further from the farm. The pre-digester DAF isn't fully functional yet, but with the current separation systems, Maple Leaf Dairy has reduced the number of trucks hauling manure on the road.

"Some farms have an accumulation of phosphorus from years of manure applications," says Jim Leverich, UW on-farm research coordinator. "Being able to separate phosphorus and haul it further to fields that need it is an economic and environmental benefit."

The sludge by-product can also be pelletized or granulated and managed like a traditional fertilizer with some precision ag applications.

The dried product could, in theory, even allow for manure-derived nutrient applications in season due to reduced risk of runoff and could be a marketable product. "This could add more income streams as well as improve environmental issues, such as eutrophication, which is when nutrient runoff causes algae blooms," says Troy Runge, UW-Madison biological systems engineering professor.

Fueling success. Back in the labs at UW-Madison, Runge and his team are working to pull even more value from manure by using the separated fibers to produce bioethanol.

"These improved processes should be a win-win-win for the future," observes John Primm, who is the UW-Madison manager of the project. "The farm is more efficient and saves money. It's a win for the environment by reducing runoff and making sure the manure is highly utilized, and even a win for the neighborhood in less smell and safer manure handling." ■

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By Charles Johnson

FIND A BETTER WAY

Local markets give western North Carolina growers a new life

From the hilltop overlooking his headquarters, Justin Dillingham can get a good overview of the western North Carolina mountain farmland his ancestor, Absalom Dillingham, settled back in 1794.

For a big part of that time, tobacco was the farm's main income. Just a few acres could turn out sizable income. The Dillinghams topped out at 15 acres of burley tobacco on the farm.

The end of the federal price support system in 2004 made it tough for small acreage growers. In 2007, the Dillinghams grew their last tobacco and looked to replace that lost income

►**Large photo:** Justin Dillingham farms with several family members in the western North Carolina mountains. Once tobacco growers, they now focus on vegetables, grass-fed livestock, and chickens. ►**Right:** These hefty tomatoes grew in a Dillingham family greenhouse.

►**Top left:** The Dillingham family raises grass-fed beef on pastures in North Carolina. ►**Above:** "We're lucky to have so many farmers here doing interesting things in agriculture. It's a great area to grow food," says John Fleer, chef/owner of Rhubarb restaurant in Asheville.

►**Above:** Traci McMahan with gladiolas at her family's farm near Burnsville, North Carolina. They also grow strawberries and lettuce.

with another crop. Row crops like corn and soybeans could never do it. The same dilemma hit many of the hilly western North Carolina farms.

At about the same time, the local food movement became popular in the area, centered on Asheville, North Carolina. Direct food sales there increased 70% from 2007 through 2012, according to USDA's Census of Agriculture. "It was perfect timing for us," Dillingham says. He and his family began attending seminars sponsored by the Appalachian Sustainable Agriculture Project (ASAP), which started to help tobacco farmers transition to new types of agricultural enterprises.

The Dillinghams soon were raising grass-fed beef and pork, along with chickens for meat and eggs, a wide range of vegetable crops, and seven-tenths of an acre of table grapes.

"It opened many doors for us," says Justin Dillingham's mother, Brenda. "We value our relationships with our customers. We have gotten to know their families. We pack for the market with our customers in mind. I know them well enough to bring what they need. It's lots of work but rewarding."

Market boom. Just up the road at Burnsville, North Carolina, Claude and Linda Deyton and their daughter and son-in-law, Traci and Joel McMahan, stopped growing 8 to 10 acres of tobacco and focused on several types of lettuce along with strawberries and gladiolas. They deliver to 16 stores, including Whole Foods and Ingles.

"The local food movement has been a tremendous boom not only for us but also has given assistance to other farms in the county," Traci says.

They participate with more than 40 other small produce growers in a North Carolina Extension Service program that lets them share cooler space for products waiting to be delivered.

"The ASAP has also helped us an awful lot," Claude Deyton says.

"So have the stores. Ingles put our pictures on their carts. As time has gone on, people want to know more and more about who's growing their food. Some of them show up at the farm. It's really pretty amazing."

Near Waynesville, North Carolina, Skipper Russell stays busy growing tomatoes, squash, zucchini and corn on 35 acres. He still grows 4 acres of tobacco, down from 10, and says tobacco once again is profitable. He sells produce to stores, restaurants, and at a roadside market he owns.

Growing sales. "Local people here have always shopped local. What we're getting in addition are tourists staying in campgrounds who make a special stop," Russell says.

