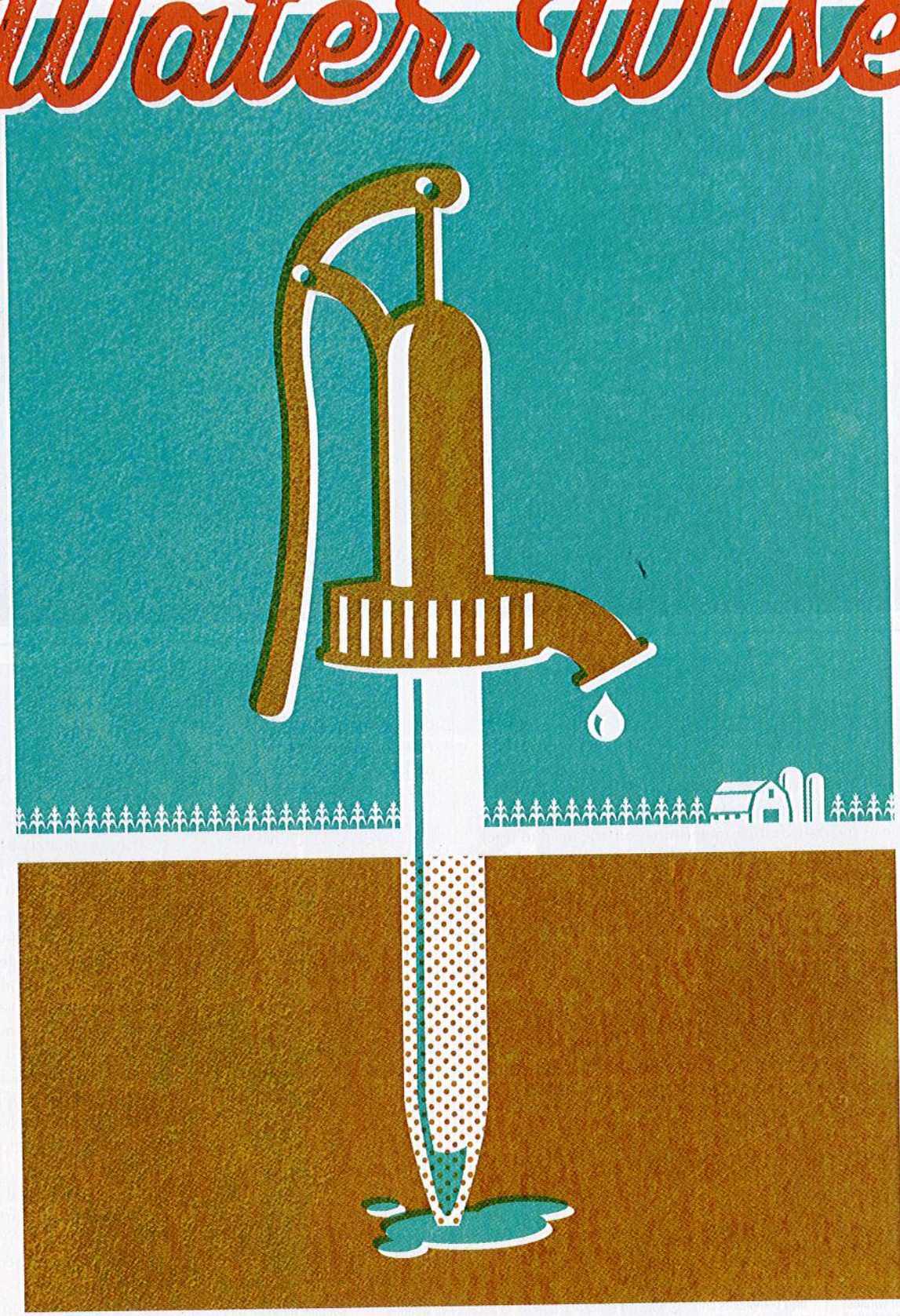
Water Wise



2014 MAY BE A PIVOTAL YEAR FOR U.S. PRODUCERS TO DOUBLE DOWN ON BEST PRACTICES AND TO EMBRACE A NEW WATER CONSERVATION ETHIC.

BY CHERYL TEVIS, DAVE MOWITZ, AND LAURIE BEDORD • ILLUSTRATIONS BY CHAD OWEN

On a foggy, drizzly day in early February, Gary Price was grateful for a trace of moisture. "We were dry last summer," the Blooming Grove, Texas, rancher says. "Beginning in September, we received 20 inches of rain. Now, the first five weeks of 2014 have been dry again."

Price and his wife, Sue, raise beef at 77 Ranch in the heart of the Blackland Prairie about 75 miles south of Dallas. Throughout severe droughts in 2011 and 2012, their ranch never ran out of water, and they never bought feed to supplement pasture.