Paul Toney, manager of Southern States co-op's Asheville store, says much of his business these days comes from vegetable farms.

"Asheville has a huge local food movement," says Toney, who also grows vegetables, berries, and pumpkins near Candler, North Carolina.

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By Larry Reichenberger

Crop rotation revival

Farmers are rediscovering the true value of broader crop rotations

The saying that 'everything old is new again' is true in spades for crop rotation. The benefits of the diverse rotations used by farmers fifty years ago are becoming clear today as input costs erode profit margins and weed and pest resistance grows. This realization has some growers looking to the past to help bolster their farm's future.

"There are clear indications that systems specializing in one or two crops—like the corn/soybean rotation—are unstable, easily disrupted by weather, insects, and disease, and rely heavily on technological advances and fossil fuel-based inputs," says Joe Lauer, corn agronomist with the University of Wisconsin. "But the age-old practice of rotating crops, which for a while was considered unnecessary, is returning to today's agriculture with proven benefits."

Lauer says though the corn/soybean rotation is good for a 10 to 20% yield increase to both crops, more could be had by stretching rotations further. "Adding a third crop like wheat adds even more to yields, especially for soybeans," he says.

Wisconsin research has shown that this rotation effect is not diminished by technology. "We've tried transgenic hybrids and varieties, more fertilizer, fungicides, insecticides, and other inputs and we can't outpace the benefit of crop rotation—it's simply the gift that keeps on giving and we really don't understand why," he says.

Gettysburg, South Dakota, farmer Ralph Holzwarth doesn't understand the rotation effect either, but knows its advantage is allowing his farm to prosper. "We began no-tilling about 25 years ago and quickly saw a boost in yields because the surface residue and improved soil structure increased water infiltration. A second yield gain occurred later when we diversified our rotations to reduce plant disease problems while also improving soil quality," says Holzwarth.

Crops in the mix. Holzwarth's rotations now include from four to six crops with a 'basic' track of spring wheat/winter wheat/corn and a broadleaf crop (sunflowers, soybeans, field peas or lentils). "We alter this to match market conditions and to target specific production problems in individual fields, which makes crop rotation another aspect of precision farming," says Holzwarth.

Randy Anderson, research agronomist with the USDA-ARS in South Dakota, did an extensive analysis of Holzwarth's farm and took the rotation effect even a step further. "We confirmed findings of earlier research that showed a synergistic effect some crops have on the crop that follows. That benefit goes beyond even the rotation effect and it results in corn that yields 12-15% more when planted after field peas. That's in addition to the increase from the rotation effect."

Holzwarth has noted this response to field peas and includes them in his rotations whenever market conditions allow. "We're growing crops that we never imagined we could produce here because of no-till and crop rotation. It's how we're keeping the farm profitable enough to retain the next generation," Holzwarth adds.

He's quick to credit Dwayne Beck, manager of the nearby Dakota Lakes Research farm, for the sustainability he's put in place. Extensive presentations of Beck's research into no-till and crop rotations are available at the farm's website, *dakotalakes.com*.

Breaking the habit. Attica, Indiana, farmer Dan DeSutter farms in an ocean of corn and soybeans, but believes wheat has a role in making his farm more sustainable. "By adding wheat to our crop rotation we open a window of opportunity for cover cropping, and that is emerging as the fast track to a healthy soil," he says.

DeSutter says his goal is to return soil organic matter levels on his farm to their native level of 6-8%. "Increasing soil organic matter levels from 2% back to 6% means 120 more units of nitrogen is made available every year, and that's $60 worth of fertilizer I don't have to buy. And, it also means the top foot of soil will hold 100,000 more gallons of water, and that's 4 inches of rain for our crop to use."

"Our approach is to use a crop rotation that allows us to have something green and growing that puts carbon back into the soil whenever possible. If I can retire knowing I've restored the health of our soils, then I would be thrilled to death," he adds. ■

►**Left:** Ralph Holzwarth and his wife Betty (not shown) farm with their son Ted (left), daughter Bobbi, and her husband Jeremy Schmidt.

PHOTO: DEAN HOUGHTON

►**Left:** Dan DeSutter is adding wheat to his corn/soybean rotation to reduce mounting problems with those crops and to provide an opportunity to plant cover crops that will improve soil health.

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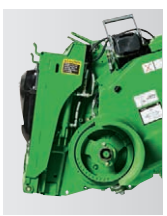

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By Joe Link

The rural brain gain

After decades of young people moving out of rural communities, there's evidence that's changing

Writer Karen Tolkkinen, born and raised in Minneapolis, had always dreamed of living in the country, a quiet place where she could craft her sentences in solitude. After chasing a journalism career that took her to four other states, Karen returned to Minnesota, married Miles Nelson, settled into the farmhouse Miles' great-great-grandparents built, and now lives her dream. The couple farms organically near Clitherall, raising garden vegetables to sell in town. They grow organic corn and hay, too, as well as beef and chickens. And, she crafts her sentences—in solitude—as a freelance writer and editor.

Karen lives on the far western plains of Minnesota, far from much of what characterized her earlier years. "It was scary at first," says the 42-year-old. Nights are dark, and the winter wind sometimes cries 'like a critter in pain,'" she says. After a pause, she adds, "But the city can be creepy, too."

Money or time. Karen has made many adjustments. One is knowing she'll probably never be rich, but that's OK with her. "When I worked in other places, I had the money. But I never had the time. There's a lot more to living than money. That's one thing I learned. I'm a lot happier out here."

Karen is educated, well traveled, talented, and experienced in life. And, she represents a new trend: young people moving into rural America.

For decades, communities have watched young people move away from rural areas—to go to college, to move to the city for job opportunities, to live a "better" way of life. The trend has a catchy but depressing name: the "brain drain" of rural America.

That hasn't changed. Young people are still moving away after high school. But often unnoticed are the people...if not young, at least on the young end of middle age...coming back to rural areas. They're a little older, educated, they have kids, and they have work and life experience.

"We are still losing many of those kids with a high school education,"

►**Top left:** Karen Tolkkinen and Miles Nelson raise their 2-year-old, Sammy, in a place where Karen still can pursue her freelance writing and editing career. ►**Top:** After traveling across the country as a construction engineer, Justin Jager returned home to Dawson to buy his uncle's lumberyard. ►**Above:** Brett Buer went off to Minneapolis, as did three siblings. They all came back.

says Ben Winchester, an Extension rural sociologist with the University of Minnesota. "But we're gaining people with high education and life experience. This actually isn't new. It's been happening since the 1970s."

Old headlines. Census data shows that almost all rural counties in Minnesota are gaining people who are 30 to 49 years old. It's a trend he noticed in data from 1990, 2000, and again in 2010. The trouble, he says, is people are missing this story because they're still looking at rural communities "through the lens of the 1950s."

"The headlines running out there are based on what happened 40 or 50 years ago. I've taken a lot of heat from people saying that it's only happening in Minnesota," says Winchester. "No, it's actually everywhere."

The population shifts are a restructuring. Winchester says that if rural communities looked, they may see they're experiencing a "brain gain." The numbers might not be huge, but they should not be overlooked.

Gretchen Boyum is a good example. She grew up on a farm near Battle Lake, then spent years with her husband, Pat Crepps, on the East Coast and San Francisco. "We just really liked it. We were in our 20s and we could do it. We didn't have kids," says the 37-year-old. But when the thought "if we had kids" became important, they returned to rural Minnesota. "If someone had told me at 18 I would move back, I would have said it wouldn't happen," she says. "You grow up thinking that if you don't go away, you've somehow failed."

Gretchen, who has a master's degree in museum studies, farms with her husband, but she's more involved

►**Top:** When he returned to the country, Brett Buer created his own business with skills he honed in the city as a welder and machinist. ►**Above:** Gretchen Boyum is an enthusiast of the arts in her rural area. "There's a lot going on in a small community. People are surprised."

with the arts than ever. The arts community in her small town is nothing short of vibrant, says Gretchen, who also is curator at a nonprofit art gallery in Fergus Falls. "We will get people from the East and West Coasts who come in and say they never would expect something like this in a small town. People are surprised."

Extremely rural. One place representing the demographic shift is Minnesota's Lac qui Parle County. The entire county has only 7,000 people; the county seat, Madison, just 1,500. Pam Lehmann, the county's economic development director, says, "It's not just rural. It's *extremely* rural." Residents here are about three hours from any metropolitan area, and though new residents say that has its challenges—healthcare and childcare are two most mentioned—the advantages are overwhelming: Good schools. Neighbors who know you. Security. Peace and quiet. Nature and beauty.