"We have to be ready to receive the rain we get," he says. "Even if it falls on dormant grass, we'll keep it. It's all about building soil health and capturing rain. That drives our management."

Water supplies across the U.S. are being drained at an unprecedented rate. Decades of dramatic population shifts into states with low precipitation set the stage. The trend away from a rotation of corn, wheat, and sorghum in the Great Plains and the Texas Panhandle to corn accelerated aquifer-fed irrigation.

The Keystone XL's proposed path atop of the Ogallala Aquifer, along with the use of water in hydraulic fracking and biofuels production in other areas, has added to water pressures. These factors, combined with reoccurring incursions of drought into water-wealthy regions of the U.S., are raising the stakes.

Price had just returned home from the North Texas Water Summit in Dallas. "Texas is adding 1,000 people per day, and one third of that growth is in northern Texas," he says. "The purpose of the summit was to figure out how to meet growing water demands. It generated a lot of conversations about conservation."

WATER IS A FINITE RESOURCE

More water is soaked up by agriculture than any other use. That's why farmers, ranchers, and the agricultural community are on the front lines of this water war.

In 2012, 80% of U.S. agricultural land was impacted by drought. The specter of drought is appearing again this year, with the first 2014 forecast from the NRCS National Water and Climate Center. "Early indications are it will be very dry in the western part of the West," says Tom Perkins, an NRCS hydrologist. (Visit wcc.nrcs.usda.gov/cgibin/bor.pl.)

One of the driest years on record in California, 2013 was the state's third consecutive year of drought. About half of the state is in extreme drought today.

Drought is only the proverbial tip of the iceberg. What lies below the surface is more revealing. A total of 50% of the value of the U.S. food supply is grown on the 16% of U.S. irrigated farmland. The High Plains Aquifer, anchored by the Ogallala, lies beneath parts of eight states and supplies 30% of irrigated groundwater.

A 2013 Kansas State University study indicates that 30% of the groundwater in the High Plains Aquifer region has been tapped out. If current trends in Kansas continue, another 39% will be soaked up within 50 years.

"Groundwater levels are going down. At some point, pumping rates are going to have to decrease," says David Steward, a coauthor of the study. "There are lots of questions about how long the water will last, how long it will take the aquifer to refill, and what society can do."

The four-year study suggests that improving water-use efficiencies in corn production, with somewhat lower water use, also could allow for increased agricultural production on irrigated land through 2040. The study was funded by the National Science Foundation, USDA, and Kansas State University.

"Water-use efficiencies are improving," Steward says. "We're growing about 2% more crop per year for each unit of water because of increased irrigation technology, crop genetics, and water-management strategies."

NEW DIRECTIONS

Encouraging efforts are under way to stem the tide of water scarcity. Farmers in Sheridan County, Kansas, are cutting water use by 20%. The 79 water-rights holders in the Local Enhanced Management Area may pump an amount averaging 11 inches per acre annually or 55 inches per acre over the next five years. Kansas is preparing its first water plan, a concerted focus on wise use of resources over the next 50 years.

In Nebraska, where more than 8.5 million ag acres are irrigated annually, farmers in the Republican River Valley were banned from using surface water for irrigation for several months last year. It was an effort to keep Nebraska in compliance with a three-state river compact.

The most threatened portion of the Ogallala Aquifer is in northern Texas. The state has a mandate to create a 50-year water plan for each water conservation district. However, the High Plains Underground Water Conservation District No. 1 has extended the moratorium on penalties for exceeding allowable production rates, installing meters on new wells, and reporting groundwater production through December 31, 2014.

At 77 Ranch, the Prices maintain two black baldy cowherds and operate a rotational grazing system using 30 pastures. Of their 2,600 acres, ▸

Nearly half of all U.S. crop revenue grows on the 16% of agricultural land that is irrigated. The remaining 84% of agricultural land (farms not irrigated) produces just over 50% of the crop value.

Source: USDA, Economic Research Service

The Price family won the 2012 National Environmental Stewardship Award.

300 acres are native tall grass prairie. They rely solely on surface water and small lakes. Part of their conservation plan is participation in the NRCS National Water Quality Initiative. It includes water-monitoring equipment. They're also part of Sand County Foundation's Water As A Crop Project (sandcounty.net).

"We'll never control the amount of rain we get," Price says. "We concentrate on things we can control."

They plant cover crops like turnips and radishes to penetrate soil, to maximize water filtration, to restore organic matter, and to boost water-holding capacity.

"It all boils down to water," Price says. "How we manage the rainwater we receive is the key to everything we do. We've got to get it right."