Those 30- 49-year-olds moving are not coming for jobs. They're coming for quality of life, says Karla Perkins. She grew up here on a farm, went off with to the big city with her husband, Jerrad, and knows that was the right thing to do. "You have to go away to get some experience," she says. "I don't think you appreciate it until you're gone." After years in the city, they came back. "We were just sick of it," says Karla, who used to drive 45 minutes in traffic to get to work. "But here, if I have a long drive, think of what I have. It's all country. It's all beautiful. It's all enjoyable."

In the city, you're lucky to know your neighbor. In the country, you know everyone. And, everyone knows you. Karla relearned the advantage of that shortly after the couple moved back and Jerrad was called up through the National Guard to serve in Iraq. Karla was pregnant with twins. "He was gone and I was alone," she says. "I honestly don't know how we would have made it. Everyone here knows your situation, and they're looking out for you."

Brett and Rose Buer both grew up on farms, left for the city, then returned. Brett started his own business as a machinist and welder, and Rose works from home as a software engineer. She has a competitive advantage that even larger cities don't offer. Despite their isolation and low

►**Above:** After city life, Jarred and Karla Perkins returned home when it came time to raise their children. "I've never regretted it," says Karla.

population, residents in Lac qui Parle County are in a hotbed of fiber optics with Internet speeds that are blazingly fast. Top upload and download speeds are an incredible 300 megabytes per second. Plans are to be at 1 gigabyte within five years.

"If we don't have true broadband, we will disappear," says Lehmann. "The younger generation will not be tolerant of not having that."

Ongoing story. Winchester says the restructuring of rural areas will continue, but it's important to remember that headlines of population declines don't tell the whole story. "Just because you lose people doesn't mean you lose everyone," he says. "This has been going on for 30 to 40 years, even though rural communities may have done very little to encourage it."

Winchester asks a question that would make fine discussion fodder in any coffee shop. "What if we actually helped people move here?" ■

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By Dean Houghton

LIFE GAVE THEM LEMONS

Building on its California citrus tradition, Limoneira positions for a future based on sustainability

Life has a way of handing out lemons, and the positive thinkers among us are supposed to take advantage of this opportunity to make lemonade. Harold Edwards is a special kind of optimist. His life is filled with lemons—and all he wants is more lemons.

Edwards serves as the president and chief executive officer for Limoneira, a Ventura County, California, farming and agribusiness operation that began in 1893. Edwards and his management team are building on the company's tradition of stewardship as it prepares to meet a burgeoning demand for food.

"Our lemon business has been growing significantly," says Edwards, who grew up in the county as a fifth-generation farmer. The company produced 1.5 million cartons of lemons in 2010. By 2020, Edwards expects Limoneira

PHOTO COURTESTY OF LIMONEIRA

►**Large photo:** Limoneira's goal is to become the world's leading supplier of fresh lemons by 2020.
►**Right:** Since its start in 1893, the company has developed a reputation as a good place to work.

PHOTO COURTESTY OF LIMONEIRA

►**Left:** By the mid-1920s, Limoneira's operations were in full swing, shipping lemons to markets all across the U.S.

to meet lofty new goals. "Our objective is to supply more than 10 million boxes and become the world leader in fresh lemons," he says.

That's an optimistic view, but there's something about this central coast area of California that inspires a positive outlook. Spanish explorers visiting the area that now surrounds the town of Santa Paula—the headquarters for Limoneira—observed the mild, Mediterranean climate and called it the "land of everlasting summer." A Limoneira employee, Katie Lopez, wrote about the area in a 1923 diary entry, describing the land as "covered with ferns, wild flowers, and big oak trees. It

is a dream place." Wallace Hardison, drawn to the area by the state's oil boom, and Nathan Blanchard, the founder of Santa Paula, started Limoneira with the purchase of 413 acres in 1893, growing lemons, oranges, and walnuts. After a slow start, the company became a leader in the citrus industry by the 1920s.

Limoneira has been a picture of steady and stable growth through the years, being guided by only five different chief executive officers from 1893 until Edwards took over in 2003. The company now operates approximately 3,200 acres in Ventura County, part of its 11,000 acres of operations; while it grows a number of fruit and nut crops, the primary focus is on lemon and avocado production. Limoneira is North America's largest lemon producer and the nation's top supplier of avocado. Limoneira also is the oldest continuously operated U.S. citrus-packing enterprise.

"Limoneira's mission is to preserve and promote its tradition, heritage, and legacy in agriculture, community development, and stewardship," Edwards says. "Limoneira has been a good steward of the community for more than 120 years, and I was able to experience this first-hand as I grew up."

The citrus business is labor intensive, and from its earliest days, Limoneira developed a reputation as a good place to work. Those workers needed housing, so the company organized Santa Paula's first subdivision, and donated land for the town's hospital. Building on that experience, Limoneira now operates a

►**Top left:** Blocks of citrus dominate the landscape near Santa Paula, Calif.
►**Above:** Sheep tend to weeding chores in a Limoneira "solar orchard."

►**Above:** This 5.5-acre "solar orchard" produces 1 megawatt of renewable, clean energy for Limoneira.

real estate division, helping manage development as Ventura County grows.

"Agriculture tends to shy away from engaging in a dialogue with communities, because we all know how difficult it can be to farm next to a city," Edwards says. "We try to get involved because we want a happy town with our happy farming operation next to it. The last thing any of us want is urban sprawl."

Limoneira also has recently headed down new pathways. In 2010, the firm became publicly traded on the Nasdaq exchange. The company was closely held by six multigenerational families, and the move provided a mechanism for shares to be more easily traded—as well as a vehicle for raising capital.

That same year, the company began direct marketing its lemons, selling the story of the Limoneira experience. "We were not capturing the full equity that we have in our brand," Edwards says. "In a world where food safety and traceability are an issue, we felt that it was important to connect customers to our trees. Integration is our competitive advantage."

Going "green" is another step in sustainability. Limoneira produces solar energy through involvement in projects such as the 5.5-acre "solar orchard" near its headquarters, which provides 1 megawatt of clean, renewable energy. It provides energy to the Santa Paula citrus plant, shaving approximately $700,000 a year off the power bill.

Installing the array required the company to remove 600 lemon trees, but the solar setup

►**Top right:** Gus Gunderson says the company has innovated a number of sustainable practices in its southern California farming operations. ►**Right:** The dam at Lake Casitas in Ventura County holds back a source of water, which serves as the lifeblood of high-value California agriculture.

will sequester 32,000 tons of carbon dioxide over the next 25 years, scientists project, exceeding what the trees could have captured.

"This company has been proactive when it comes to being sustainable," says Tomas Gonzalez, manager of food safety and sustainability for Limoneira. "Solar energy is just the next step in our commitment to the environment."

Gonzalez points out that anyone can visit the company website (*limoneira.com*) and click on the energy tab to observe in real-time the

►**Above:** Houses intertwine with ag land as Ventura County grows. ►**Right:** Tomas Gonzalez monitors an inverter at the solar array. ►**Far right:** Limoneira is the nation's oldest continuous citrus-packing operation.

output from the solar panels. "Limoneira is one of the greenest agribusiness companies in California," Gonzalez points out.

Sustainability also is an integral part of daily operations, says Gus Gunderson, who directs the company's farming operations in southern California. "Water is the lifeblood of agriculture," he says. "We have an abundance of water at Limoneira, and the founders of the company were very wise to make sure water was available for generations to come."

Squeezing more from each drop is the focus at Limoneira today. Techniques to stretch water include irrigation scheduling and moisture monitoring; the company also applies mulch, derived from recycled green waste such as lawn clippings. "The layer of mulch helps reduce evaporation and improve infiltration," Gunderson says. "It also reduces weed and insect pressure on the trees."

In addition, the company protects the environment by soil testing and tissue testing, allowing growers to apply only the nutrients that the crop needs. Limoneira also has been a leader in integrated pest management, Gunderson adds, using such techniques as the release of beneficial insects to fight fruit pests. "Our goal is to be good stewards by following a holistic approach to farming," he says.

Reaching out. Since consumers seem to be less connected to agriculture with each passing year, Limoneira tries to get a head start on telling its story of stewardship by reaching school-age children. The company opens its doors to school tours, hosting thousands of kids. "I want to see a school bus parked outside my window every day," Edwards says.

He is convinced that, if the company can just tell its story of sustainability, consumers will respond. This is Ventura County; "ventura" is Spanish for "good fortune," and Edwards is an optimist. "Our goal is to supply market regions around the world," he says. "Each day here is brighter than the last." ■

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fun & PHILOSOPHY

Previous plans

"Now, how many of you would like to go to heaven?" asked the Sunday school teacher. All the eager 4-year-olds raised their hands except Tommy.

"I can't," he said. "My mother told me I have to come right home after Sunday school."