Conserving U.S. water resources soon may rival national energy security concerns. Adapting to finite water supplies requires the latest tools and technology: irrigation innovations, no-till and strip-till, cover crops, and less thirsty varieties. Policy changes also will play a role.

Read on to learn how eight producers are navigating their way to a water-wise future. SF

KYLE AND JEREMY BALTZ
POCAHONTAS, ARKANSAS
METHOD: PIVOT IRRIGATION

Rice is a water-hungry crop. Not so much by its nature, but by the way it is raised in flooded paddies.

This is inspiring farmers like Kyle and Jeremy (shown above) Baltz of Pocahontas, Arkansas, to experiment with irrigating rice with center pivot sprinklers.

Access to water is not an issue in their area of Arkansas, they say. Most restrictions exist in the southern part of the state. The Baltz brothers are looking to be more efficient, which is why they are working with irrigating upland rice.

While this innovation holds promise, one of its "biggest challenges is weed control," Jeremy says. "Under a center pivot and on sandy soil, pigweeds are relentless."

The farmers also think they have found an ideal rotational crop with peanuts. Peanuts under pivots have been averaging a yield around 2 tons per acre, while their upland rice comes in at 140 bushels per acre. The operation has also been using high-efficiency sprinkler heads to reduce waste.

"Every gallon we don't have to pump is just that much less energy we use," Jeremy says. •

LENZ FAMILY FARMS
WRAY, COLORADO
METHOD: REMOTE CONTROL

Water is the lifeblood of Lenz Family Farms of Wray, Colorado. Without water, the farm couldn't produce one of its highest revenue and highest risk crops: potatoes.

Constantly monitoring the sprinkler system is crucial, particularly for family member Corwin Lenz. He has been assigned management of some of the farthest fields, located 100 miles away in Nebraska. To manage the 10 pivots on that land, Lenz has turned to an Apple iPad that works with remote monitoring and control equipment on each pivot. Besides tracking the pivots with an iPad, he can also use an office computer or cell phone for communications.

Added to the advantage of being alerted when a sprinkler shuts down and threatens yields, the ability to remotely control systems allows Lenz to fine-tune water applications. This ultimately conserves water and meets local withdrawal limitations.

To conserve water, he uses a dammer-diker implement that leaves water-retaining divots every few feet in furrows to reduce irrigation runoff. •

JACOB FARMS
HALSTEAD, KANSAS
METHOD: CROP NOZZLES

Ryan Speer faces two crucial challenges in managing water for Jacob Farms. The Halstead, Kansas-based operation must abide by local groundwater withdrawal restrictions.

"Limits vary from 15 to 17 inches per year," Speer says.

The farm's water contains elevated salt (chloride) levels, which affect yields.

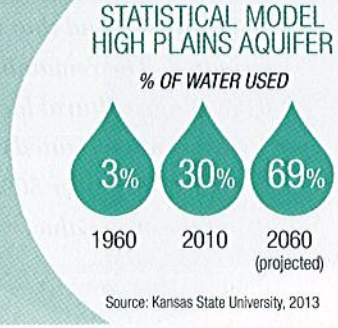
To meet withdrawal limits, Speer has switched to no-till, which reduces water loss.

"We installed longer nozzle drops that operate 2 to 3½ feet from the ground on our pivots to reduce evaporation loss," he says. "On newer sprinklers, drops are spaced every 3 feet with nozzles 2½ feet above the ground. Their nozzles spray larger droplets horizontally to further reduce evaporation."

Jacob Farms also has equipped all of its sprinklers with remote monitoring and control systems. This technology allows them to adjust irrigation to crop needs by using smartphones.

"Being able to change application rates on-the-go from a remote location is very convenient," Speer says. "We also use software to change applications for a series of pie-shape sectors under a pivot as the soil conditions change."

When it comes to managing the salt problems that come with irrigation, Jacob Farms rotates to "soybean varieties that are more tolerant to salt," Speer says. "The more water we apply, the worse the salt buildup gets – especially in a dry year." •



The Water Resources Group forecasts that under business-as-usual conditions, water demand will rise 50% by 2030. Water supplies, however, will not – and physically cannot – grow in parallel. Agriculture will drive nearly half of that additional demand, because global calorie production needs to increase 69% to feed 9.6 billion people by 2050.

TOM BARCELLOS
PORTERVILLE, CALIFORNIA
METHOD: WELL MONITORING

Nestled in the foothills of California's Central Valley, Tom Barcellos is bracing for a zero allocation of surface water.

"No amount of snow or rain – barring a flood – will alleviate summer drought," he says.

Barcellos owns Barcellos Farms and T-Bar Dairy, and he is a partner in White Gold Dairy and LGT Harvesting.