■ The latter part of a wise man's life is taken up in curing the follies, prejudices, and false opinions he had contracted in the former.—*Jonathan Swift (1667-1745)*

■ Ideals are like stars; you will not succeed in touching them with your hands. But like the seafaring man on the desert of waters, you choose them as your guides, and following them you will reach your destiny. —*Carl Schurz (1829-1906)*

Eggsactly

Shopper: "Don't you think these eggs are rather small?"

Storekeeper: "Yes, I do. That's the trouble with farmers these days. They're so anxious to sell their eggs they take them out of the nests way too soon!"

"Who needs candles? You get just as much light from the T.V."

Hairbrained

Suzy: "You can't drive that nail into the wall with a hairbrush!"

Sally: "Really?"

Suzy: "Of course you can't! Use your head!"

■ There are periods when the principles of experience need to be modified…when in truth to dare is the highest wisdom.—*William Ellery Channing (1780-1842)*

■ Do not cumber yourself with fruitless pains to mend and remedy remote effects; let the soul be erect, and all things go well.—*Ralph Waldo Emerson (1803-82)*

Mature

Farmer: "Aren't you the boy who applied here for a job three weeks ago?"

Boy: "Yes, sir."

Farmer: "And didn't I say I wanted an older boy?"

Boy: "Yes, sir. I had my birthday last week and that's why I came back here today."

■ What is life? It is the flash of a firefly in the night. It is the breath of a buffalo in the wintertime, it is the little shadow which runs across the grass and loses itself in the sunset. —*Crowfoot (1830-90)*

■ A true friend unbosoms freely, advises justly, assists readily, adventures boldly, takes all patiently, defends courageously, and continues a friend unchangeably. —*William Penn (1644-1718)*

■ It is only imperfection that complains of what is imperfect. The more perfect we are, the more gentle and sweet we become towards the defects of others.—*Francois Fenelon (1651-1715)*

Capsule sermons

■ Striving for success without hard work is like trying to harvest where you haven't planted.

■ Wise men talk because they have something to say; fools, because they have to say something.

■ A lifetime isn't nearly enough to figure out what it's all about.

■ Wisdom is the reward you get for a lifetime of listening when you would have preferred to talk.

■ Most of our worries are reruns.

■ Patience is the ability to let your light shine after your fuse has blown.

■ It's important to learn which bridges to cross and which to burn.

■ A friend is that rare soul who sees right through us but sees us through.

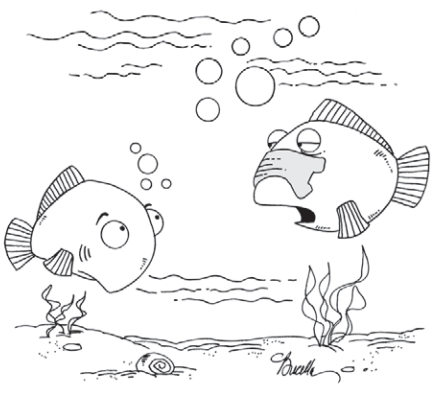
■ The art of living a pleasant life is constantly adjusting to circumstances.

■ The happiness of your life depends on the quality of your thoughts.

■ Success is more a function of consistent common sense than it is of genius.

■ There is a close correlation between getting up in the morning and getting up in the world.

■ It's a funny thing about life; if you refuse to accept anything but the best, you very often get it.



"Quite frankly, these breathing strips were useless until they made them waterproof."

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ComfortView™ Cab: The name says it all

The ComfortView cab is ideal for the high-hour user. It's spacious and user-friendly. The automotive style gauges, easy-to-access controls and standard features such as tilt, telescoping steering wheel and adjustable air seat get you in the right position. And for greater rearward visibility – and less fatigue – get 30 degrees of right-hand seat swivel with CommandARM™ equipped cabs.

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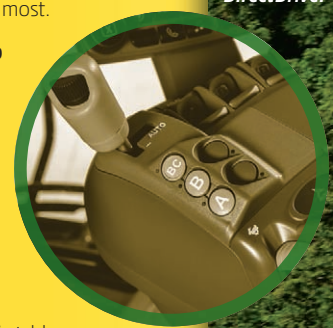

A tractor this versatile needs a transmission to match. That's why the 6R comes standard with the AutoQuad™ PLUS. You get four power-shiftable gears in each range. Or for even more fine-tuning, try the DirectDrive™. It gives you the convenience of our Infinitely Variable Transmission™ (IVT) with the economy and efficiency of an all-mechanical transmission. Just pick one of three ranges and go automatic. Or select manual mode for more control. You can also choose other options, including a full IVT, and a 31 mph (50 kmh) option for fast transport.*

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