"In this area, 70% of irrigation comes from surface water," he says. "We'll rely on well water from underground aquifers, but it won't sustain demands from agriculture and cities. Drip irrigation conserves water, but flood irrigation recharges aquifers. It takes both."

Barcellos surveys well depth every two weeks.

He questions talk of a shift to permanent crops, including almonds and pistachios. "My grandfather had a dairy farm here in the 1940s," he says. "Is dairy a permanent crop?"

His aim is to secure feed and to grow a winter crop.

"If it looks tough, we may cut herd size and shift from corn to sorghum silage," he says. "The drought's a wake-up call. California isn't an isolated case. We need to reduce demand on water and inefficient uses. We're all in the same boat, drink the same water, and need to work together." •

JOEL ARMISTEAD
ADAIRVILLE, KENTUCKY
METHOD: SOIL-MOISTURE PROBES

Joel Armistead depends on river water to supply his two center pivot sprinkler systems near Adairville, Kentucky.

Armistead added those systems several years ago to ensure high yields on highly productive ground during dry periods of the summer.

"So far, I don't have to apply for any kind of water-use permit in Kentucky," Armistead reports. "I've never had a problem getting enough water from the creek."

Even so, Armistead is looking at converting one of his pivots to a variable-rate irrigation system and installing soil moisture probes to reduce operating costs.

With this investment, he'll apply only as much water as the crop requires. •

TRIPLE M FARMS
PIQUA, OHIO
METHOD: CENTER PIVOT

It is the abundance of available moisture that inspired Triple M Farms near Piqua, Ohio, to invest in a sprinkler irrigation system.

"Dad started irrigating 40 years ago using a big traveling gun," Curt Mohler says. "So we knew there was an advantage to adding supplemental water when the corn needed it the most."

To that end, the family operation invested in its first center pivot sprinkler in 2008. Since then, it has added eight more pivots. Those sprinklers don't consume a lot of water. In most years, just 5 inches are applied. During the 2012 drought, that use climbed to between 7 and 8 inches.

The farm doesn't face any water restrictions, but it does look to be water-efficient as a means to cut costs. •

LUSSETTO FARMS
BROADWATER, NEBRASKA
METHOD: VARIABLE-RATE IRRIGATION

Sandy soils and water restrictions limit water availability on Frank Lussetto's farm.

"It takes 22 to 24 inches of water to grow a crop in my sand," he says. "I was allotted 14 inches last year, and my area normally gets around 13 inches of rain. However, the rain doesn't always come when it's needed."

Because several of his fields have up to 12 different soil types, Lussetto implemented variable-rate irrigation to take advantage of every drop.

Rather than take the risk of implementing technology on 25 pivots and having it end up being wrong, he set up a 70-acre research field, which was split into five zones. Initially, he had a moisture probe in each zone to help determine how far he could cut down yet still maintain his profile.

"Although my fields did get some rain, I saved enough water to run the town of Broadwater for almost a year," says Lussetto. "Some of the zones were cut down to 50%, and I saved 250 gallons a minute." •

MY-T ACRES, INC.
BATAVIA, NEW YORK
METHOD: NOZZLE CONVERSION AND ONTRAC SYSTEM

In 1980, MY-T Acres installed impact sprinklers on top of the pivot pipe. In 2003, the operation converted 23 pivots from overhead to drop-down nozzles below the pivot pipe. These nozzles reduce wind drift and losses typically associated with an overhead nozzle. The result was increased water delivered to the crop and reduced runoff.

"Overhead nozzles are about 12 feet from the ground; drop-down nozzles are about 6 feet from the ground," says Chris Gerould, who is in charge of the irrigation systems. "They're also closer together, so we get a more even water pattern."

The cost to convert ranged from $3,000 to $5,000 per pivot. It was a wise conversion, because it's resulted in more uniform water distribution and lower energy costs.

The farm also takes advantage of Reinke's OnTrac, a satellite communication monitor and tracking system that provides status updates and sends an alert when there's a problem with a pivot. "We take fewer trips to go check pivots," Gerould says, "and there's less downtime when there's an issue."

Although the operation has no water restrictions, it is required to report the amount of surface water it uses annually.

"The governors of the states that border the Great Lakes Water Shed (where we are) are interested in what's happening to the water nearby," says Gerould.

The state is blessed with a plentiful water source, yet the operation is not immune to drought or the impact others feel from water restrictions.

"We do all we can to make the best of it, to conserve it, and to protect it for a sustainable future," Gerould says. •

Photography: National Cattlemen's Beef Association/Baxter Communications, Tharran Gaines, Eugene Blake, Harlen Persinger, Chester Peterson Jr.